ANTELOPE VALLEY PUBLIC LANDFILL
CUP

AMENDMENT TO
DRAFT ENVIRONMENTAL IMPACT REPORT

(SCH #1990010988)

TECHNICAL APPENDICES
VOLUME II

Prepared for:
City of Palmdale
Planning Department
38250 Sierra Highway
Palmdale, California 93550

Prepared by:
EDAW/AECOM
2737 Campus Drive
Irvine, California 92612

May 2010

ANTELOPE VALLEY PUBLIC LANDFILL
CUP

AMENDMENT TO
DRAFT ENVIRONMENTAL IMPACT REPORT

(SCH #1990010988)

TECHNICAL APPENDICES
VOLUME II

Lead Agency:

City of Palmdale
Planning Department
38250 Sierra Highway
Palmdale, California 93550
Contact: **Mr. Richard Kite, Assistant Director of Planning**
(661) 267-5200

Consultant:

EDAW/AECOM
2737 Campus Drive
Irvine, California 92612
Contact: **Ms. Jane Chang, Project Manager**
(949) 660-8044

May 2010

APPENDICES

Volume I

Appendix A-1 IS/NOP

Appendix A-2 NOP Comment Letters

Appendix A-3 NOP Responses

Appendix A-4 Original County-Approved MMP for 1992 Certified EIR

Appendix A-5 Remaining Refuse Disposal Capacity of Active in County Landfills 2003

Appendix B-1 Earth Resources and Earthquake Hazards, Golder Associates, October 2005

Appendix B-2 Report of Geological Findings for the San Andreas Fault Zone Potential Impact on the Proposed Expansion Area, GCE, August 30, 1999

Volume II

Appendix C Air Quality Analysis, Giroux and Associates, November 2, 2004

Appendix C-1 AB-32 Compliance Study, Giroux and Associates, January 13, 2010

Appendix D-1 Combined Report of Hydrology and Hydraulics Design and Capital Flood Floodplain Analysis, Golder Associates, June 2004

Appendix D-2 Excerpts (Text, Figure 2 & Table 5) from Semi-Annual Groundwater Monitoring Report, Year 2004, SCS Engineers, July 2004

Appendix E-1 Palmdale Landfill Expansion Plan Supplemental Biological Assessment 2004 Survey Update, Frank Hovore and Associates, August 9, 2004

Appendix E-2 Desert Vegetation Plan, Frank Hovore and Associates, October 25, 1998

Appendix F Noise Impact Study, Giroux and Associates September 17, 2004

Appendix G Traffic Impact Analysis, Kunzman Associates, September 20, 2005

Appendix G-1 Evaluation of Sight Distances at Existing Access to Waste Management Site, JT Engineering, March 24, 2010

Appendix C

Air Quality Impact Analysis, Giroux and Associates
November 2, 2004

Giroux & Associates
Environmental Consultants

AIR QUALITY ANALYSIS

ANTELOPE VALLEY PUBLIC LANDFILL

PALMDALE, CALIFORNIA

Prepared for:

EDAW
Attn: Alia Hokuki
2737 Campus Drive
Irvine, California 92612

Date:

November 2, 2004

Project No.: P03-045

17744 Sky Park Circle, Suite 210, Irvine, California 92614 - Phone (949) 851-8609 - Fax (949) 851-8612

EXISTING CONDITIONS

Meteorology/Climate

The climate of the Antelope Valley, technically called an interior valley subclimate of Southern California's Mediterranean-type climate, is characterized by hot summers, mild winters, infrequent rainfall, moderate afternoon breezes, and generally fair weather. The clouds and fog that form along the Southern California coastline rarely extend as far inland as Palmdale, and if they do, they usually burn off quickly after sunrise. The most important weather pattern is associated with the funneling of the daily onshore seabreeze through Soledad Canyon into the upper desert to the north of the heavily developed portions of the Los Angeles Basin. This daily airflow brings polluted air into the area late in the afternoon from late spring to early fall. This transport pattern creates both unhealthful air quality as well as destroying the scenic vistas of the mountains surrounding the Antelope Valley.

Temperatures in the project area average a very comfortable 61 degrees Fahrenheit year-round, but it gets very hot on summer afternoons (close to 100 degrees) and quite cool on winter mornings (around 30 degrees). About 100 days per year reach 90 degrees, while about 60 days drop to slightly sub-freezing temperatures. The warm summer afternoons are quite dry and the breezes are moderate such that physical comfort is good despite the warm weather.

Rainfall in the Antelope Valley area varies considerably in both time and space. Almost all the annual rainfall comes from the fringes of mid-latitude storms from late November to early April with summers often completely dry except for occasional widely scattered summer thundershowers. The Antelope Valley is located in a transition area between the semi-arid conditions of the Los Angeles Basin and the completely arid portions of the Mojave Desert. Rainfall averages from 6 to 9 inches per year at various locations around the project area with light rain falling on 12 days per year, and only 3 to 4 days per year with moderate precipitation. The Antelope Valley may occasionally experience a light winter snowfall, but temperatures are not cold enough for the snow to remain on the ground for very long.

Winds blow mainly from south to north and from west to east in response to the regional pattern of airflow from the cool ocean to the heated interior. A large portion of the airflow across the Antelope Valley therefore has its origin in more developed areas of the Los Angeles Basin. Seventy percent of all airflow across Palmdale derives from a narrow sector from southwest through west-northwest. These winds are moderately strong during the daytime, averaging from 10 to 13 mph, but become light and variable at night. Daytime local ventilation is, therefore, very good, but there may be nocturnal stagnation near local emissions sources such as the major area highways during the calm wind periods. Air pollutant emissions, however, are generally sufficiently low such that even during limited local dispersion conditions, air quality near the project site remains quite healthful. The primary Antelope Valley air quality concern is that there is a general transport of air from the polluted Los Angeles Basin through the Santa Clarita Valley, and then toward the normally cleaner upper desert, especially during the summer smog season. This meteorological pattern will, therefore, make it difficult for the area to achieve clean air until sources in the developed portions of the basin are better controlled and less pollution is carried downwind across communities within the Antelope Valley.

In addition to winds that control the rate and direction of pollution dispersal, Southern California is notorious for strong temperature inversions that limit the vertical depth through which pollution can be mixed. In summer, coastal areas are characterized by a sharp discontinuity between the cool marine air at the surface and the warm, sinking air aloft within the high-pressure cell over the ocean to the west. This marine/ subsidence inversion allows for good local mixing, but acts like a giant lid over the South Coast Air Basin. Such summer inversions, however, occur very infrequently, if at all, in the Antelope Valley. Air starting onshore at the beach is relatively clean, but becomes progressively more polluted as sources continue to add pollution from below without much dilution from above. Some dilution occurs in the thermal chimneys along the heated slopes of the San Gabriel Mountains, but not enough to prevent the intrusion of significantly polluted air into the Antelope Valley. In the absence of strong summer inversions, the dilution process continues as the smoggy air traverses the Valley such that there is considerable variation in air quality across the area. Ozone concentrations (the main ingredient in photochemical smog) decrease markedly in moving from Palmdale out to Edwards AFB and beyond.

A second inversion type forms on clear, winter nights when cold air off the mountains sinks to the valley floor while the air aloft over the valley remains warm. This process forms radiation inversions. These inversions, in conjunction with calm winds, trap pollutants such as automobile exhaust near their source. While these inversions may lead to air pollution "hot spots" in heavily developed coastal areas of Southern California, there is not enough traffic in inland valleys to cause any winter air pollution problems. Thus, while summers are periods of hazy skies and unhealthful air, winter is often a period of spectacular visibility and excellent air quality in the Antelope Valley.

AIR QUALITY SETTING

Ambient Air Quality Standards (AAQS)

In order to gauge the significance of the air quality impacts of the proposed landfill consolidation, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. However, recent research has shown that chronic exposure to ozone, even at levels that just meet the federal clean air standard, may have long-term negative respiratory health effects.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. Because California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology,

there is a considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1.

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the U.S. Environmental Protection Agency (EPA) review all national AAQS in light of all current health data. EPA was charged with modifying existing standards or promulgating new ones where appropriate. EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted on July 17, 1997. California standards for PM-10, which includes PM-2.5, are more stringent than the federal PM-2.5 standard.

Planning and enforcement of the new federal standards for PM-2.5 and for ozone (8-hour) were put on hold through a decision by the U.S. Court of Appeals. The Appeals Court ruled that EPA did not have discretionary authority to adopt national clean air standards without specific congressional approval. An appeal filed on behalf of EPA by the Department of Justice was heard by the U.S. Supreme Court in November 2000. In a unanimous decision published at the end of February 2001, the Court ruled the EPA did have authority to promulgate standards without specific congressional authority, and that a cost-benefit analysis was not required for health-based standards. The Court also ruled, however, that there was an attainment schedule inconsistency between "old" and "new" standards. The EPA signed a consent decree in November 2002, to move forward with redesignation of numerous air-sheds, including the Mojave Desert Air Basin, as “non-attainment” for the “new” 8-hour ozone standard. The redesignation was completed earlier this year. As noted below, the Palmdale area exceeds the federal eight-hour ozone standard with a much greater frequency than the hourly standard. The attainment of the 8-hour ozone standard will occur further in the future than the eventual attainment of the one-hour standard.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board to recommend adoption of a statewide PM-2.5 standard that is more stringent than its federal counterpart. This standard was adopted on June 20, 2002. The State PM-2.5 standard is more of a goal in that it does not have specific attainment planning requirements like the federal clean air standard. Violations of the more stringent State PM-2.5 standard will, however, be a constant reminder that major progress needs to be made to protect the health of those citizens most sensitive to airborne small-diameter particulate pollution.

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		Federal Standards		
		Concentration	Method	Primary	Secondary	Method
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	0.12 ppm (235 µg/m³)	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	–		0.08 ppm (157 µg/m³)		
Respirable Particulate Matter (PM_{10})	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		50 µg/m³		
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		65 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	15 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–	–	–
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	–	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m³)		–		
Lead	30-Day average	1.5 µg/m³	Atomic Absorption	–	–	–
	Calendar Quarter	–		1.5 µg/m³	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	Ultraviolet Fluorescence	0.030 ppm (80 µg/m³)	–	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	–	
	3 Hour	–		–	0.5 ppm (1,300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		–	–	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer–visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Baseline Air Quality

Existing levels of ambient air quality and historical trends and projections in the project area are well documented from measurements made on behalf of the Antelope Valley Air Pollution Control District (AVAPCD). The Antelope Valley is in the Mojave Desert Air Basin (MDAB). Until 1997, the Los Angeles County portion of the Antelope Valley was under the regulatory authority of the South Coast Air Quality Management District (SCAQMD). With the creation of the AVAPCD, much of the technical support (monitoring, enforcement, etc.) was transferred to the Mojave Desert AQMD. In 2002, the AVAPCD became the Antelope Valley Air Quality Management District (AVAQMD). The Mojave Desert AQMD still retains its role of technical support.

The South Coast and/or Mojave Desert AQMDs have operated an air quality monitoring station in Lancaster for many years. This station location is considered representative of most of the developed areas of the Antelope Valley. Measured air pollutants include ozone, carbon monoxide, nitrogen oxides, and respirable particulates. These measurements have shown that photochemical smog levels (mainly ozone) are high in summer, and that dust levels may exceed particulate standards throughout the year, but that primary vehicular pollutant levels such as carbon monoxide, nitrogen dioxide or lead are very low in the Antelope Valley area. Table 2 summarizes the last seven years of published data for the Lancaster station from 1997 to 2003. While ozone levels continue to exceed the California and national hourly standards and the California 24-hour suspended particulate (PM-10) standard is often exceeded, all other pollutants, particularly those related to local source emissions, do not exceed their allowable levels. The data in Table 2 suggests that whatever air quality problems are present in the project vicinity, they are mainly due to the transport of pollutants into the area from outside sources. These data also suggest that the Antelope Valley can accommodate a reasonable level of growth without threatening the continued attainment of standards such as nitrogen oxides or carbon monoxide. Such growth may, however, exacerbate existing violations of standards for ozone and particulates.

Meteorological variability produces a corresponding year-to-year change in ozone levels that somewhat obscures long-term trends. Whereas 1999 was the “cleanest” ozone year, hourly maxima in 2002 to 2003 of 0.16 ppm were similar to those found 10 years ago. There were more violations of the state ozone standard in 2002 than any year since 1995. While there has been substantial air quality improvement within the last two decades, the Antelope Valley will apparently experience occasional unhealthful air quality well into the current decade.

Table 2

Antelope Valley Monitoring Summary
(Days Per Year Exceeding Standards and Maximum Concentrations)

Pollutant/Standard	1997	1998	1999	2000	2001	2002	2003
Ozone							
1-hour > 0.09 ppm	14	24	1	35	37	46	40
1-hour > 0.12 ppm	0	8	0	2	3	5	4
8- Hour > 0.08 ppm	7	18	0	28	24	38	33
Max 1-hour Conc. (ppm)	0.12	0.16	0.10	0.14	0.15	0.16	0.16
Carbon Monoxide							
1-hour > 20. ppm	0	0	0	0	0	0	0
8- Hour > 9. ppm	0	0	0	0	0	0	0
Max 1-hour Conc. (ppm)	6	5	7	6	6	-	-
Max 8-hour Conc. (ppm)	4.0	3.6	5.4	4.3	3.3	2.2	1.9
Nitrogen Dioxide							
1-hour > 0.25 ppm	0	0	0	0	0	0	0
Max 1-hour Conc. (ppm)	0.07	0.08	0.08	0.06	0.08	0.10	0.07
Inhalable Particulates (PM-10)							
24-Hour > 50 $\mu g/m^3$	2/59	2/52	2/58	-	-	2/58	-
24-Hour > 150 $\mu g/m^3$	0/59	0/52	0/58	-	-	0/58	-
Max. 24-Hr. Conc. ($\mu g/m^3$)	54.	80.	85.	-	-	73.	-
Ultra-Fine Particulates (PM-2.5)							
24-Hour > 65 $\mu g/m^3$	-	-	0/113	0/113	0/116	0/107	-
Max. 24-Hour Conc. ($\mu g/m^3$)	-	-	47.6	36.0	35.0	24.0	-

Source: California ARB (2000); Voyager CD, PTSD-00-015-CD; Lancaster Monitoring Station and arb.ca.gov/adam/cgi-bin/adamtop4b.
- = No data available, or not yet reported (2003).

Air Quality Planning

The Federal Clean Air Act, and the California Clean Air Act, have established timeframes for air quality improvement in "non-attainment" areas such as the Antelope Valley. The United States Environmental Protection Agency (USEPA) designated the Southeast Desert Modified Air Quality Management Area (Southeast Desert Modified AQMA) as non-attainment for ozone NAAQS pursuant to the provisions of the Federal Clean Air Act (FCAA). The antelope Valley is included in the Southeast Desert Modified AQMA. The California Air Resources Board has also designated the Antelope Valley non-attainment for ozone California Ambient Air Quality Standards (CAAQS) pursuant to the provisions of the California Clean Air Act (CCAA). The south Coast Air Quality Management District (SCAQMD) adopted attainment plans for the Antelope Valley when the region was under its jurisdiction. The most recent such plan that was approved by USEPA is the 1994 version of the AVAQMD Air Quality Management Plan (AQMP).

The Antelope Valley Air Quality Management District now has jurisdiction over Antelope Valley air quality. The AVAQMD has reviewed and updated all elements of the ozone plan. The Antelope Valley will be in attainment of the NAAQS for ozone by the required year, 2007. The Antelope Valley will also show significant progress towards attainment of the CAAQS for ozone standard by that year.

A draft plan has been developed that includes the latest planning assumptions regarding population, vehicle activity and industrial activity. That proposal plan addresses all existing and forecast ozone precursor-producing activities within the Antelope Valley through the year 2007. The plan includes all necessary information to allow general and transportation conformity findings to be made within the Antelope Valley.

The planning process does make some allowances when an air-shed such as the Los Angeles County portion of the Mojave Desert Air Basin is downwind of an extreme non-attainment air-shed such as the South Coast Air Basin (SCAB). Air pollution control measures embodied in clean air plans for the SCAB therefore are not equally effective in the downwind receptor air-shed such as the Antelope Valley. However, it was believed that if air pollution control was excessively relaxed within the Mojave Desert since its air quality fate was controlled by the SCAB, the Antelope Valley would possibly become a haven for polluters seeking to escape the more restrictive SCAB. Required air quality controls are therefore almost identical in Palmdale as in Los Angeles.

The rules and regulations of the AVAQMD are a part of the currently adopted and proposed updated clean air plans. Compliance with such rules insures that the landfill operation conforms to the air plan. The facility is in full compliance with AVAQMD Rule 1150.1 governing control of gaseous emissions from landfills, and with Rule 402 prohibiting creation of a nuisance from odor or dust. On-site emissions sources are consistent with all emissions control requirements.

However, many landfill-related emissions derive from trucks that haul refuse to the site. The landfill must be sized to accommodate the service demand of the region, or else the trash must be hauled out of the valley with even greater indirect emissions. Refuse disposal capacity must be

consistent with the forecast growth of the service region. When capacity and growth are reasonably well matched, the landfill is considered growth-accommodating and not growth-inducing.

Based on the above discussion, the proposed project would not conflict with or obstruct implementation of the 1994 AVAQMD Air Quality Management Plan (AQMP).

AIR QUALITY IMPACTS

Standards of Significance

Air quality impacts are considered "significant" if they cause clean air standards to be violated where they are currently met, or if they measurably contribute to an existing violation of standards. Any substantial emissions of air contaminants for which there is no safe exposure, or nuisance emissions such as dust or odors, would also be considered a significant impact.

Appendix G of the California CEQA Guidelines offers the following five tests of air quality impact significance. A project would have a potentially significant impact if it:

a. Conflicts with or obstructs implementation of the applicable air quality plan.

b. Violates any air quality standard or contributes substantially to an existing or projected air quality violation.

c. Results in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

d. Exposes sensitive receptors to substantial pollutant concentrations.

e. Creates objectionable odors affecting a substantial number of people.

Primary Pollutants: Air quality impacts generally occur on both local and regional scales. Near an individual source of emissions or a collection of sources such as a crowded intersection or parking lot, some pollutants are emitted that require no additional chemical reactions in order to be unhealthy to breathe. Carbon monoxide (CO) is an example of such a pollutant. These are called "primary pollutants." Primary pollutant impacts can generally be evaluated directly in comparison to appropriate clean air standards. Violations of these standards where they are currently met, or a measurable worsening of an existing or future violation, would be considered a significant impact.

Secondary Pollutants: Many mobile source air pollutants require additional transformation to become unhealthful for people. That conversion process occurs several hours later and miles away. Their impact occurs regionally far from the source.

The individual regional impact of secondary pollutants is immeasurably small because of dilution that occurs over many miles of travel. Analysis of significance of such emissions is thus based on a specified amount of emissions (pounds, tons, etc.) even though there is no way to translate those emissions directly into a corresponding ambient air quality impact.

Project Background

The proposed project consists of combining two existing adjoining disposal units into one contiguous landfill. The project also proposes to change the 1993 CUP approved daily disposal volume of 1,800 tons per day to 3,600 tons per day. These tonnages exclude recyclable materials. The traffic and mobile source air quality analysis must consider maximum tonnage figures which include refuse to be disposed of as well as recyclables and/or materials for alternative daily cover or beneficial use. The average daily "total" volume accepted (i.e., waste for disposal and recyclables) is projected to be 3,613 tons per day; however, this volume of waste may peak to 5,548 tons per day.

During the intake of concrete, rubble and other inert demolition debris, and during the import of soils that are suitable for use as daily cover, a short-term peak in site-related traffic may occur. A peak disposal volume of 5,548 tpd was considered as a possible maximum disposal rate. Because such materials are transported by larger capacity trucks the increase of 54 percent in volume of material handled is accommodated by only a 20 percent increase in site-related traffic, during a peak event.

An expansion of the total refuse footprint of 11 acres is proposed, but there are no air quality consequences due to this expansion. The only anticipated air quality impact is that the ultimate closure date is advanced farther into the future, and that there will be a greater volume of refuse in place at landfill closure.

Decomposition of municipal solid waste (MSW) produces landfill gas (LFG). LFG is comprised primarily of carbon dioxide and methane. About 1 percent of the LFG is comprised of complex organic materials that are considered smog precursors and give landfills a characteristic decay odor. An extended landfill life will increase the LFG production during the operational lifetime and after landfill closure. LFG is collected and burned in an on-site disposal system. Any possible air quality impact from project approval would derive from the uncaptured ("fugitive") fraction of increased LFG associated with an extended landfill life.

Although the CUP-approved daily tonnage for Landfill II is 1,800 tons per day of landfilled material and 3,564 total tons per day including recyclable, existing operations are well below this level. Much of the disposal increase from a current average disposal volume of 1,372 tons per day (tpd) to an average 3,613 tpd (MSW plus various recyclable materials) will result from a shift from individual collection vehicles ("packer" trucks) to tractor/trailers from various transfer stations. The volume of traffic will not be directly proportional to disposal volume because the tractor/trailer hauls three times as much refuse per trip as does the collection truck.

For purposes of presenting a "worst-case" air quality impact analysis, the existing daily traffic (416 truck trips) and disposal volume (1,372 tpd) was treated as the baseline, and disposal volume was presumed to instantaneously jump to the maximum allowable disposal volume of 5,548 which equates to 1,134 truck trips. The transition will actually occur over many years. Because Landfill II is permitted to receive a greater amount of tonnages and associated truck trips (see above) than the existing baseline, the future project impacts are overstated.

The equipment needed to process the increased disposal volume will not be measurably different from existing on-site, off-road equipment. The size of the "working face" and associated cover material needed at the end of each workday is similar for each scenario (existing vs. build-out). One extra compactor is presumed necessary to compact the refuse prior to placement of daily cover. An increase in on-site traffic and a small increase in on-site equipment were evaluated as part of project impacts even though the expansion to the 3,564 total tpd was previously analyzed for CEQA purposes and subsequently approved by the County (CUP #93041). The increase to 5,548 tpd peak event is a "new" impact.

Project-Related Impacts

Air quality impacts resulting from a project are significant if they cause clean air standards to be exceeded, or if they substantially worsen an existing violation. Impacts deriving from vehicular exhaust occur when relatively benign precursor emissions are subsequently converted to more unhealthful pollutants such as ozone. This process may take many hours. By the time this conversion is completed, the contribution from any individual project will have been diluted to undetectable levels miles away from the emissions source. Any such impacts are therefore primarily cumulative.

Because such "secondary" impacts cannot be evaluated relative to ambient clean air standards, many air quality jurisdictions have developed surrogate indicators of potential impact significance. Most commonly, the volume of material emitted is used as a significance criterion even though there is no effective mechanism to convert these emissions into actual air quality. The AVAQMD relies on guidance from the Mojave Desert AQMD (MDAQMD) in the use of significance thresholds. The MDAQMD has adopted numerical emissions thresholds as indicators of potential impact even if the actual air quality increment cannot be directly quantified. The MDAQMD's thresholds are as follows:

Carbon Monoxide (CO)	548 pounds/day
Nitrogen Oxides (NOx)	137 pounds/day
Reactive Organic Gases (ROG)	137 pounds/day
Sulfur Oxides (SOx)	137 pounds/day
PM-10	82 pounds/day

Construction Impacts

Equipment Emissions

The proposed project will involve a variety of construction activities to implement the various needed improvements. Construction activities include some internal roadway paving, creek bank armoring, minor ancillary facilities, and the realignment of the entrance road. The types of equipment used for these activities are similar to the diesel-powered heavy equipment currently operating on the landfill. These construction projects, however, will be in addition to day-to-day, ongoing landfill operations.

The roadway realignment is the largest "extra" project-related activity. The equipment fleet to be operating at any time is at the discretion of the construction contractor. Grading of the hillside near the new access road connection is the likely single-most equipment intensive activity. A representative equipment fleet was hypothesized comprised of the following pieces:

1 Dozer (50% load)
1 Loader (30% load)
1 Backhoe (20% load)
1 Compactor (40% load)
4 Haul Trucks (100 miles/day)

Emission factors from USEPA AP-42 were combined with the assumed load factors to produce the following peak daily equipment emissions:

Roadway Construction Diesel-Powered Equipment Emissions

	Emissions (lb/day)			
Source	**CO**	**ROG**	**NOx**	**PM-10**
Dozer	7.2	0.8	16.7	0.1
Loader	1.4	0.6	4.5	0.4
Backhoe	0.7	0.3	3.2	0.2
Compactor	3.2	0.3	0.2	0.1
Haul Trucks	4.6	0.9	3.1	0.2
TOTAL	**17.1**	**2.9**	**27.7**	**1.0**

Worst-case daily emissions will be well below the adopted significance thresholds of 137 pounds per day each of ROG or NOx, and 548 pounds per day of CO and 82 pounds per day of PM-10. Maximum equipment construction emissions will not substantially increase daily operational emissions to any significant level. Chemical testing of airborne particulates in Southern California has consistently found that less than 5 percent of PM-2.5 is comprised of "crustal materials." PM-2.5 is mainly created from the coagulation of molecules into larger chemical chains, or from high temperature combustion. Therefore, very little PM-2.5 is derived from fugitive dust. The 1.0-pounds per day of diesel exhaust generated during access roadway construction will be primarily PM-2.5, but very little of the fugitive dust (PM-10) will be small enough to be classified as PM-2.5

PM-10 Emissions from Construction/Grading

In addition to exhaust emission, roadway construction and construction of the two desilting basins and creek erosion protection will cause fugitive dust to be generated from grading, excavation and other soil disturbance. Fugitive dust is a combination of dust particles that are too large/heavy to remain suspended in the air, plus smaller particles that can remain in the air semi-indefinitely (PM-10). As stated above, chemical testing of particulate matter shows that

very little breakdown of soil material occurs into ultra-small diameter particulates (PM-2.5). Fugitive dust during construction activities therefore primarily can cause a soiling nuisance, or add to locally elevated PM-10 levels by not to PM-2.5.

The precise quantity of earthworks, the weight of construction vehicles, the daily wind speed, soil moisture and particle size distribution of the soil on any given future day would need to be known in order to accurately calculate PM-10 emissions. Because these parameters can vary from point to point hour-by-hour, approximate "default" values are often used to estimate PM-10 emissions that depend only upon the disturbance acreage. The accepted statewide PM-10 emissions rate from fugitive construction dust is 10 pounds per acre of disturbance per day activity (California ARB, 2000). The proposed ancillary facilities which would involve grading and/or earth disturbing activities include the desilting basin construction (two total), the creek erosion protection, and the access road realignment to R-5. The disturbance area for the three ancillary facilities grading projects totals 20+ acres as follows:

R-5 Access Road Realignment	7.5 acres
Anaverde Creek Scour Protection	7.7 acres
Desilting Basins (2)	5.0 acres

The fugitive PM-10 emissions from each individual construction project are as follows if the entire project is under simultaneous disturbance and BACMs for dust control are utilized:

R-5 Access Road Realignment	75 pounds/day
Scour Protection	77 pounds/day
Desilting Basins)	50 pounds/day

Combined grading/construction of any two ancillary facilities could cause the PM-10 significance threshold of 82 pounds per day to be exceeded. However, excess soil removed from the desilting basins or from the hillside cut for the R-5 realignment would be used as daily cover on the landfill. The decreased excavation of cover material at the landfill would offset increased PM-10 from ancillary construction. This offset is presumed sufficient to "neutralize" fugitive PM-10 emissions from the desilting basins as the smallest ancillary project. Potentially significant PM-10 emissions impacts would therefore only occur if the entire road realignment (R-5) and the creek bank armoring were both under simultaneous maximum disturbance. A restriction to not conduct full grading/disturbance for these two activities simultaneously is required by Mitigation Measure 1 to maintain "project related" PM-10 emissions at less-than-significant levels.

Larger diameter dust particles are normally re-deposited within 100 feet of their origin (EPA, 1995). Existing homes east of Tierra Subiba are more than 100 feet away from most soil disturbance activities. Soiling nuisance is not an anticipated issue for the access road realignment.

Operational Activity Impacts

Mobile Source Emissions

Mobile-source emissions associated with the project implementation were calculated using the California Air Resources Board (ARB) computer model called URBEMIS2002. Operational exhaust emissions for the project will result from on- and off-site heavy equipment, truck hauling operations, and employee commuting. Because these activities currently exist at the landfill, it is the additional equipment, truck operations and new employee trips generated that have been analyzed to determine what operational air quality impacts, if any, are associated with the proposed increase in refuse tonnage at the project site.

The following equipment fleet was assumed operating daily at the landfill, and the existing and future daily truck trips was extracted from the traffic impact study provided by Kunzman & Associates.

Operational Equipment and Personnel

Equipment		Personnel	
Existing (1,372 tons/day)	**Future (3,613 tons/day)**	**Existing (1,372 tons/day)**	**Future (3,613 tons/day)**
2 Dozers + spare	2 Dozers + spare	3 Operators	5 Operators
1 Compactor + spare	2 Compactors + spare	1 Mechanic	1 Mechanic
2 Scrapers	2 Scrapers	4 Laborers	5 Laborers
2 Loaders	2 Loaders	2 Scale House	2 Scale House
1 Grader	1 Grader	1 Site Manager	1 Site Manager
2 Water Trucks	2 Water Trucks		1 Mechanic/Fueler

Daily Landfill Truck Traffic (loads/day)*

Existing Daily Truck Haul Traffic (1,372 tpd)	Future Daily Truck Haul Traffic (3,613 tpd)	Peak Future Daily Truck Haul Traffic (5,548 TPD)
208 loads	432 loads	567 loads

*Note that each truck load represents two truck trips.

The California Air Resources Board (ARB) emissions computer model URBEMIS2002 was used to estimate the daily operational emissions for existing and future scenarios. The computer model was run with the equipment operations information identified above. The emissions results are shown in Table 3.

All of the analyzed project-related pollutant emissions are below significance thresholds with an adequate margin of safety. With the tonnage increase occurring over time with a cleaner future vehicle fleet rather than instantaneously, the emissions improvements will partially offset the greater trip generation. The combined effects of consolidation of MSW into larger-capacity transfer trailers and an increasingly cleaner future vehicle fleet will maintain the future project-related emission burden at close to its existing level.

Peak activity hauling emissions will generate a greater level of on-road exhaust emissions, especially NOx from diesel exhaust. Table 3 shows, however, that all emissions increases will still be less-than-significant even on a worst-case activity day. The 125-pounds per day NOx increase would be close to the 137-pounds per day significance threshold, but still remain less-than-significant by a reasonable margin. With continued future emissions reductions from newer on-site equipment (25 percent) and from on-road traffic (60 percent) lower by 2020, the emission differential will be inconsequential between existing and future mobile equipment exhaust emissions.

Table 3

Project-Related Mobile Source Emissions
(pounds/day)

Scenario	**ROG**	**NOx**	**CO**	**PM-10**
Existing Equipment	18.2	147.8	132.4	7.2
Existing On-road	8.3	64.3	70.5	6.5
Total	**26.5**	**212.1**	**202.9**	**13.7**
Future Equipment*	20.3	166.7	146.0	8.2
Average Future On-road* (3,613 TPD)	18.6	126.6	152.4	14.0
Total	**38.9**	**293.3**	**298.4**	**22.2**
Project Increase (Average TPD)	**12.4**	**81.2**	**95.5**	**8.5**
Significance Thresholds	***137***	***137***	***548***	***82***
Threshold Exceeded?	**No**	**No**	**No**	**No**
Future Equipment*	20.3	166.7	146.0	8.2
Peak Future On-road* (5,548 TPD)	23.0	170.4	191.0	17.6
Total	**43.3**	**337.1**	**337.0**	**25.8**
Project Increase (Peak TPD)	**16.8**	**125.0**	**134.1**	**12.1**
Significance Thresholds	***137***	***137***	***548***	***82***
Threshold Exceeded?	**No**	**No**	**No**	**No**

URBEMIS2002 Computer Model; Year=2005.

*Calculated with 2004 emission factors and they are adjusted in Table 4 to account for future emission reduction programs.

Dust (PM-10)

Dust (PM-10) emission from landfills will not change substantially with project implementation. Dust emissions derive from vehicle and equipment travel on paved industrial roads and on unpaved surfaces, and from dumping of materials. The consolidation of smaller loads into larger transfer trailers will create only a small increase in daily haul trips, and only one additional piece of heavy equipment will operate on the landfill. On-site operational activity emissions (dust and equipment exhaust) will not be substantially greater than from existing conditions.

Excavation hauling, spreading and compaction of cover material create airborne particulate matter (PM-10). The material is wetted by water trucks, as are unpaved internal haul routes and the road from the entrance gate to the working face. PM-10 emission rates from these activities vary dramatically with soil silt content, moisture levels, disturbance vigor and wind conditions. The amount of cover material needed for a proposed 3,600-TPD intake is not substantially larger than for the current 1,372 TPD rate. The working face that needs to be covered is kept as small as practical. At 3,600+ TPD, there is simply more refuse covering refuse than at the current rate. At the end of each workday, the daily cover requirement is not much different for either case. There is therefore no substantial change in PM-10 emissions as further evidenced by the fact that the expanded intake rate requires only one more piece of heavy equipment than existing conditions. It should also be noted that the working face would not change under the proposed peak daily tonnage intake of 5,548 tpd as the added tonnage would be due to a higher intake of recyclables, fill dirt, or other materials not destined for landfill disposal.

Dust generation from increased landfill truck traffic will be offset by a reduction in the unpaved travel distance within the landfill compared to existing conditions. Even with frequent watering, and unpaved industrial road generates almost six (6) times as much PM-10 per vehicle mile of travel than does a paved and cleaned road (2.3 pounds per mile versus 0.4 pound per mile).

Under existing and proposed future conditions, the average travel distance per refuse truck one-way trip is as follows:

Existing:	1.22 miles paved	1.72 miles unpaved
Proposed/Future:	2.43 miles paved	0.39 miles unpaved

PM-10 calculations for truck travel are as follows:

Existing Average @ 1,372 ton/day - 208 one-way trips	924.4 lb/day
CUP #93041 Permitted Peak/Maximum – 550 one-way trips	2,444.2 lb/day [1]
	1,027.95 lb/day [2]
Future Reduce Alternative @ 1,800 tpd – 216 one-way trips	403.7 lb/day
Proposed Average @ 3,613 ton/day - 432 one-way trips	807.4 lb/day
Proposed Peak/Maximum @ 5,548 ton/day - 567 one-way trips	938.6 lb/day[3]

[1]Assumes existing travel distance/paving scenario.
[2]Assumes future travel distance/paving scenario.
[3]The additional 135 one-way trips associated with the peak intake scenario (567 – 432) would all occur on "paved surface" only.

Changes in paved versus unpaved road travel, plus the consolidation of refuse into larger vehicles, will allow for a substantial increase in landfill disposal rates with a reduction of 117 pounds per day of PM-10 except during the peak disposal events, which will result in a 89.35 pound per day reduction ("permitted" maximum/peak versus "proposed" maximum/peak). Because the (permitted peak/maximum) is not currently being accepted at Landfill I, the "existing" and "future" travel distance/paving scenarios were utilized in the calculation of "permitted maximum" truck travel PM-10. The peak/maximum reduction of 89.35 lb/day represents a "worst case" comparison since the "future" paving scenarios were used to calculate the permitted peak/maximum truck travel PM-10.

The 117 and 89.35 pound per day PM-10 "saving" (under the future average and peak daily tonnage intake scenarios) will off-set any minor increase in off-road dust generation from the increase in daily cover extraction, transport and placement associated with the increased disposal volume. The PM-10 significance threshold is not exceeded under either scenario, and therefore, no significant project impacts from increases in truck traffic are anticipated.

Peak activity day intake of 5,548 TPD will entail delivery of inert material that may be suitable for use as daily cover and/or recyclables which would not be transported to the landfill working face. PM-10 emissions from the peak tonnage intake will be offset by a reduced need for on-site extraction and hauling of daily cover. The increased delivery and the decreased extraction will likely balance in terms of PM-10 generation. No significant PM-10 impact is anticipated during the landfill's maximum/peak daily tonnage intake.

Landfill Gas (LFG)

Operation of the landfill at an increased daily rate of refuse receipt will increase subsurface landfill gas (LFG) production. Greater quantities of LFG will require additional combustion in a waste gas disposal flare, and also result in greater levels of fugitive LFG percolating through the cover material. The flare produces NOx and CO as combustion products. A small fraction of the "fugitive" LFG is non-methane hydrocarbons (<1 percent) that will be contained in the material not captured by gas wells within the landfill.

The rate of LFG production depends upon the organic fraction of the waste stream, its biodegradability, and the moisture content within the refuse mass. Southern California landfills within dry climates have very slow decay rates. Newspapers are often still readable 20 to 30 years after they have been deposited in the fill.

Landfill engineers have developed a gas production estimate that projects an increase in methane collection from 287 standard cubic feet per minute (scfm) for existing operations to a maximum production rate of 1,964 scfm near 2020. For existing conditions, for every three scfm of LFG collected, about one scfm escapes without collection. This equates to a 75% collection efficiency ratios. With increasing collection efficiency in a larger landfill with deeper gas collection/extraction wells, the future LFG control efficiency is accepted by most air quality agencies as near 90 percent. Because of air intrusion into shallow wells, the existing measured methane level in LFG is 39.2 percent. At landfill closure, the forecast methane fraction is 55 percent. The basis for calculating operational emissions is thus as follows (scfm):

Methane Collection and Fugitive Losses

	Existing	No Project or Reduced Project 1,800 tpd disposal	Future 2020 with 3,600 TPD disposal
Methane collected/burned	112.5 (scfm) [1]	880 (scfm)[5]	1,080(scfm)[2]
Fugitive loses	37 (scfm)[3]	98 (scfm)[6]	120 (scfm)[4]
Collection efficiency	75%	90%	90%

[1] 287 scfm x 39.2 % measured methane in LFG = 112.5 scfm
[2] 1,964 scfm x 55 % future methane in LFG = 1,080 scfm
[3] 112.5 scfm ÷ 75% = 150 total generated (fugitive losses equal 25% of total – 150 x 25% = 37 scfm
[4] 1,080 scfm ÷ 90% = 1,200 total generated (fugitive losses equal 10% of total – 1,200 x 10% = 120 scfm
[5] 1,600 scfm x 55% future methane = 880 scfm
[6] 880 scfm ÷ 90% = 978 total generated (fugitive losses equal 10% of total – 978 x 10% = 98 scfm

Existing combustion emissions were calculated based upon the source test data from the Antelope Valley Landfill (2004). The emissions factors determined from the landfill testing are as follows (pounds/day/287 scfm LFG):

Existing AVPL LFG Combustion Emission Factors

NOx	9.84
PM-10	0.26
CO	0.46
ROG	0.51
SOx	4.03

As the LFG flow to the flare reaches (and eventually exceeds) the 1,388 scfm permit level, the combustion characteristics of the flare will change substantially. Under the future scenario, the emission factors for the flares will be best characterized by the emission permit limits on the current flare rather than the measurement data from existing LFG combustion. The emission factors for the future two flares are given as a follows (lb/day/1,388 scfm):

Future AVPL LFG Combustion Emission Factors

NO_X	65
PM-10	30
CO	311
ROG	7
SO_X	12

For current combustion rate of 287 scfm, and a future rate of 1,964 scfm of LFG, the following combustion emissions will result (pounds/day):

LFG Flare Combustion Air Pollutant Emissions

Scenario	**NOx**	**PM-10**	**CO**	**ROG**	**SOx**
Existing (1,372 TPD)	9.8	0.3	0.5	0.5	4.0
Future (3,600 TPD)*	92.3	42.6	441.4	9.9	17.0
Increase	82.5	42.3	440.9	9.4	13.0
Future (1,800 TPD)	74.9	34.6	358.5	8.1	13.8
Increase	65.1	34.3	358.0	7.6	9.8
Signif. Threshold	**137.0**	**82.0**	**548.0**	**137.0**	**137.0**
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**

* Permit limit at 1,388 scfm x 1,964 ÷ 1,388

By 2020 as the peak LFG production year, LFG combustion will not cause the significance threshold to be exceeded for any of the five pollutants analyzed. Furthermore, by 2020, diesel haul truck exhaust will be 60 percent cleaner than in 2004. The reduction in future vehicular emissions, will off-set the small emissions increases from the two flares (one existing, one future addition).

The most recent LFG combustion source test (March 31, 2004) at the landfill showed that 112.5 standard cubic feet of methane per minute collected by the LFG control system contained 4.54 pounds per hour (109.0 pounds per day) of reactive organic gases (expressed as methane). The ratio of 109.0 pounds of ROG per day to 112.5 scfm methane was applied to the fugitive LFG emissions estimates for existing and future conditions as follows:

ROG Emission from Fugitive LFG Losses

Existing	37.1 scfm methane fugitive losses x 109.0 lb/day ROG ÷ 112.5 scfm methane = **35.9 lb/day**
Future	120.4 scfm methane fugitive losses x 109.0 lb/day ROG ÷ 112.5 scfm methane = **116.7 lb/day**
Increase	**80.8 lb/day**

The increased ROG emissions will be less than the 137-pound per day significance threshold.

The increase in emissions from the flare and the fugitive ROG sources will also be further offset by emissions improvements in the project travel fleet. Between 2004 and 2020, the EMFAC2002 computer model predicts that truck exhaust per mile of travel will decrease by 60 to 80 percent (SCAQMD, CEQA Handbook Update, 2003). Vehicular emissions reductions will further reduce ROG due to fugitive LFG emissions to less-than-significant levels.

For the "no project" or "reduced project" alternative, the daily intake to be disposed would be restricted to 1,800 tons per day. The lower intake rate would reduce daily ROG emission from fugitive LFG losses, and would reduce the flare combustion by-products because less LFG would be generated. Under the reduced project alternative, the peak LFG production would be deferred to 2037.

Landfill engineers have developed LFG generation curves for the 1,800 tpd alternative. The future gas generation rate at peak generation will be 1,600 scfm of LFG. At a 90-percent LFG recovery efficiency, the landfill will lose 98 scfm of methane. The daily landfill emission burden from all sources will compare as shown in Table 4.

The 11-acre footprint expansion/consolidation would not occur under the No Project Alternative, but it would occur with the Reduced Project Alternative. Thus, the internal paving improvements and new landfill access (R-5) associated with the project would also occur with the Reduced Project Alternative. However, the internal paving improvements and new landfill access (R-5) would not occur under the No Project Alternative. Therefore, the No Project Alternative which allows for the current permitted daily tonnage intake (1,800 net tpd) with no footprint expansion/consolidation or ancillary facility improvements would add more operational PM-10 emissions than the proposed project or Reduce Project Alternative due to the different internal paving and travel scenarios.

The 1,800 TPD No Project Alternative may have a significant PM-10 impact because of different landfill internal travel. Unless internal haul routes are paved/improved as are proposed under the project, any substantial increase from the existing 1,372 TPD disposal rate could create a significant PM-10 impact within the AVAQMD PM-10 non-attainment area.

Table 4
Total Daily Operation Emissions Comparison (lb/day)[1]

Existing Operations (2004)	**ROG**	**NOx**	**CO**	**PM-10**	**SO_X**
On-site Equipment	18.2	147.8	132.4	7.2	Negl.
On-road Travel	8.3	64.3	70.5	6.5	Negl.
Flare Combustion	0.5	9.8	0.5	0.3	4.0
Internal Travel Fugitive Dust	-	-	-	924.4	-
Fugitive LFG	35.9	-	-	-	-
TOTAL	**62.9**	**221.9**	**203.4**	**938.4**	**4.0**

Future Operations (2020)	**ROG**	**NOx**	**CO**	**PM-10**	**SO_X**
On-site Equipment[1]	16.2	133.4	116.8	6.6	Negl.
On-road Travel[2]	9.2	68.2	76.4	17.6	Negl.
Flare Combustion	9.9	92.3	441.4	42.6	17.0
Internal Travel Fugitive Dust (with average TPD intake)	-	-	-	807.4	-
Fugitive LFG	116.7	-	-	-	-
TOTAL	**152.0**	**293.9**	**634.6**	**874.2**	**17.0**
Difference from Existing	*+89.1*	*+72.0*	*+431.2*	*-64.2*	*+13.0*
Significance Criteria	137.0	137.0	548.0	82.0	137.0

Reduced Project / 1,800 TPD Alternative (2037)	**ROG**	**NOx**	**CO**	**PM-10**	**SO_X**
On-site Equipment[3]	12.2	100.0	87.6	4.9	Negl.
On-road Travel[4]	4.6	34.1	38.2	17.6	Negl.
Flare Combustion[5]	8.1	74.9	358.5	34.6	13.8
Internal Travel Fugitive Dust[6]	-	-	-	403.7	-
Fugitive LFG[7]	95.0	-	-	-	-
TOTAL	**119.9**	**209.0**	**484.3**	**469.8**	**13.8**
Difference from Existing	*+57.0*	*-12.9*	*+280.9*	*-468.6*	*+9.8*
Significance Criteria	137.0	137.0	548.0	82.0	137.0

[1]20 percent reduction from 2004 (with project) for ROG/NOx/CO/PM-10.
[2]60 percent reduction from 2004 (with project) for ROG/NOx/CO.
[3]40 percent reduction from 2004 (with project) for ROG/NOx/CO/PM-10.
[4]80 percent reduction from 2004 (with project) for ROG/NOx/CO.
[5]Permit limit @1,388 scfm x 1,600 ÷ 1,388
[6]PM-10 was calculated by dividing the emissions at 3,600 TPD by two
[7]98 scfm methane x 109 lb/day ROG per 112.5 scfm methane.

Toxic Air Contaminants

Heavy equipment exhaust contains carcinogenic compounds within the diesel exhaust particulates, known as diesel particulate matter (DPM), which may represent a possible air quality constraint due to increased cancer risk associated with DPM exposure.

Landfills are sources of a variety of toxic air contaminants (TACs) that have no safe public exposure level. TACs may be released in gaseous form in the exhaust of the landfill gas (LFG) flare or on-site vehicles or equipment, and within the fraction of "fugitive" LFG not collected within the gas collection/control system. TAC particulates can derive from dust from contaminated municipal solid waste (paint, batteries, etc., included with house hold refuse) and within the soot fraction from on-site diesel trucks and heavy equipment.

There is no accepted methodology that can evaluate the combined health risk from all these sources. All major landfills in California were tested for cancer risk due to gaseous emissions from flare exhaust and fugitive LFG as required by AB-3525 (Calderon). No significant risk was identified at landfills many times larger than the Antelope Valley Landfill with far greater levels of LFG emissions. The conclusion of the statewide AB-3525 program was that municipal solid waste (MSW) landfills do not pose a health risk to the public from LFG fugitive emission or combustion byproducts (California ARB, 1990: The Landfill Testing Program: Data Analysis and evaluation, September). With state-of-the-art LFG control (collection system and flares), as practiced at the Antelope Valley Landfill, regulatory agencies such as the AVAQMD have concluded that landfill operations constitute no substantial public health risk from the low levels of TACs found above the landfill surface and which migrates off-site.

Heavy equipment exhaust contains carcinogenic compounds within diesel exhaust known as diesel particulate matter (DPM). Because most of the trucks and heavy equipment on the landfill are diesel powered, there is a potential impact from their exhaust on nearby receptors. There is no accepted methodology for quantifying these risks from mobile sources at a landfill. However, the following factors suggest that any project-related health risk due to DPM exposure will be extremely low for the nearest residents:

- Substantial source/receptor setback distance. The nearest residence is ½ mile from the site.
- Enhanced turbulent dispersion because of complex topography
- DPM emissions will only last until landfill closure, for approximately 17 years. Health risk assessments typically assume a 70 year exposure.

In addition, the California Air Resources Board's diesel reduction program for refuse hauling fleets will reduce DPM emissions starting in 2005 by 75% over the next decade and by 85% by 2020.The landfill has recently constructed a Liquefied Natural Gas (LNG) fueling station for waste collection and public vehicles which will assist in reducing the number of diesel fuel engines and vehicles in the future. AVPL currently has converted 12 MSW collection vehicles to LNG and 2 more are slated for conversion in early 2005. Thus, approximately 10% of the AVPL waste hauling vehicles are currently fueled by LNG.

Landfill Odor

Landfills emit odor from freshly delivered municipal solid waste (MSW) when the truck is emptied at the landfill "working face." The "fresh trash" odor is the odor that might be noticed in the curbside collection container on pick-up day after the material has begun initial decomposition. Odor strength of fresh refuse depends upon the amount of readily degradable material, the moisture level, and the storage temperature. For residentially-dominated MSW, with generally good daytime mixing, the fresh trash odor is noticeable for approximately one-fourth mile downwind (normally east of the landfill). There are minimal sensitive uses within the zone of daytime odor detectability.

After burial, the bio-degradable portion of refuse begins a very slow decay process that lasts for more than 50 years in dry environments such as Lancaster. Bacteria break down complex cellulose molecules into methane and carbon monoxide. About 1 percent of landfill gas (LFG) is more complex organic molecules that have a "sickeningly sweet" character in heavy concentration.

LFG percolates through the cover material along the path of least resistance. It escapes into the air along subsidence cracks, bare soil or cover material penetrations. The extent of odor detectability from LFG depends upon the emission quantity and the atmospheric dilution rate. Because daytime dilution is ten-fold better than at night, LFG odor is most prevalent from late evening until early morning.

As stated previously, the landfill is in full compliance with AVAQMD Rule 1150.1 governing control of gaseous emissions from landfills, and with Rule 402 prohibiting creation of a nuisance from odor or dust. On-site emissions sources are consistent with all emissions control requirements.

The landfill has a gas collection and flare, which combusts 99+ percent of LFG collected by a system of perforated wells and connecting tubes placed within/on the landfill. The typical existing collection efficiency for gas systems is around 75 percent. With thick final cover and with deep collection wells in a closed landfill, the LFG collection efficiency increases to near 90 percent. The increased efficiency offsets some of the possible fugitive LFG losses, and disperses the LFG escape without creating any possible LFG odor "hot sport."

With a properly operating LFG disposal system, the zone of LFG detectability under stable nocturnal meteorological conditions due to "fugitive" LFG emissions can be reduced from 1-2 miles with no system to around one-half mile with the system. The system of wells and the flare at the existing landfill maintain a zone of odor detectability that rarely, if ever, reaches the closest houses. No odor complaints have been registered with the AVAQMD. As long as additional LFG collection and disposal capacity is developed in conjunction with an increased disposal rate, setback from the nearest homes will be adequate to preclude creation of any adverse odor impact from "fugitive" landfill gas. Although no significant impacts are anticipated, mitigation has been proposed to ensure that no future odor nuisance problem results from the project.

Cumulative Impacts

The air basin is a non-attainment area for ozone (State and Federal) and for particulate matter (PM-10) (State). Any increase in air emissions, even at below-threshold levels, will retard attainment of applicable standards. While the long-term increase in air emissions from the landfill and associated activity will be less-than-significant the existing landfill is already a significant source of ROG, NOx and PM-10. ROG and NO_X are ozone formation precursor compounds. The increase due to the project will increase the degree of "excess" emissions even if significance thresholds are not individually exceeded. The cumulative impact of existing operations, along with the incremental increases associated with the proposed increase in disposal volume and other cumulative growth, and development projects in the area, is considered a cumulatively significant unavoidable impact. This conclusion is consistent with the finding of the previous environmental documents for the landfill.

CONCLUSION

Aside from the 11-acre refuse footprint expansion and 5-acre facility expansion, implementation of the proposed project will not require any substantial physical changes to the existing landfill or on-site structures. The proposed ancillary facility construction activities associated with the proposed project include the desilting basins, the erosion protection for Anaverde Creek and the access road relocation. Grading of the relocated entrance road as the maximum intensity construction activity will not substantially increase daily on-site construction equipment and dust emissions beyond the significant threshold with the implementation of mitigation measures.

The operational activities would include small increases in on-site equipment usage, haul truck trips and on-site employees. These increases will not cause pollutant significance thresholds to be exceeded in any category analyzed.

PM-10 emissions from operational activities will not increase substantially because the size of the working face is not much larger at 3,600+ tons per day than at 1,372 tons per day for current activities. Peak activity materials delivery of inert waste will reduce on-site PM-10 generation from daily cover extraction and hauling with minimal PM-10 emissions differences. Decreased travel distances unpaved roads for the new landfill configuration will create a PM-10 emissions reduction from existing conditions except on the infrequent days when 5,548 tons of refuse might be brought to the facility. The "typical day" reduction of 117 pounds of PM-10 at the 3,613 average maximum disposal rate compared to existing conditions will off-set any small PM-10 increases from increased cover material extraction, transport and placement.

Increased MSW intake rates will increase the levels of daily LFG production. If/when the capacity of the existing flare system is reached an additional flare and more collection wells will be needed. State regulations are in place, which dictate LFG disposal requirements that will limit fugitive LFG escape as a source for odor.

Increased LFG production will be accompanied by an increased rate of fugitive gas losses through any weaker sections of the cover material. The fugitive LFG contains a small percentage of reactive organic compounds (ROG). However, even at peak gas production, the future ROG increase associated with the increase in daily tonnage will not exceed the adopted AVAQMD/MDAQMD significance threshold of 137 pounds per day.

The 1,800 TPD No Project Alternative, an already permitted operational level, would not necessarily be accompanied by internal roadway paving and thus would result in more PM-10 emissions than the project. The proposed project features to reduce on-site PM-10 and off-site vehicle exhaust will allow for a substantial increase in intake capacity without creating increases in air pollution that exceed the significance threshold.

MITIGATION

Fugitive Dust Emissions (PM-10)

1 Because the grading/disturbance of more than 10 acres will cause the daily PM-10 thresholds to be exceeded, construction of landfill ancillary facilities (R-5 and the Anaverde Creek erosion protection) shall not exceed 10 acres of grading on any given day.

2. Because of the potential for fugitive dust emissions from the proposed landfill to cause a public nuisance or exacerbate PM-10 non-attainment status within the Antelope Valley dust generated by project activities shall be kept to a minimum and prevented from dispersing off-site by following the dust control measures listed below:

   a. Water truck or fixed sprinkler systems shall be used to keep all areas of vehicle movement damp enough to prevent dust from leaving the site.

   b. Areas to be graded or excavated shall be watered before commencement of the grading or excavation operations. Application of water must penetrate sufficiently to minimize fugitive dust during grading activities.

   c. All graded and excavated material, exposed soil areas, and active portions of the landfill, including on-site roadways, shall be treated to prevent fugitive dust. Treatment shall include, but not be limited to, periodic watering, application of environmentally safe soil stabilization materials, and/or roll compaction as appropriate. Watering shall be done as often as necessary to prevent fugitive dust from leaving the landfill site.

   d. Signs shall be posted on-site limiting traffic to speeds of 15 mph or less on unpaved roads and 25 mph on paved roads.

   e. During periods of high winds (i.e., wind speed sufficient to cause fugitive dust to impact adjacent properties), all clearing, grading, earth moving, and excavation operations shall be curtailed to the degree necessary to prevent fugitive dust created by on-site activities and operations from being a nuisance or hazard, either off-site or on-site.

Odor

3. If an odor nuisance problem should develop, appropriate control measures shall be employed such as applying additional cover material or more frequent application of the cover material to seal the surface, or adjustments to the wells or equipment.

APPENDIX A

URBEMIS2002 Computer Model Output

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill -EXISTING
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

*** 2003 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	18.22	147.79	132.40	0.00	7.22	7.21	0.01

*** 2004 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	8.32	64.34	70.53	0.86	6.52

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	8.40	64.34	71.12	0.86	6.52

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2003
Construction Duration: 12
Total Land Use Area to be Developed: 0 acres
Maximum Acreage Disturbed Per Day: 0 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2003***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	17.97	147.49	126.77	-	7.20	7.20	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.25	0.30	5.63	0.00	0.02	0.01	0.01
Maximum lbs/day	18.22	147.79	132.40	0.00	7.22	7.21	0.01
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	18.22	147.79	132.40	0.00	7.22	7.21	0.01
*** 2004***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '03
Phase 2 Duration: 1.2 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Graders	174	0.575	8.0
3	Other Equipment	190	0.620	8.0
2	Rubber Tired Loaders	165	0.465	8.0
2	Scrapers	313	0.660	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jul '03
Phase 3 Duration: 10.2 months
Start Month/Year for SubPhase Building: Jul '03
SubPhase Building Duration: 10.2 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

Start Month/Year for SubPhase Architectural Coatings: May '04
SubPhase Architectural Coatings Duration: 1 months
Start Month/Year for SubPhase Asphalt: May '04
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	-	0.00
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.08	0.01	0.58	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Landfill Vehicles	8.32	64.34	70.53	0.86	6.52
TOTAL EMISSIONS (lbs/day)	8.32	64.34	70.53	0.86	6.52

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2005 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Landfill Vehicles	2.00 trips /	313.00	626.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.00	2.30	97.10	0.60
Light Truck < 3,750 lbs	0.00	4.00	93.40	2.60
Light Truck 3,751- 5,750	33.50	1.90	96.80	1.30
Med Truck 5,751- 8,500	0.00	1.50	95.60	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	0.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	66.50	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	0.00	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	0.00	14.30	78.60	7.10

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Landfill Vehicles	2.0	1.0	97.0

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill - AVERAGE
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

*** 2003 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	20.32	166.73	146.02	0.00	8.16	8.15	0.01

*** 2004 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	18.59	126.63	152.43	1.79	13.96

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	18.67	126.63	153.01	1.79	13.96

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2003
Construction Duration: 12
Total Land Use Area to be Developed: 0 acres
Maximum Acreage Disturbed Per Day: 0 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2003***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	20.05	166.40	139.83	-	8.14	8.14	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.27	0.33	6.19	0.00	0.02	0.01	0.01
Maximum lbs/day	20.32	166.73	146.02	0.00	8.16	8.15	0.01
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	20.32	166.73	146.02	0.00	8.16	8.15	0.01
*** 2004***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '03
Phase 2 Duration: 1.2 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Graders	174	0.575	8.0
4	Other Equipment	190	0.620	8.0
2	Rubber Tired Loaders	165	0.465	8.0
2	Scrapers	313	0.660	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jul '03
Phase 3 Duration: 10.2 months
Start Month/Year for SubPhase Building: Jul '03
SubPhase Building Duration: 10.2 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

Start Month/Year for SubPhase Architectural Coatings: May '04
SubPhase Architectural Coatings Duration: 1 months
Start Month/Year for SubPhase Asphalt: May '04
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	-	0.00
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.08	0.01	0.58	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Landfill Vehicles	18.59	126.63	152.43	1.79	13.96
TOTAL EMISSIONS (lbs/day)	18.59	126.63	152.43	1.79	13.96

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2005 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Landfill Vehicles	2.00 trips /	662.00	1,324.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.00	2.30	97.10	0.60
Light Truck < 3,750 lbs	0.00	4.00	93.40	2.60
Light Truck 3,751- 5,750	34.70	1.90	96.80	1.30
Med Truck 5,751- 8,500	0.00	1.50	95.60	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	0.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	65.30	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	0.00	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	0.00	14.30	78.60	7.10

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Landfill Vehicles	2.0	1.0	97.0

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill - PEAK
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

*** 2003 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	20.32	166.73	146.02	0.00	8.16	8.15	0.01

*** 2004 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	22.97	170.44	190.97	2.41	17.56

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	23.05	170.44	191.56	2.41	17.56

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: AV Landfill
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2003
Construction Duration: 12
Total Land Use Area to be Developed: 0 acres
Maximum Acreage Disturbed Per Day: 0 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2003***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	20.05	166.40	139.83	-	8.14	8.14	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.27	0.33	6.19	0.00	0.02	0.01	0.01
Maximum lbs/day	20.32	166.73	146.02	0.00	8.16	8.15	0.01
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	20.32	166.73	146.02	0.00	8.16	8.15	0.01
*** 2004***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '03
Phase 2 Duration: 1.2 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Graders	174	0.575	8.0
4	Other Equipment	190	0.620	8.0
2	Rubber Tired Loaders	165	0.465	8.0
2	Scrapers	313	0.660	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jul '03
Phase 3 Duration: 10.2 months
Start Month/Year for SubPhase Building: Jul '03
SubPhase Building Duration: 10.2 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

Start Month/Year for SubPhase Architectural Coatings: May '04
SubPhase Architectural Coatings Duration: 1 months
Start Month/Year for SubPhase Asphalt: May '04
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.00	0.00	0.00	-	0.00
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.08	0.01	0.58	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	0.08	0.01	0.58	0.00	0.00

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Landfill Vehicles	22.97	170.44	190.97	2.41	17.56
TOTAL EMISSIONS (lbs/day)	22.97	170.44	190.97	2.41	17.56

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2005 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Landfill Vehicles	2.00 trips /	817.00	1,634.00

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.00	2.30	97.10	0.60
Light Truck < 3,750 lbs	0.00	4.00	93.40	2.60
Light Truck 3,751- 5,750	28.20	1.90	96.80	1.30
Med Truck 5,751- 8,500	0.00	1.50	95.60	2.90
Lite-Heavy 8,501-10,000	0.00	0.00	80.00	20.00
Lite-Heavy 10,001-14,000	0.00	0.00	66.70	33.30
Med-Heavy 14,001-33,000	0.00	10.00	20.00	70.00
Heavy-Heavy 33,001-60,000	71.80	0.00	12.50	87.50
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	0.00	87.50	12.50	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	0.00	14.30	78.60	7.10

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

% of Trips - Commercial (by land use)

Landfill Vehicles	2.0	1.0	97.0

APPENDIX B

LFG Combustion Source Test (3/31/04); Landfill Gas Flare Curves and Authority to Construct Permit for Landfill Flare

- Flare Source Test Report (Table 2-1)
- Non-Methane Hydrocarbons in LFG (Table 5-2)
- AVAQMD Flare Emissions Limits (1,388 scfm)
- LFG Generation Curves (3,600 tpd)
- LFG Generation Curves (1,800 tpd)

Table 2-1

Summary of Results
Antelope Valley Landfill
March 31, 2004

Parameter	Emission Rate	Allowable Emissions
Landfill Gas Flow Rate	287 dscfm	1388 scfm
Oxides of Nitrogen (as NO_2)	0.410 lb/hr 9.84 lb/day 0.060 lb/MMBtu	2.7 lb/hr 65 lb/day 0.06 lb/MMBtu
Particulate Matter	0.011 lb/hr 0.26 lb/day	1.3 lb/hr 30 lb/day
Carbon Monoxide	0.019 lb/hr 0.46 lb/day	12.9 lb/hr 311 lb/day
Total Non-Methane Hydrocarbons (as CH_4)	0.0213 lb/hr 0.511 lb/day	0.28 lb/hr 7 lb/day
Oxides of Sulfur (as SO_2)*	0.168 lb/hr 4.03 lb/day	0.5 lb/hr 12 lb/day

Note: All emission rates are based on stoichiometrically calculated flow rate.

* - All values calculated based upon the concentration of landfill gas reduced sulfur compounds.

Table 5-2
Trace Organic Species
Destruction Efficiency Results
Antelope Valley Landfill
March 31, 2004
Run 1

Species	Inlet Concentration (ppb)	Inlet Emission Rate (lb/hr)	Outlet Concentration (ppb)	Outlet Emission Rate (lb/hr)	Destruction Efficiency (%)
Hydrogen Sulfide	47200	7.29E-02	< 500	< 8.36E-03	> 88.54
Benzene	2200	7.77E-03	< 0.20	< 7.65E-06	> 99.90
Benzychloride	< 40	< 2.30E-04	< 0.80	< 4.98E-05	NA
Chlorobenzene	219	1.12E-03	< 0.20	< 1.11E-05	> 99.01
Dichlorobenzenes	1920	1.28E-02	< 1.50	< 1.08E-04	> 99.15
1,1-dichloroethane	1900	8.52E-03	< 0.20	< 9.71E-06	> 99.89
1,2-dichloroethane	67.9	3.05E-04	< 0.20	< 9.71E-06	> 96.81
1,1-dichloroethylene	103.0	4.53E-04	< 0.20	< 9.51E-06	> 97.90
Dichloromethane	4500	1.73E-02	4.95	2.06E-04	98.81
1,2-dibromoethane	< 30	< 2.55E-04	< 0.20	< 1.84E-05	NA
Perchloroethene	3900	4.19E-02	< 0.10	< 1.16E-05	> 99.97
Carbon tetrachloride	< 30	< 2.09E-04	< 0.10	< 7.55E-06	> NA
Toluene	52100	2.17E-01	0.66	2.98E-05	99.99
1,1,1-trichloroethane	20.0	1.21E-04	< 0.20	< 6.52E-06	NA
Trichloroethene	1220	7.24E-03	< 0.10	< 6.42E-06	> 99.91
Chloroform	< 20	< 1.08E-04	< 0.10	< 5.84E-06	NA
Vinyl Chloride	248	7.02E-04	< 0.20	< 6.13E-06	> 99.13
m xylenes	25600	1.23E-01	0.7	3.69E-05	99.97
o+p xylene	3660	1.76E-02	< 0.20	< 1.04E-05	> 99.94
TNMHC	6264117	4.54E+00	2720	2.13E-02	99.53

Note: All values preceded by "<" are below the detection limit - reported values are detection limit values.
NA--Not applicable: Destruction efficiency cannot be calculated since both inlet and outlet values are below the detection limit.

Antelope Valley AQMD

43301 Division St., Suite 206, Lancaster, CA 93535-4649 (661) 723-8070

AUTHORITY TO CONSTRUCT

C008629

If construction is not completed by the expiration date of this permit, it may be renewed for one additional year upon payment of applicable fees. Any additional extension will require the written approval of the Air Pollution Control Officer. This Authority to Construct may serve as a temporary Permit to Operate provided the APCO is given prior notice of intent to operate and the Permit to Operate is not specifically denied.

EXPIRES LAST DAY OF: FEBRUARY 2004

OWNER OR OPERATOR (1228)
Waste Management of California, Inc
600 E Avenue F
Lancaster, CA 93534

EQUIPMENT LOCATION: (02470
Antelope Valley Recycling & Disposal Facility
1200-1202 West City Ranch Rd
Palmdale, CA 93590

DESCRIPTION:
ENCLOSED FLARE consisting of:

McGill Environmental Systems, Inc., (1990), provided by Waste Management, Inc., from Bradley Landfill, 47 MM Btu/hr HHV.

Capacity	Equipment Descriptio
	Purge air blower
	Propane gas pilot
	Electric pilot ignitor
	UV flame scanner with flame safeguard system
	Automatic shutdown valve on landfill gas (LFG) inlet
	Thermocouple with temperature controller and recorder
	Temperature controlled combustion air dampers
	Flame arrester
	Failure alarm
	Blower
	Condensate injection nozzle
	Landfill gas flow element with recorder
	Air compressor, 20,300 scfm

CONDITIONS:

1. Operation of this equipment shall be conducted in accordance with all data and specifications submitted with

Fee Schedule: E() Rating: 1.0 SIC: 9511 SCC: 50200601 Location/UTM(Km): 395E/3840N

This permit does not authorize the emission of air contaminants in excess of those allowed by law, including Division 26 of the Health and Safety Code of the State of California and the Rules and Regulations of the District. This permit cannot be construed as permission to violate existing laws, ordinances, statutes or regulations of this or other governmental agencies. This permit must be renewed by the expiration date above. If billing for renewal fee required by Rule 301(c) is not received by expiration date above, please contact the District.

Waste Management of California, Inc
PO Box 4040
Palmdale, CA 935904040

BY: **Copy**
For: Charles L. Fryxell
Air Pollution Control Officer

DATE: 4/18/2003

the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be properly maintained and kept in good operating condition at all times.

3. This equipment shall be operated and maintained by personnel properly trained in its operation.

4. A third blower shall be installed as a standby or alterations be made to the existing blowers to increase the flowrate within 90 days after the landfill gas collection rate reaches 700 cfm or when two blowers are required to dispose of the gas.

5. All collected landfill gas and extracted air shall be directed to the flare for combustion.

6. A sufficient number of sight glass windows shall be maintained in the flare to allow visual inspection of the flame within the flare at all times. Adequate and safe access shall be provided to all sight glass windows.

7. A set of four (4) sampling ports shall be maintained in the flare shroud and located at least two (2) feet above the flame zone and at least four (4) feet below the top of the flare shroud. Each port shall be installed at 90 degrees apart, and each port shall consist of four inch couplings with plugs. Adequate and safe access to all source test ports shall be provided by the applicant within twenty-four (24) hours upon request by the District to conduct a test.

8. A sampling port or other method approved by the District shall be maintained at the inlet gas line and the extracted air line to the flare to allow the collection of a landfill gas sample.

9. The flare shall be equipped with a temperature indicator and recorder which measures and records the gas temperature in the flare stack. The temperature indicator and recorder shall operate whenever the flare is in operation.

10. The thermocouple used to measure the flare temperature shall be above the flame and at least 4 feet below the top of the flare shroud and at least 0.6 seconds downstream of the burner.

11. Whenever the flare is in operation, a temperature of not less than 1400 degrees F, as measured by the temperature indicator and recorder, shall be maintained in the flare stack, except during flare start-up for a time period not to exceed 30 minutes in length.

12. The flare shall be equipped with a failure alarm which shuts down the landfill gas blowers and associated landfill gas supply valves, ISSA blower and associated air stream supply valve, and the condensate injection pump in order to isolate the flare from the landfill gas supply line, ISSA supply line, and condensate supply line, and to notify a responsible party of shutdown in the even of flare failure.

13. The safety system specified in condition no. 12 shall be tested annually for proper operation and the results recorded.

14. The landfill gas flow rate, the condensate flow rate, and the air flow rate from the ISSA system to the flare, shall be monitored by flow indicators and recorders, which will operate continuously.

15. All recording devices shall be synchronized with respect to the time of day.

16. A pressure differential indicator shall be maintained across each flame arrestor.

17. The total volume of landfill gas and extracted air burned in the flare shall not exceed 1388 standard cubic feet per minute. In addition, the total volume of condensate burned in the flare shall not exceed 4 gallons per hour.

18. The skin temperature of the flare shroud within four feet of all the source test ports shall not exceed 250 degrees F. If a heat shield is required to meet this requirement, its design shall be approved by the executive officer prior to construction. The heat shield, if required to meet the temperature requirement, shall be in place whenever a test is conducted by the District.

19. Emissions from the flare shall not exceed the following:

Contaminant	Lbs./Hour	Lbs./Day
NOX, as NO2	2.7	65
SOX, as SO2	0.5	12
CO	12.9	311
PM	1.3	30
NMHC as Methane	0.28	7

20. Oxides of nitrogen emissions shall not exceed 0.06 pounds per million BTUs of heat input.

21. Any breakdown or malfunction of this equipment resulting in the emission of raw landfill gas shall be reported to the District within one hour of detection, and immediate remedial measures shall be undertaken to correct the problem and prevent further emissions into the atmosphere.

22. This equipment shall be performance tested when the number of operating hours equals one year of continuous operation, but at least every two years. The landfill company shall conduct performance tests in accordance with the District test procedures and furnish the District with written results of such performance tests within thirty (30) days after the tests are conducted. Written notice of the performance tests shall be provided to the District seven (7) days prior to the tests so that an observer may be present. All source testing and analytical methods shall be submitted to the District for approval at least sixty (60) days prior to the start of the tests.

    The performance tests shall be conducted at the maximum achievable flow rates allowed by this permit and shall include, but shall not be limited to, a test of the inlet landfill gas flare, the inlet extracted air, and the flare exhaust for:

    A. Methane
    B. Total Non-Methane Organics
    C. Oxides of Nitrogen (exhaust only)
    D. Carbon Monoxide (exhaust only)
    E. Total Particulates (exhaust only)
    F. Hydrogen Sulfide (inlet only)
    G. C1 and C3 Sulfur Compounds (speciated, inlet only)
    H. Carbon Dioxide
    I. Qualitative Identification of Chemical Compounds using a Gas Chromatograph/Mass pectrometry method (GC/MS) and Quantification of these Compounds using District approved methods.
    J. Oxygen
    K. Nitrogen
    L. Moisture Content
    M. Temperature
    N. Flow Rate

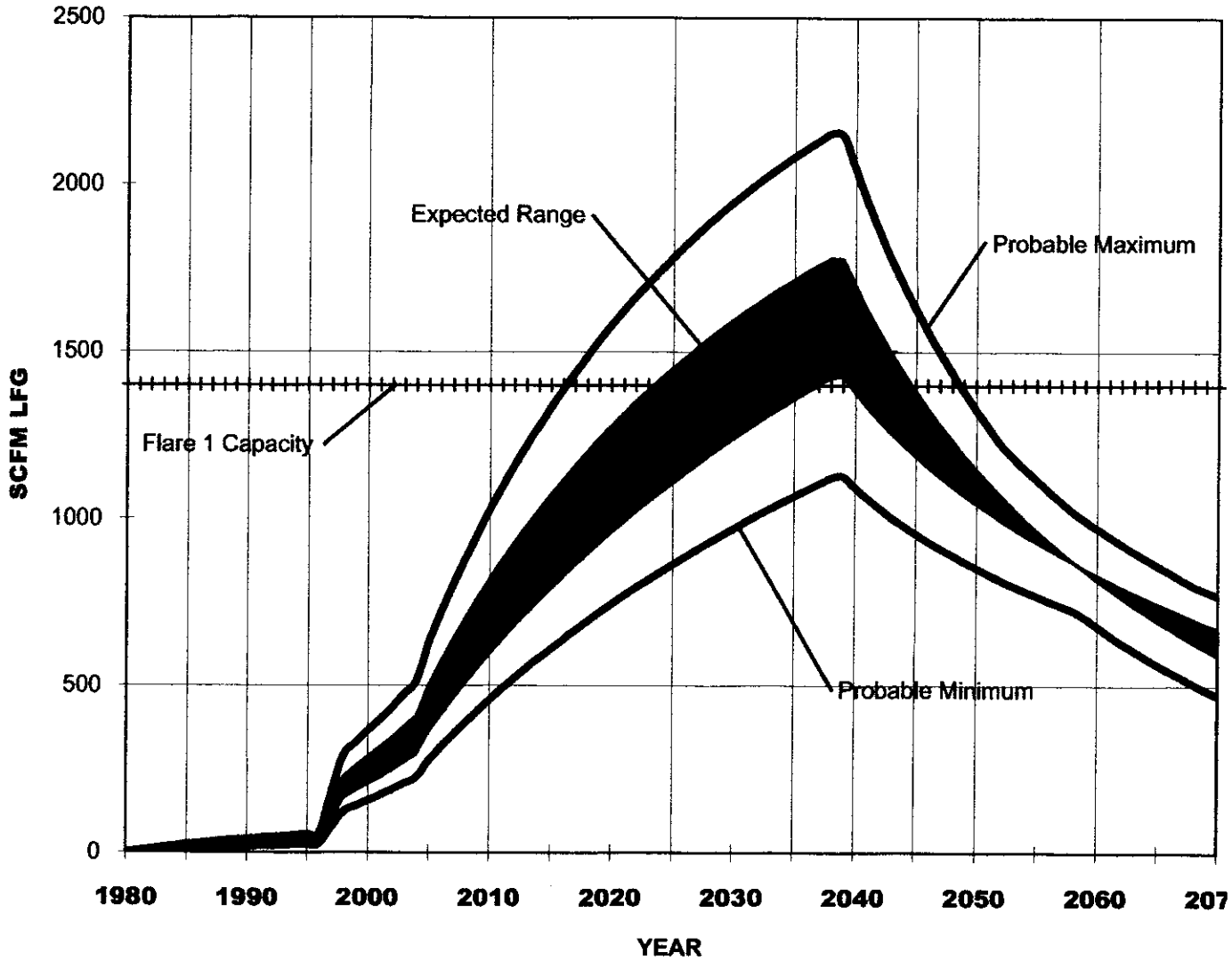
23. All records shall be kept for a period of at least two (2) years and shall be made available to AQMD personnel upon request.

24. Records shall be maintained indicating the hours of operation and submitted to the District, Attn: Public Facilities Team Manager, on a quarterly basis.

25. This equipment and the associated landfill shall be operated in compliance with Rule 1150 and NSPS Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills (40 CFR 60.750).

1800 TPD

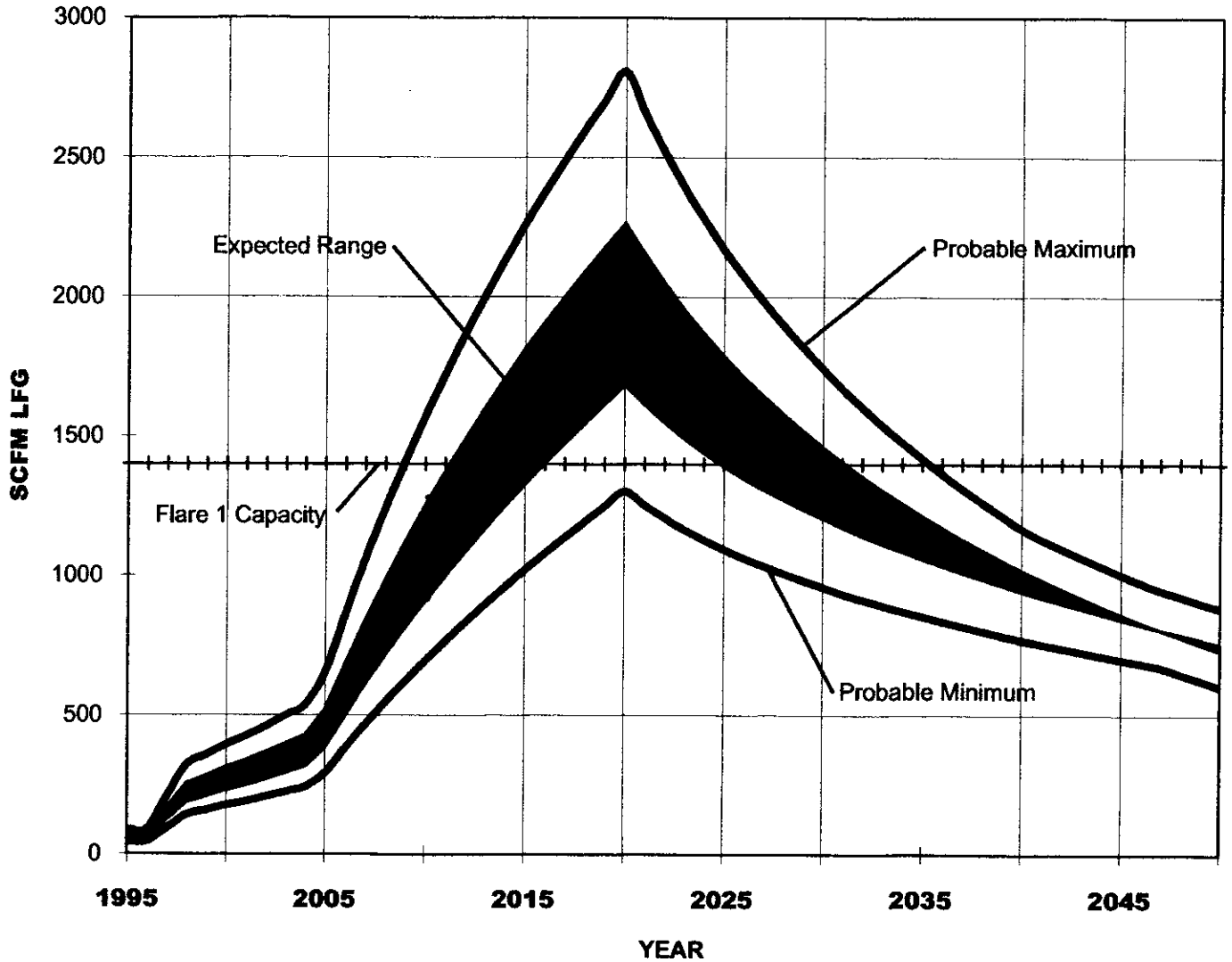
Figure 2 - Palmdale Estimated LFG Collection (55% Methane with 90% Collection Efficiency)



Information used in the landfill gas generation model includes numerous assumptions concerning refuse composition, decomposition rate, moisture content and other semi or non quantifiable information. It should be recognized that the decomposable fraction of refuse at any landfill along with numerous other semi-quantifiable variables are impossible to quantify. While specific methane and/or LFG production rates are included in this figure, these rates are impossible to accurately predict. All results must be used with caution. No warranty is expressed or implied. The work provided is consistent with the standard of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in Southern California.

3600 TPD

Figure 2 - Palmdale Estimated LFG Collection (55% Methane with 90% Collection Efficiency)



Information used in the landfill gas generation model includes numerous assumptions concerning refuse composition, decomposition rate, moisture content and other semi or non quantifiable information. It should be recognized that the decomposable fraction of refuse at any landfill along with numerous other semi-quantifiable variables are impossible to quantify. While specific methane and/or LFG production rates are included in this figure, these rates are impossible to accurately predict. All results must be used with caution. No warranty is expressed or implied. The work provided is consistent with the standard of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in Southern California.

Appendix C-1

AB-32 Compliance Study, Giroux and Associates
January 2010

AB – 32 Compliance Study

Antelope Valley Landfill

Palmdale, California

Prepared For:
EDAW / AECOM
Attn: Jane Chang
2737 Campus Dr
Irvine, CA 92612

January 13, 2010

GREENHOUSE GAS EMISSIONS AND GLOBAL WARNING

Since circulation of the Draft SEIR, the issue of global climate change resulting from human activities has gained prominence and the scientific basis for measuring and predicting climate change has strengthened. This analysis considers the contribution of the proposed Project to greenhouse gas (GHG) emissions and global climate change. It should be noted that GHG emissions from municipal solid waste (MSW) would be generated with or without the proposed Project. GHG emissions from vehicles to haul MSW, from equipment to dispose of non-recyclables and from landfill gas (LFG) generation and control would occur in Southern California independent of any proposed action. Any project-related GHG impacts would be offset by a lack of almost identical impacts at some other landfill operation in the region.

In California, generally, observational trends from the last half-century show warmer winter and spring temperature, decreased spring snow levels in lower- and mid-elevation mountains, snowpack melting up to one month earlier, and flowers blooming one to two weeks earlier than under historical conditions. Research suggests that human activities, such as the burning of fossil fuels and clearing of forests, are resulting in more emission of carbon dioxide (CO_2) and other heat trapping gases into the atmosphere. Because the earth has undergone even more dramatic climatic cycles in geologic history, the role of man-made GHG emissions is not completely certain. However, the scientific consensus is that even if human activity is not the sole cause or trigger of currently observed climate change, it is a contributor. This conclusion is the basis for state and proposed federal rule-making regarding GHGs.

Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they allow for the transmission of short wave solar radiation but retard the re-radiation of long wave (infra-red) radiation, much like a greenhouse. The principal GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydroflourocarbons (HFC), perflourocarbons (PFC), and sulfur hexafluoride (SF_6). Water vapor (H_2O) is also a heat trapping gas, but is normally not included among “standard” (Kyoto Protocol) GHGs.

The accumulation of GHGs has been implicated as a driving force for global climate change. Climate change is commonly used interchangeably with “global warming” and the “greenhouse effect.” Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth’s climate caused by natural fluctuations and anthropogenic activities that alter the composition of the global atmosphere.

While the primary GHGs in the atmosphere are naturally occurring, the presence of dramatically increased levels of CO_2, CH_4, and N_2O is largely the result of human activities that have accelerated the rate at which these compounds occur within the earth’s atmosphere. CO_2 is the “reference gas” for climate change, meaning that emissions of GHGs are typically reported in “carbon-dioxide-equivalent” (CO_2E) measures. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from biological decay associated with organic

materials. Other GHGs, which have even greater heat-absorption potential than CO_2, are generated in certain industrial processes. There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming, although there is uncertainty concerning the magnitude and rate of the warming. The effects of climate change on the natural environment in California may include, but are not limited to, sea level rise, extreme heat conditions that could last longer and become more frequent, reduced snowpack, more high ozone days, more large forest fires, and more drought years. Secondary effects are likely to include a global rise in sea level, adverse impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity.

The California Air Resources Board (ARB) has recently (2009) published its most recent (2006) inventory of GHG gases in California. The 2006 inventory is calculated as 483.9 million metric tons (MMT) per year. The ARB estimates that transportation is the source of 39 percent of the state's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 22 percent and industrial sources at 21 percent. All other sources comprise 18 percent of the total.

Climate Change and GHG Emissions Regulatory Framework

Federal

With respect to GHGs, the U.S. Supreme Court ruled on April 2, 2007 (*Massachusetts v. EPA*) that CO_2 is an air pollutant as defined under the Clean Air Act (CAA), and that the U.S. EPA has the authority to regulate GHG emissions. If the EPA Administrator finds that the six key greenhouse gasses threaten the public health and welfare through climate change, he makes a finding of adverse impact. This is called an endangerment finding. After making this finding, the Administrator must find that new motor vehicles contribute to GHG levels and thus threaten the climate. This is called a "cause or contribute" finding. On April 24, 2009, the EPA released a proposed endangerment finding and cause or contribute finding in the Federal Register. The final Endangerment Finding was published in December, 2009.

Concurrently with the development of the endangerment finding, EPA published mandatory reporting rules for major GHG sources (74 FR 16488) that would mandate GHG emissions reporting from thousands of sources, including certain landfills. Draft rules to incorporate GHG emissions into federal Title V and Prevention of Significant Deterioration (PSD) programs have also been developed.

It is believed that any EPA regulation of GHGs will be legally challenged by regulated industries and ultimately superseded by congressional legislation. The Obama Administration wants the United States to be an active participant in the U.N. Global Summit on climate change in Copenhagen in December 2009. However, the Administration's efforts are currently focused on domestic healthcare and on Middle East foreign policy. Congressional action on GHGs may be hampered by the slumping economy. EPA regulation may be the only reasonably anticipated federal GHG action.

Environmental groups are continuing to exert GHG control pressure on stationary sources (the EPA finding initially only covers motor vehicles). The Second Circuit Court on September 30, 2009, allowed a "public nuisance" lawsuit against coal-fired power plants to proceed based upon GHGs. Creation of national GHG policies through federal legislation is perceived as necessary in order to unify the fragmented efforts being developed by various administrative or judicial initiatives.

California

Senate Bill 1771

Senate Bill (SB) 1771 (Sher), adopted in September 2000, required the Secretary of the Resources agency to establish a nonprofit public benefit corporation, to be known as the "California Climate Action Registry," (CCAR). This agency was established for the purpose of administering a voluntary greenhouse gas (GHG) emissions registry to record and register voluntary greenhouse gas reductions that have been achieved since 1990. In 2008, the CCAR became a voluntary membership agency known as the California Action Reserve (CAR) that has no regulatory control or over-sight.

The CAR provides leadership on climate change by developing and promoting credible, accurate and consistent GHG reporting standards and tools for organization to measure, monitor and reduce their GHG emissions consistently across industry sectors and geographical borders, and subject to third-party verification. The CAR has developed a General Reporting Protocol (GRP, 2009) to guide businesses and government agencies to participate in the registry. The GRP guides participants through the rules and methodologies for voluntary reporting in the web-based system called the Climate Action Registry Reporting Online Tool (CARROT). Waste Management is a member of the Registry, and was designated a "Climate Action Leader" for developing a company-wide GHG inventory. The CAR has developed and recently updated a landfill-specific protocol entitled "Landfill Project Protocol, Collecting and Destroying Methane from Landfills, Version 2.1" dated October 14, 2009.

Assembly Bill 1493

In 2002, then-Governor Gray Davis signed Assembly Bill (AB) 1493 (Pavley 2002). AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicle and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the state." CARB adopted regulations in 2004 and applied to the USEPA for a waiver under the federal Clean Air Act to implement the regulation. The Pavley regulations incorporate both performance standards and market based compliance mechanisms. In addition to delivering GHG reductions, the standards will benefit California drivers by ultimately saving them an estimated $30 each month in avoided fuel costs (CARB Draft Scoping Plan, p. 20 (June 2008).

In December 2007, USEPA denied California's waiver request. California, among other states, is challenging that denial in federal court. AB 32, discussed below, states that if the Pavley regulations do not remain in effect, CARB shall implement alternative regulations to control mobile sources to achieve equivalent or greater GHG reductions (Health and Safety Code Sec 38590)

On June 21, 2007, CARB published its Proposed Early Actions to Mitigate Climate Change in California. The Early Action Plan describes recommendations for discrete early action measures to reduced GHG emissions (CARB 2007). These measures will become part of California's strategy for achieving GHG reductions under AB 32. One of the sources for the potential measures includes the CAT Report. Three new regulations have been adopted as "discrete early action greenhouse gas reduction measures," which include the following: a low carbon fuel standard; reduction of HFC-143a emissions from non-professional servicing of motor vehicle air conditioning systems; and improved landfill methane capture (CARB 2007). The discrete early action measures must be implemented by January 1, 2010. CARB estimates that by 2020, the reductions from those three measures would be approximately 13-26 million metric tons per year of carbon dioxide equivalent.

The California Integrated Waste Management Board (CIWMB) recently published a guidance document on reducing GHG emissions from landfills. This report from the CIWMB is designed primarily as a guidance document for landfill operators and regulators. It provides recommended technologies and management practices for reducing landfill gas (LFG) emissions through improved landfill design, construction, operation and closure. The report evaluates the effects that changes in landfill practices may have in reducing LFG emissions. It includes discussions on each technology and management options for applicability, cost and overall effectiveness in reducing greenhouse gas emissions. Waste Management endeavors to employ the practices outlined in this report at the Antelope Valley landfill to minimize GHG emissions.

Executive Order S-3-05 (2005)

In recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger announced the following GHG emission reduction targets, as established through Executive Order S-3-05: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.

Assembly Bill 32 (2006)

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Section 38500, et seq., or AB 32). It required the CARB to design and implement emission limits, regulations, and other measures to reduce statewide GHG emissions to 1990 levels by 2020 (representing a 25 percent reduction in emissions). The reduction would be accomplished through an enforceable statewide cap on global warming emissions and reduction measures that would be phased in starting by 2012. It also included a requirement for discrete early action measures that could be adopted as regulations and made effective by 2010. Some proposed early action measures will require new legislation to implement, some will require subsidies, some have already been developed, and

some will require additional effort to evaluate and quantify. AB 32 primarily establishes a timeframe for the CARB to adopt emissions limits, rules, and regulations, but does not provide thresholds or methodologies for analyzing a project's impacts regarding global climate change.

GHG emissions controls from landfills is one of the early action measures in AB-32 aimed at capturing methane from landfills throughout the state with an anticipated reduction of 1.5 million tons of GHGs per year. The adoption of the landfill rule in June, 2009, was the final "early action measure" required under AB-32. The landfill regulation was the second biggest emission reduction regulation, second only to the Low Carbon Fuel Standard.

CARB Scoping Plan (2008)

Pursuant to AB 32, the CARB adopted the Scoping Plan in December 2008, which is the State's plan to achieve GHG reductions in California required by AB 32. The Scoping Plan contains the main strategies California will implement to achieve reduction of 169 million metric tons (MMT) of carbon dioxide equivalent (CO_2E), or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO_2E under a business-as-usual scenario, and a reduction of 42 MMT CO_2E, or almost 10 percent, from 2002–2004 average emissions.

The Scoping Plan also includes CARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reductions are expected to be achieved from improving emission standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2E), implementation of the Low Carbon Fuel Standard (15.0 MMT CO_2E), energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2E), and a renewable portfolio standard for electricity production (21.3 MMT CO_2E). CARB has not yet determined what amount of GHG reductions from local government operations will be recommended; however, the Scoping Plan does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. The CARB is also developing an additional protocol for community emissions. CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The Scoping Plan states that the ultimate GHG reduction assignment to local government operations is to be determined (CARB, 2008). With regard to land use planning, the Scoping Plan expects approximately 5.0 MMT CO_2E will be achieved associated with implementation of SB 375, which is discussed further below.

Other Bills and Executive Orders

There are several other senate bills and executive orders that have been passed over the past several years and they relate to reducing GHG emissions from electricity generation (Senate Bills 1078, 107, and 1368, Executive Order S-14-08**)**; establishing guidelines for mitigating GHG emissions or the effects of GHG emissions under CEQA by 2010 (Senate Bill 97**)**; aligning regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation through adoption of a Sustainable Communities Strategy (SCS) or Alternative

Planning Strategy (APS) (Senate Bill 375); providing land use planning guidance related to sea level rise and other climate change impacts (Executive Order S-13-08); and establishing a Low-Carbon Fuel Standard (LCFS) and coordinating actions of the California Energy Commission, the CARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels.

Project-Related GHG Emissions

Four specific sources of increased GHG emissions are associated with the proposed landfill modifications. The proposed increase in daily disposal limits to 3,613 tons per day will require a larger number of disposal vehicles to bring material to the landfill. Exhaust emissions from disposal vehicles will increase. Large capacity haul trucks will be used to take away sorted recyclable materials. Additional heavy equipment will be required to spread, compact and cover the residual refuse, along with increased employees to operate the equipment.

Once the non-recycled materials are entombed, the organic fraction begins to decompose. The process rapidly changes from aerobic (oxygen sufficient) to anaerobic (oxygen deficient). In the dry climate of the Antelope Valley, the decomposition process is very slow. On average, approximately one-third of the organic fraction of refuse is still present 50 years after disposal. The byproduct of organic breakdown by anaerobic bacteria is primarily CO_2, CH_4 and H_20, which are the primary ingredients of landfill gas (LFG). These are all GHGs. The typical composition of "dry" LFG is around 45 percent CH_4, 40 percent CO_2 and 15 percent other gases, particularly inert nitrogen (N_2). The source test at the Antelope Valley Landfill in March, 2006, found the following breakdown within the LFG collection system:

Methane	42.7%
Carbon Dioxide	37.3%
Oxygen	1.2%
Non-Methane Organics	0.5%
Other Gases	18.3%

One molecule of CH_4 has 21 times the global warming potential (GWP) of one molecule of CO_2. Collection and disposal of LFG (rather than allowing for natural percolation through the cover soil) is required by law to control odor and other emissions. The conversion of CH_4 to CO_2 by combustion reduces the GWP of the captured/destroyed fraction by a factor of 21.

It is not possible to capture every molecule of LFG and its associated CH_4. Extraction of LFG is conducted with perforated pipes placed within the refuse operating under vacuum. Complete capture is not feasible because excessive vacuum draws atmospheric oxygen into the collection system. The combination of methane plus oxygen is explosive. The collection pipes also cannot be effectively placed within the shallow fringes at the edge of the refuse. The capture efficiency for retrofit systems drilled into old landfills is generally around 75 percent. When systems are installed in concert with creation of each new refuse cell, efficiency increases to 90+ percent. These factors are considered typical of existing and future landfill technology, and were the factors used in the previously completed environmental studies for the project. These "default" percentages were retained for analysis consistency rather than using site-specific factors for the

project site. Although collection efficiencies of 95+ percent have been reported at some landfills, the proposed Antelope Valley Landfill project will create a "new" landfill on only a portion of the existing footprint. A future LFG collection efficiency of 90 percent has therefore been assumed.

Of the future ten percent of uncaptured "fugitive" LFG, a portion of the CH_4 is oxidized to CO_2 by microbes in the cover material. The EPA default value for fugitive methane oxidation during percolation through cover material is ten percent. This value is low based upon numerous LFG flux measurements. Site-specific oxidation factor studies have measured a value of 35 percent oxidation (SCS Engineers, 2009). This site-specific measured rate has been assumed applicable to the continued future operation of the Antelope Valley Landfill (AVL) as well.

The project GHG emissions analysis was based on comparing emissions for pre-project conditions versus increased LFG production associated with proposed placement of 3,613 TPD of refuse. The baseline year that was selected was 2006, the year that AB-32 became law and the baseline year for the completion of other environmental (air quality) studies for the project. In 2006, AVL was producing approximately 896 cubic feet per minute (CFM) of LFG based upon a measured input of 672 CFM to the LFG disposal system. The sources of GHG emissions for baseline conditions included the following:

1. CO_2 collected in LFG control passed through the flare (37.3 % of all LFG)
2. CO_2 created when methane (CH4) is burned (42.7% methane in LFG - unburned CH4)
3. CO_2 escaping within fugitive LFG (25% fugitive x 0.373 CO_2 fraction in LFG)
4. CO_2 from oxidized CH4 within cover material (25% fugitive x 0.35 oxidation rate)
5. CH_4 within fugitive LFG not oxidized (25% fugitive x 0.65 not oxidized by microbes)
6. CH_4 within unburned LFG (42.7% methane in LFG x 0.009 unburned in flare)

The two residual sources of CH_4 (Nos. 5 & 6) must be weighed by their global warming potential (GWP) to establish CO_2 equivalent emissions. Most of these emissions are considered "biogenic" and are not created by the landfill itself. They would have occurred anyway and are not "new" GHG emissions to the earth's atmosphere. Various agencies have adopted landfill GHG reporting protocols. EPA's guidance in its "Greenhouse Gas Inventory Protocol" recommends that Sources 1, 2, 3 and 5 be reported as information items, but that they are not to be considered a direct project-related impact. This recommendation has been followed in this analysis.

Future scenarios were calculated based upon LFG / CH_4 emissions projections assuming that the collection efficiency increases to 90 percent and that the CH_4 fraction increases to 55 percent (Landfill engineers feel the 55 percent rate is slightly over-predictive, but it was used in this report to maintain analysis consistency with the assumptions used in the Lancaster Landfill and Recycling Project GHG Study).

A detailed inventory of non-LFG sources of project-related GHG emitters was developed as part of the criteria pollutant air quality impact analysis. That analysis quantified the existing level of landfill on-road traffic and the amount of off-road equipment use. The analysis also calculated the change in the refuse hauling and employee commuting, as well as the added off-road equipment operations that would accommodate a 3613 TPD disposal rate.

The input parameters for existing and proposed future conditions for diesel (D) and gasoline-powered equipment (G) as documented in the previously completed environmental (SEIR) studies were as follows:

	Existing	Proposed
Surface Street Trucks (D)	1945 VMT	4039 VMT
Freeway Truck Miles (D)	936 VMT	1944 VMT
Auto & Small Trucks (G)	1155 VMT	2530 VMT
Off-Road Equipment (D)	9016 HP-HR	11,864 HP-HR

Fuel efficiencies of 6 miles per gallon for diesel trucks, 13.75 miles per gallon for gasoline autos and small trucks and 0.066 gallons of diesel per horsepower hour (HP-HR) for off-road equipment were assumed. Internal combustion engine fuel consumption was calculated as follows (gallons/day):

Source:	Existing	Proposed
Heavy Trucks (D)	480	997
Auto / Small Truck (G)	84	184
Off-Road Equipment (D)	595	783

The CCAR Protocol provides CO_2 equivalent emissions factors for diesel and gasoline combustion as 22.35 pounds per gallon of diesel fuel and 19.98 pounds per gallon of gasoline (including small amounts on GWP-weighted non-CO_2 GHGs). As a worst-case assumption fuel efficiencies for on-road vehicles and off-road equipment were not assumed to change in the future.

The resulting combination of landfill gas and internal combustion engine GHG emissions for a typical work day are shown in Table 1 for baseline (2006) methane production of 383 CFM and future peak methane production of 1,080 CFM that would be achieved in 2023 if disposal volumes were to increase to 3,163 TPD in 2010. The daily increase in non-biogenic GHG emissions would be 12.1 MT per day if vehicular GHG emissions are assumed unchanged(worst-case) and peak GHG production occurs in the 2023 closure year.

Annual totals were calculated assuming that LFG is produced, collected and destroyed 365 days per year while refuse processing occurs on 306 days with the following GHG emissions results (metric tons (MT) of CO_2 -equivalent emissions per year):

Source	Existing	Proposed	Change
Combustion Engines	3,580	6,059	+2,479
Non-Biogenic Landfill Emissions	1,460	2,920	+1,460
TOTAL	5,040	8,979	+3,939
Biogenic GHGs	29,930	60,918	+30,988

Increased landfilling at 3,613 TPD will lead to a maximum project-related GHG emissions increase of 3,939 MT per year. This increase represents 0.0009 percent of the statewide inventory of 484,000,000 MT/year, and will be somewhat reduced by anticipated increased hauling efficiencies not included in the above analysis.

Table 1 - Antelope Valley Landfill GHG Emissions Summary (MT/day) and Annual MT/year

Source Daily (MT/day)	**Baseline – 2006**	**Future – 2023**
On-Road Trucks	4.9	10.1
On-Road Gasoline	0.8	1.7
Off-Road Equip.	6.0	8.0
Oxidized CH4	2.5	2.8
Fugitive CH4 in Flare	1.5	5.2
TOTAL – Non-Biogenic	15.7	27.8

Source Annual (MT/year)	**Baseline 2006 -1372 TPD**	**Proposed 2023 – 3613 TPD**
Combustion Engines (306 days)	3,580	6,059
Non-Biogenic Landfill (365 days)	1,460	2,290
Total	5,040	8,979

For purposes of this analysis, the incremental contribution of the proposed Project to global climate change would be considered significant if it would:

- Conflict with or obstruct implementation of the goals or strategies of Executive Order S-3-05 or the California Global Warming Solutions Act of 2006

- Result in increased exposure to one or more of the potential adverse effects of global warming identified in the California Global Warming Solutions Act of 2006 (Health & Safety Code, sec 38501, sub (a) or

- Exceed CARB's proposed mandatory reporting threshold of 25,000 metric tons of CO_2E per year. If the California Market Advisory threshold for industrial sources of 10,000 MT/year were to be exceeded, and enhanced level of GHG mitigation is considered warranted.

The proposed project will not conflict with AB-32 or create potential adverse effects of global warming. The project complies with all existing GHG control requirements for landfills. The 25,000 MT/year proposed mandatory reporting threshold would not be exceeded. It would similarly not cause the 10,000 MT/year threshold of the CARB Market Advisory Committee to be exceeded, and therefore would not be considered "substantial" in a CEQA sense. Nevertheless, because of the globally cumulative nature of anthropogenic GHG emissions and suspected global warming, any reasonably available additional control measures should be implemented on a project basis.

The recommended mitigation measures to reduce hauling and disposal GHG exhaust emissions are:

- The project shall include the following set of measures that, working together, will reduce operational greenhouse gas emissions of the project and the effects of global warming:

    - Hauling trucks shall be powered by liquefied natural gas (LNG) or ultra-low sulfur diesel fuel.

    - Idling of heavy-duty hauling trucks in excess of five minutes, and idling of off-road mobile sources of any type in excess of ten minutes shall be prohibited.

    - When new landfill equipment is purchased by WMI, new commercially available equipment shall be purchased that meets or exceeds California's emission standards in effect at the time of purchase.

    - Onsite vehicles and equipment shall be properly maintained by being serviced at least every 90 days and once annually in compliance with Department of Transportation (DOT) requirements.

- Operation equipment used for the proposed project shall use clean alternative (i.e., non-diesel/biodiesel) fuels, or use equipment that has been retro-fitted with diesel particulate reduction traps or equivalent control technology, using equipment certified by CARB. Such equipment is now subject to CARB's new regulation to control PM emissions from off-road diesel engines.

- For the purchase of primary heavy duty, diesel powered landfill equipment at AVPL (dozers and compactors), if equipment meeting California's 2014 emission standards for off-highway, heavy duty diesel equipment is commercially available before 2014, WMI shall purchase such equipment as older equipment is replaced.

- Within three years of project approval, the applicant shall develop a Greenhouse Gas Reduction Plan that demonstrates how the AVPL will achieve by 2020 a reduction in annual GHG emissions such that emissions are no greater than 10 percent below 2006 levels and will meet or exceed all regulatory requirements related to GHG control. The Reduction Plan shall include one or more of the following measures, or combination thereof:

  - Use of B-5 or B-20 Biodiesel in on-site equipment and in heavy duty truck fleets (and as a condition of future contract approvals if third-party haulers are used)

  - Use of hybrid hauling trucks

  - Use of Best Available Control Technology and BMPs when designating new waste disposal cells (e.g., by designing any additional gas collectors in bottom liner systems) and to increase gas combustion capacity/improve flare destruction efficiency

  - Reconsider the feasibility of gas-to-energy production capacity in the future for use in fueling vehicles, operating equipment or energy conversion

  - Increased diversion of organic material from landfill disposal and use as landfill cover material

  - Increased recycling and carbon offsets

  - The plan shall include cost estimates for GHG reduction measures and identify funding sources. The plan shall include an implementation schedule that demonstrates substantial GHG emission reductions prior to the 2020 deadline, including implementation of "Early action" measures that may be implemented within three years of plan approval. The plan shall include an updated inventory of projected GHG emissions and an updated estimate of GHG emissions in 1990. The plan shall be subject to review and approval by AVAQMD.

  - Increase waste diversion of recyclable materials

- Following closure of the landfill, the applicant shall continue to operate, maintain, and monitor the landfill gas collection and treatment system as long as the landfill continues to produce landfill gas, or until it is determined by the ACAQMD that emissions no longer constitute a considerable contribution to greenhouse gas emissions, whichever comes first.

1,800 Disposal Alternative

The suggested project alternative is to allow for the consolidation of the two existing disposal units, but to limit the average daily refuse placement at the currently permitte4d maximum of 1,800 tons per day. This alternative would delay final closure because of full capacity by almost 20 years. It would increase average daily traffic, but not to the same extent as the proposed 3,613 ton per day project. The GHG impact from the 1,800 TPD alternative was calculated using the following assumptions:

1. Off-road sources-one additional compactor was assumed necessary operating at 356 HP for eight hours.

2. On-road sources-on road traffic was assumed to grow at an intermediate rate between projected future versus existing traffic using the following multiplier:

   Existing VMT + (1800-1372)/(3613-1372) x (Future VMT – Existing VMT)

   With the following projected VMT and associated fuel use:

	VMT	Fuel Use
Surface Street Tracks (D)	2,343	390
Freeway Trucks (D)	1,128	188
Auto and Small Trucks (G)	1,416	103

3. LFG Production will increase more slowly. Peak production of 1,600 CFM will be achieved in 2040. As assumed for the proposed project, the methane percentage was assumed at 55 percent and the LFG capture efficiency was assumed to be 90 percent.

   Daily and annual GHG emissions for this alternative, compared to existing and proposed disposal scenarios, are as follows:

Daily (MT/day)	**Baseline 2006 -1372 TPD**	**Proposed 2023 – 3613 TPD**	**Alternative 2040 – 1800 TPD**
On-Road Trucks	4.9	10.1	5.9
On-Road Gasoline	0.8	1.7	0.9
Off-Road Equipment	6.0	8.0	8.0
Oxidized CH4	2.5	2.8	2.3
Fugitive CH4 in Flare	1.5	5.2	4.0
Total Non-Biogenic	15.7	27.8	21.1

Annual (MT/year)	Baseline 2006 -1372 TPD	Proposed 2023 – 3613 TPD	Alternative 2040 – 1800 TPD
Combustion Engines (306 days)	3,580	6,059	4,529
Non-Biogenic Landfill (365 days)	1,460	2,290	2,300
Total	5,040	8,979	6,829

The 1,800 TPD alternative would not cause the most stringent candidate significance threshold of 10,000 MT/year to be exceeded, and it would not interfere with programs, plans and policies to reduce GHG emissions to mandated levels. The GHG impact of the 1,800 TPD alternative is considered less-than-significant.

Attachment: Emissions calculations spread sheet (Excel File)

Existing	
On-Road T	4.876364
On-Road Gas	0.762873
Off-Road Equipment	6.044659
Future 2023	
On-Road Trucks	10.12861
On-Road Gas	1.671055
Off-Road Equipment	7.954568
Landfill Gas - Existing	
CO2 Flare Pass-Through	18.70349
CO2 from Combustion	21.21854
Fugitive CO2	6.234498
Oxidized methane	2.497978
Unoxidized methane	35.892
Unburned methane	1.490898
Landfill Gas - Future	
CO2 Flare Pass-Through	49.17338
CO2 from Combustion	71.85731
Fugitve CO2	5.447127
Oxidized methane	2.835491
Unoxidized methane	40.41164
Unburned methane	5.195782
1800 TPD Alternative	
CO2 Flare Pass-Through	40.06996
CO2 from Combustion	58.57527
Fugitive CO2	4.477091
Oxidized methane	2.313164
Unoxidized methane	32.90662
Unburned methane	4.041164

Appendix D-1

Combined Report of Hydrology and Hydraulics Design and Capital Flood Floodplain Analysis, Golder Associates
June 2004

Golder Associates Inc.

230 Commerce, Suite 200
Irvine, CA USA 92602
Telephone (714) 508-4400
Fax (714) 508-4401
www.golder.com

COMBINED REPORT

HYDROLOGY AND HYDRAULICS DESIGN ANTELOPE VALLEY PUBLIC LANDFILL PALMDALE, CALIFORNIA

AND

CAPITAL FLOOD FLOODPLAIN ANALYSIS – ANAVERDE CREEK

Submitted to:

Antelope Valley Public Landfill
Waste Management, Inc.
1200 City Ranch Road
Palmdale, California 93551

Prepared by:

Golder Associates Inc.
230 Commerce, Suite 200
Irvine, California 92602

June 2004

Scott G. Sumner, P.E.

REGISTERED PROFESSIONAL ENGINEER
SCOTT G. SUMNER
No. C049769
Exp. 9-30-04
CIVIL
STATE OF CALIFORNIA

033-1857

1.0 INTRODUCTION

Golder Associates Inc. (Golder) is pleased to present the results of the Hydrology and Hydraulics studies performed on behalf of Waste Management Inc. (WMI) for the Antelope Valley Public Landfill (AVPL). The report has been divided in to two sections as follows:

Section 1 – Hydrology and Hydraulics Design, Antelope Valley Public Landfill, Palmdale, California. This report evaluates the impacts of the proposed project on off-site flows that report to Anaverde Creek. The report provides and analysis of pre-developed conditions, post-development without mitigation and post-development with mitigation to attenuate the peak flow from the Los Angeles County Department of Public Works (LACDPW) 50-year Capital Flood. Stormwater retention/detention basins are proposed as well as other Best Management Practices (BMPs) are proposed to manage stormwater runoff from the project.

Section 2 – Technical Report Capital Flood Floodplain Analysis – Anaverde Creek, Antelope Valley Public Landfill, Palmdale, California. This report evaluates the potential for scour within Anaverde Creek in the vicinity of AVPL. The report develops floodplain and surface water profiles to develop a means to protect the proposed project from scour, if it occurs. Based on the evaluations, scour protection is recommended and design alternatives are proposed.

Section 1

Golder Associates Inc.
230 Commerce, Suite 200
Irvine, CA USA 92602
Telephone (714) 508-4400
Fax (714) 508-4401
www.golder.com

Golder Associates

HYDROLOGY AND HYDRAULICS DESIGN
ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

Submitted to:

Waste Management, Inc.
1200 City Ranch Road
Palmdale, California 93551

Prepared by:

Golder Associates Inc.
230 Commerce, Suite 200
Irvine, California 92602

Revised: June 2004

Scott G. Sumner, P.E.

REGISTERED PROFESSIONAL ENGINEER
SCOTT G. SUMNER
No. C049769
Exp. 9-30-04
CIVIL
STATE OF CALIFORNIA

033-1857.2

SECTION 1

HYDROLOGY AND HYDRAULICS DESIGN
ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

Submitted to:

Waste Management, Inc.
1200 City Ranch Road
Palmdale, California 93551

Prepared by:

Golder Associates Inc.
230 Commerce, Suite 200
Irvine, California 92602

Revised: June 2004

033-1857.2

Scott G. Sumner, P.E.

TABLE OF CONTENTS

SECTION PAGE

1.0 INTRODUCTION 1

2.0 BACKGROUND 1

3.0 PHYSICAL SETTING 2

4.0 PRE-DEVELOPMENT HYDROLOGY 2
- 4.1 Objective 2
- 4.2 Methodology 3
  - 4.2.1 Times of Concentration 3
  - 4.2.2 Hydrologic Routing 3
- 4.3 Results 4

5.0 POST-DEVELOPMENT HYDROLOGY 4
- 5.1 Objective 4
- 5.2 Methodology 4
- 5.3 Results 5

6.0 COVER SOIL EROSION LOSS ESTIMATES 6
- 6.1 Objective 6
- 6.2 Methodology 7
- 6.3 Results 7

7.0 HYDRAULIC STRUCTURES 7
- 7.1 CMP 8
- 7.2 Benches 8
- 7.3 Concrete Channels 8
- 7.4 Detention Basins 8
- 7.5 Erosion Control 9

8.0 CONCLUSIONS 9

9.0 REFERENCES 10

LIST OF TABLES

Table 1	Pre-Development Design Rainfall Depths
Table 2	Pre-Development 50-Yr Capital Flood Time of Concentration Input
Table 3	Pre-Development 50-Yr Capital Flood Time of Concentration Output
Table 4	Pre- and Post-Development Peak Flows at Reporting Locations
Table 5	Pre- and Post-Development Debris Production
Table 6	Pre- & Post-Development Bulking Calculation
Table 7	Post-Development Design Rainfall Depths
Table 8	Post-Development 50-Yr Capital Flood Time of Concentration Input
Table 9	Post-Development 50-Yr Capital Flood Time of Concentration Output
Table 10	CMP Downchutes and Culverts Design Summary
Table 11	Typical Post-Development Earth Benches - Maximum Length
Table 12	Concrete Channels Design Summary
Table 13	Post -Development Discharge Velocities and Erosion Control

LIST OF FIGURES

Figure 1	Site Map
Figure 2	Pre-Development Hydrology Map with 50-Year Capital Flood Isohyets
Figure 3	Pre-Development Hydrology Map with LACPDW Soil Types
Figure 4	Pre-Development Hydrology Map with Debris Potential Areas
Figure 5	Post-Development Hydrology Map with 50-Year Capital Flood Isohyets
Figure 6	Post-Development Hydrology Map with LACDPW Soil Types
Figure 7	Post-Development Hydrology Map with Debris Potential Areas
Figure 8	Post-Development Surface Water Control Plan
Figure 9	Pre-Development Hydrographs at Reporting Points
Figure 10	Post-Development Hydrographs at Reporting Points
Figure 11	Basin Outlet Details
Figure 12	Post-Development Hydrographs with Attenuation from West and South Ponds
Figure 13	Typical Riprap-lined Auxiliary Spillway
Figure 14	Soil-Lined Bench Flowing Full (Typical Cross Section)

LIST OF APPENDICES

Appendix A	Pre-Development Hydrology Calculations – F0601 Files
Appendix B	Post-Development Hydrology Calculations – F0601 Files
Appendix C	Cover Soil Erosion Loss Calculations
Appendix D	Post-Development Hydrology Calculations – SEDCAD & RETARD Files

1.0 INTRODUCTION

This document is an update to Golder Associates Inc.'s (Golder's) report *Hydrology and Hydraulics Design, Antelope Valley Public Landfill, Palmdale, California* dated January 2001. The report was previously update in August 2003 to meet the requirements of the Los Angeles County Department of Public Works (LACDPW) *Hydrologic Method, Addendum to the 1991 Hydrology/Sedimentation Manual* dated June 2002. This update includes debris basin design and the approach to post development peak runoff reduction. The purpose of this document is to provide sufficient detail for planning and permitting of the proposed project. Additional design will be required prior to construction including design of interim structures.

Presented within this document (Volume I) are the analytical methods used and the results of hydrologic analyses and hydraulic design performed for the pre- and post-development conditions at the Antelope Valley Public Landfill (AVPL), soil erosion loss calculations, sizing of conveyance structures (channels, downchutes, etc.) and sizing requirements for sedimentation/detention basins are also presented. Limits of the floodplain and flow velocities in the Anaverde Creek channel adjacent to the AVPL are presented in Volume II.

2.0 BACKGROUND

The AVPL comprises 185 acres of land (see Figure 1) with two separate landfills (Landfill I and Landfill II) spreading over three parcels known as Parcels 1, 2 and 3. Each landfill is currently operated under a separate Solid Waste Facilities Permit (SWFP) and a separate Waste Discharge Requirements (WDR) issued by the State of California. The site is located within the incorporated City of Palmdale. The combined landfill will be operated as a single facility, with an ultimate disposal area of approximately 125 acres. The balance of 60 acres will be partly developed, partly remain undeveloped, and partly contain landfill operation buildings or facilities.

The pre-development surface water drainage at the AVPL can be separated into three basic elements:

- Run-off from undeveloped land (800 and 900 series of hydraulic subbasins) located west of the current landfill flows south to Anaverde Creek at Reporting Points A and B (see Figures 2 through 4);
- Run-off from undeveloped or partially developed land (including portions of Landfill 1) (700 series of hydraulic subbasins) is conveyed southwards to Anaverde Creek at Reporting Point C (see Figures 2 through 4); and
- Run-off from the eastern portion of Landfill 1 and existing facilities (600 series of hydraulic subbasins) to Anaverde Creek at Reporting Point D (see Figures 2 through 4);

The post-landfill surface water drainage at the AVPL can be separated into five basic elements:

- Run-on from the northern (100 series of hydraulic subbasins) undeveloped land located outside of the landfill property which is conveyed westwards and southwards around the landfill perimeter to Anaverde Creek at Reporting Point A (see Figures 5 through 7);

- Run-off from the northwest quarter (200 series of hydraulic subbasins) of the landfill is conveyed through the proposed West Basin to combine with the run-on from the north flowing to Anaverde Creek at Reporting Point A (see Figure 5 through 7).;

- Run-off from the southern and northeastern portions of the landfill (400 series of hydraulic subbasins) is conveyed through the proposed South Basin to Anaverde Creek at Reporting Point B (see Figure 5 through 7);

- Run-off from a small area south of the landfill (500 series of hydraulic subbasins), near the west edge of the existing landfill discharging to Anaverde Creek at Reporting Point C (see Figure 5 through 7), and

- Run-off from the southeastern portion of the landfill and a relatively small portion of the run-on north of the property boundary (300 series of hydraulic subbasins) is conveyed eastwards and southwards through the channels and culverts to Anaverde Creek at Reporting Point D (see Figure 5 through 7).

The City of Palmdale Drainage Master Plan requires peak flows discharging from developed areas be attenuated to 85 percent of the pre-development peak flow.

Also, the City of Palmdale required, in a letter dated January 29, 1999 and sent to Waste Management, Inc. (WMI) that the bulked LACDPW Capital Flood be used for the hydrologic evaluations. In addition, the design of on-site drainage systems must be evaluated in accordance with the California Code of Regulations (CCR) Title 27 requirement for the 100-year (yr), 24-hour (hr) event. There are several hydrologic evaluations previously prepared by AKM Consulting Engineers (AKM) for the Anaverde Creek Basin that include the site (AKM, 1991; AKM, 1995). As these hydrologic analyses have been reviewed extensively and approved by the City of Palmdale and LACDPW, these documents were utilized as a source of data in Golder's analyses.

3.0 PHYSICAL SETTING

The AVPL is immediately adjacent to the northern bank of the Anaverde Creek drainage. Within the vicinity of the landfill, Anaverde Creek is a linear topographic depression formed by the San Andreas Fault. A linear northwest-southeast trending set of continuous ridges located immediately north of Anaverde Creek forms the northern boundary of the watershed. Surface elevations at the site range from approximately 2,840 feet near the toe of the landfill to 3,200 feet above mean sea level (msl) in the ridgeline to the north. The ground surface at the AVPL slopes to the south and southeast, toward Anaverde Creek. Anaverde Creek drains to the east toward the City of Palmdale.

4.0 PRE-DEVELOPMENT HYDROLOGY

4.1 Objective

The objective of the pre-development hydrologic study is to evaluate the run-off contribution to Anaverde Creek from the land located within and upgradient of, the ultimate landfill footprint. The permitted post-development peak flow contribution to Anaverde Creek, or Q_{DESIGN}, is then obtained

based on the criteria established by the City of Palmdale Master Drainage Plan and stated in Section 2.0 of this document.

4.2 Methodology

The pre-development hydrologic study was performed in accordance with the methods described in the LACDPW Hydrology & Sedimentation Manual Addendum. Watershed delineation was performed with the existing pre-development site topography to identify drainage areas contributing to specific drainage points, as shown in Figure 2. These subbasins (and their topographic parameters) were then used in the following calculations.

4.2.1 Times of Concentration

Times of concentration were determined at each drainage point using the LACDPW Time of Concentration Spreadsheet, provided on the *Addendum to the 1991 Hydrology/Sedimentation Manual* CD-ROM (September 2002). Inputs to this program include subbasin geometric characteristics (area, flow length, and slope), isohyetal flood depth, and soil type number as defined by LACDPW. Capital Flood isohyetal rainfall depths were computed using the LACDPW isohyetal method with Figure 2, which also shows the isohyetal rainfall lines taken from the LACDPW Hydrology & Sedimentation Manual Addendum. Soil types were assigned to each subbasin using Figure 3, which shows the subbasins in relation to soil type boundaries that were taken from "Anaverde Creek Basin Hydrology Study, Upstream of Antelope Valley Freeway", AKM Consulting Engineers, 1991. This data was used because the hydrology map available from LACDPW has no soil number data in the vicinity of the project site.

4.2.2 Hydrologic Routing

Hydrologic routing computations were performed using the F0601 software as prescribed by the LACDPW. Inputs to this program include subbasin data (areas, LACDPW soil type numbers, times of concentration, and effective imperviousness), conveyance channel information (shape, bottom width, sideslope, hydraulic roughness, and length), and subbasin connectivity information, i.e.: how the drainage network is connected. The burn adjustment to basin runoff coefficients described in the LACDPW Hydrology & Sedimentation Manual Addendum is automatically handled by the F0601 software when 200 is added to the soil type number for that basin. The burn adjustment was performed for undeveloped areas (i.e. areas that will remain undisturbed). No burn adjustment was performed for developed areas (i.e. the landfill and site facilities), following guidance from Curtis Page of the LACDPW Land Development Division.

The F0601 software employs the Modified Rational Method for hydrologic routing as described in the LACDPW Hydrology & Sedimentation Manual Addendum. The hydrologic routing computations produced burn-adjusted Capital Flood hydrographs at four reporting points, labeled A through D as shown on Figure 2.

4.3 Results

Inputs and outputs of the pre-development hydrology study are presented in this report as indicated in the following:

- Pre-Development design rainfall depths are included in Table 1,
- Pre-Development time of concentration calculation inputs are included in Table 2; the corresponding outputs is included in Table 3,
- Pre-Development hydrologic routing from the F0601 program is in Appendix A and summarized on Table 4.
- Debris production calculation results are included in Table 5, and
- Peak flow bulking results are included in Table 6.

For purposes of determining the permissible post-development peak flow contribution to Anaverde Creek (Q_{DESIGN}), the burn-adjusted, clear water pre-development peak flows at each of the four reporting points: 46 cubic feet per second (cfs) at A (902A), 111 cfs at B (804A), 93 cfs at C (706A), 16 cfs at D (602A), summarized in Table 4, were added to give a conservative value of 266 cubic feet per second (cfs). This value was then multiplied by 85% to give a Q_{DESIGN} value of 226 cfs. The attenuated flow is conservative since it provides for attenuation of off-site flows to 85% of the existing peak flow. A sum of the four individual hydrographs is presented in Figure 9. Total debris production to Anaverde Creek was computed in a similar manner by summing the debris production at the four reporting points, giving a total pre-development debris production of 5,534 cubic yards (cy).

5.0 POST-DEVELOPMENT HYDROLOGY

5.1 Objective

The objective of the post-development hydrologic study is to evaluate the run-off contribution to Anaverde Creek from the land located within and upgradient of, the ultimate landfill footprint after the proposed landfill project has occurred. The post-development peak flow contribution to Anaverde Creek is computed and compared to the permissible value, Q_{DESIGN} (226 cfs), to ensure that the proposed project will not result in peak flow exceeding 85 percent of the pre-development peak flow value. Post-development debris production is used to determine the required debris storage volume in the proposed South and West retention/detention basins. Peak bulked flows are used to size the flow control structures prior to reaching the basins.

5.2 Methodology

The post-development hydrologic study was performed in accordance with the methods described in the LACDPW Hydrology & Sedimentation Manual Addendum. Watershed delineation was performed with proposed post-development site topography to identify drainage areas contributing to specific drainage points, as shown in Figure 5 through 7. These subbasins (and their topographic parameters) were then used in calculations following the same methods that were previously discussed in Section 4.2.

Debris production calculations were performed in accordance with the methods described in the LACDPW Hydrology & Sedimentation Manual. These methods involve an area-weighting calculation with debris production rates that vary depending on Debris Potential Area (DPA), shown on Figure 7. Following the guidance of the City of Palmdale, the landfill is assumed to have the same debris potential area as the pre-development area and debris production calculations were performed in a similar manner as the pre-development condition.

Grading for the proposed South and West basins was performed in AutoCAD and the locations are shown in Figures 5 through 8. Due to space limitations, both the proposed South and West basins will combine the debris capture and flood attenuation functions in a single basin. Both basins were sized to store the estimated volume of debris (2,073 yd^3 at 413AC for the proposed South Basin and 866 yd^3 at 204A for the proposed West Basin). As indicated in the LACDPW Sedimentation Manual (Section 4.D) the sediment volume for a retention/detention basin is below the spillway elevation and assumed to be level. The flow is then attenuated using the inflow hydrographs (200-series for the West Basin and the 400-series for the South Basin) to a rate for which the peak-combined discharge from points A, B, C, and D is no greater than 85 percent of the pre-development peak flow. Perforated riser outlet stage-discharge relationships were developed using SEDCAD software (Civil Software Design, 1999). Outflow hydrographs from F0601 for the 200- and 400-series subbasins were routed using the RETARD routing and pond discharge software (Civildesigns, 1993) assuming the bottom of the basins were already filled with the estimated debris volume from the 200- and 400-series, respectively.

To design on-site drainage systems in accordance with Title 27 requirements for a 100-yr 24-hr storm event, a factor of 1.12 is applied to the isohyet obtained from the Isohyetal Map (Personal Communication with Mr. Mike Miranda, 2002). The computed rainfall depths for the 100-year 24-hr storm were input into the Los Angeles County F0601 software, based on the Modified Rational Method, to prepare hydrographs. The various drainage areas described previously were taken from Figure 5.

5.3 Results

Inputs and outputs of the post-development hydrology study are presented in this report as indicated in the following:

- Post-Development design rainfall depths are included in Table 7,
- Post-Development time of concentration calculation inputs are included in Table 8; the corresponding outputs are included in Table 9,
- Post-Development hydrologic routing from the F0601 program is in Appendix B and summarized on Table 4,
- Debris production calculation results are included in Table 5, and
- Peak flow bulking results are included in Table 6.

The burn-adjusted, clear water, unattenuated, post-development peak flows at each of the four reporting points: 117 + 39 = 156 cfs at A (105A + 204A), 97 cfs at B (413AC), 7 cfs at C (502A), 30 cfs at D (309AB), summarized in Table 4, were added to give a conservative value of 290 cfs. A sum of the four individual unattenuated hydrographs is presented in Figure 10. Proposed detention basins

on the west, and south portions of the post-development site are designed to, in combination, attenuate the estimated post-development peak flow to much less than Q_{DESIGN} (226 cfs).

Output hydrographs from F0601 output for 204A and 413AC were routed through the West and South Basins respectively using RETARD and the results are presented in Appendix D. Both basins are designed using a SEDCAD software utility (see Appendix D for SEDCAD output) with vertical 48-inch diameter perforated risers (see Figure 11) to trap debris and attenuate the inflows as much as practicable. Figure 12 presents the summed hydrograph from the attenuated and unattenuated hydrographs at reporting points A, B, C, and D. The resulting peak discharge to Anaverde Creek is 160 cfs, 29 percent less than the Q_{DESIGN} (226 cfs). Both basins also have auxiliary spillways designed to pass the 50-year Capital Flood should they be full at the onset of the 50-year Capital Storm (see Figure 13).

The estimated post-development debris production to Anaverde Creek is 2,378 yd^3 (calculated by summing the values in Table 5). The estimated 866 yd^3 from 204A and the 2,073 yd^3 from 413AC (reference Table 5) will be captured in the proposed West and South Basin, respectively. The debris captured in the basins represents in a significant reduction in debris reaching Anaverde Creek compared to the pre-development condition. Additionally, areas of the project that potentially contribute debris to Anaverde Creek will be controlled to the extent possible with best management practices (BMPs) such as straw bales and silt fences.

The following table summarizes the inflow, outflow and tributary area for the West and South Basin debris/detention ponds:

Location	Peak Inflow (cfs)	Peak Outflow (cfs)	Tributary Area (acres)
West Basin	39	3	34
South Basin	97	3	105

6.0 COVER SOIL EROSION LOSS ESTIMATES

6.1 Objective

The objective of the cover soil erosion loss estimates is to evaluate the soil loss potential due to water erosion using the Revised Universal Soil Loss Equation (RUSLE), developed by the U.S. Department of Agriculture (USDA). RUSLE considers soil and vegetation type as well as physical and climatic features of the landfill area.

6.2 Methodology

The RUSLE can be used to evaluate landfill cover soil loss. This equation may be stated as:

A = R K LS C P, where

A = average annual soil loss, in tons per acre per year

R = rainfall and runoff erosivity index

K = soil erodibility factor

LS = hill slope length and steepness factor

C = cover-management factor

P = support practice factor

For the purpose of soil loss analysis, the landfill was divided into lots based upon the average slopes of the final cover and surface drainage characteristics as shown in Attachment C.

The RUSLE factors for the AVPL were assigned as follows:

R = 10	Index for the Palmdale area provided by the USDA, which best represents weather conditions at the site.
K = 0.238	It is assumed that the textural class of the final cover material will be of a "sandy loam" based on the average grain size distribution curve of the proposed final cover material.
LS	Dependent upon length and average gradient of lot under consideration. Values range from 0.49 to 8.38 for this application.
C = 0.135	"C" represents the effects of plants (California annual grass), soil cover, soil biomass (roots and incorporated residue), and soil-disturbing activities on soil loss.
P = 1.0	"P" accounts for reduction of erosion due to land management practices and is conservatively assumed to be 1.0 (highest value) for the entire landfill site.

6.3 Results

Based on the soil erosion analyses presented in Appendix C, the average soil loss is approximately 2.22 ton/acre/year, or approximately 187 cubic yards per year for the landfill area. The soil loss is within the limits or 2 to 3 tons/acre/year that is considered acceptable for soil loss from a landfill closure cover.

7.0 HYDRAULIC STRUCTURES

The principal hydraulic structures to be installed at the AVPL between now and final closure of the landfill site will include corrugated metal pipe (CMP) downchutes, concrete channels, soil lined channels, bench crossings, and sedimentation basin(s). Some CMP downchutes, CMP culverts and drainage channel structures have been designed to accommodate the most significant flows. These selected drainage structures are shown on Figure 8. The hydraulic structures on and around the

landfill will be designed to meet the requirements of the California Code of Regulations Title 27. Final designs will be performed using the selected material types and peak flows for the 100-year 24-hr storm.

7.1 CMP

CMP downchutes on sideslopes (approximately 40 percent grade) and bench crossings (approximately 10 percent grade) should have a minimum pipe diameter ranging from 24 to 36 inches in order to accommodate the 100-yr 24-hr storm event, as shown by Structure No. 10 on Table 11. CMP culverts should have a minimum pipe diameter ranging from 24 to 48 inches in order to accommodate the same storm event.

7.2 Benches

Most benches will be graded at a 2 percent slope and will have a cross-slope of 1 foot vertical to 15 feet horizontal, as shown on Figure 14. Corrugated Metal Pipes (CMPs) have been spaced in order to control erosion of the benches by controlling the maximum flow velocity on the benches. Using a Manning coefficient of 0.024 for moderately weathered earthen channels, it was assumed that the maximum flow velocity on the benches is 3.50 feet per second (fps), in order to minimize erosion, and that a minimum freeboard of 6 inches would be maintained to prevent overtopping of the benches. Calculations for the maximum allowable length of an earth-lined bench are presented in Table 11. The preliminary surface water control plan layout presented on Figure 8 reflects these conditions.

7.3 Concrete Channels

Various channel geometries were assumed at the site in order to evaluate the times of concentration for the different hydrologic studies presented herein. The diversion channel, which will intercept the run-on flows, was assumed to have a bottom width of 5 feet and a slope of 1 percent, as shown on Table 12. The concrete channel, which is parallel to the run-on channel and discharges in the proposed West Basin, was assumed to have a bottom width of 10 feet and a slope ranging from 4 to 10 percent. The eastern concrete channel which runs north south along the eastern side of the landfill was assumed to have a bottom width of 3 to 5 feet and an average slope of 12 percent. Finally, the concrete channel located along the access road was assumed to have a bottom width ranging from 3 to 5 feet and a slope ranging from 0.5 to 10 percent.

7.4 Detention Basins

Based on the pre- and post-development hydrologic analyses presented in this document, some of the stormwater must be detained on site to attenuate the peak flow discharging from the site to Anaverde Creek to a level that does not exceed Q_{DESIGN}. It is proposed that this attenuation be accomplished by the two retention/detention basins shown on Figure 8. As was discussed previously, these detention basins are designed to attenuate peak flows during the Capital Flood to fulfill the City of Palmdale's 85 percent requirement. A detailed discussion is presented in section 5.3.

7.5 Erosion Control

The landfill will implement Best Management Practices (BMPs), as necessary, to maintain compliance with National Pollution Discharge Elimination System (NPDES) Phase II requirements to remove sediment (to the extent practicable) from stormwater runoff prior to discharge to Anaverde Creek. In additions to the two proposed retention/detention basins, compliance with NPDES Phase II requirements for BMPs will be implemented, as suggested in the City of Palmdale's Stormwater Management Plan (SWMP), using methods such as: preserving existing vegetation, hydro-seeding, soil binders, drainage swales and ditches, straw bales, silt fences, and erosion control blankets as necessary for source control of sediments.

To reduce the potential for scour in the four discharge reporting points to Anaverde Creek, riprap armoring is recommended for the discharge channels at the A, C, and D outfalls to Anaverde Creek. Table 13 summarizes the 50-year peak flow, channel slopes, and recommended channel geometries and riprap armoring to protect these three reporting points, respectively. The relatively small flows discharging from the two retention/detention ponds do not require additional armoring as the West Basin discharges into the recommended 8-foot wide armored channel going to reporting point A and the South Basin discharges directly to Anaverde Creek where the peak flow is expected to be orders of magnitude higher.

In addition to the NPDES requirements other regulations were reviewed for applicability. The primary regulations included:

- U.S. Environmental Protection Agency (USEPA) Total Maximum Daily Loads (TMDLs). Under the Clean Water Act (CWA) TMDLs are imposed on impaired surface water bodies. Anaverde Creek is not listed on the 2000 Section 303 (d) List of impaired water bodies and therefore TMDLs are not established for the watershed.

- As part of meeting NPDES requirements Los Angeles County has developed the requirement for "Standard Urban Stormwater Mitigation Plans" (SUSMP). Antelope Valley and this project are outside the jurisdictional limits of the SUSMP program and is therefore not applicable.

8.0 REFERENCES

Based on the results presented within this report the proposed Antelope Valley Public Landfill project is able to attenuate the peak flow to less than 85% of the predevelopment condition. The site will require two retention/detention basins be constructed on the west and southern sides of the site. Additional design of on-site conveyance structures will be required prior to construction to ensure interim conditions do not exceed the final design flows.

9.0 REFERENCES

AKM Consulting Engineers, 1991. "Anaverde Creek Basin Hydrology Study, Upstream of Antelope Valley Freeway", report to the City of Palmdale dated December 1991.

AKM Consulting Engineers, 1995. "Anaverde Creek Hydrology Study", letter to George Wolfrank, City of Palmdale dated March 16, 1995.

Chow, V. T., 1959. "Open-channel hydraulics", New York: McGraw Hill.

City of Palmdale, 2003. "Stormwater Management Plan (SWMP)", August 21, 2003.

Civildesigns, 1993. User's Manual Program "RETARD", Joseph E. Bonadiman & Associates, Inc. San Bernardino, California.

Civil Software Design, 1999. *SEDCAD 4 for Windows* [computer software]. Version 2000.05.10.

BSI Consultants, 1988. "City of Palmdale Drainage Master Plan", 1988.

Golder Associates (2004), "Capital Flood Floodplain Analysis, Anaverde Creek, Antelope Valley Public Landfill, Palmdale, California", June 2004.

Golder Associates (2001), "Hydrology and Hydraulics Design, Antelope Valley Public Landfill, Palmdale, California", January 2001.

LACDPW, 1991. "Hydrology/Sedimentation Manual", Los Angeles County Department of Public Works, Hydraulic/Water Conservation Division, December 1991.

LACDPW, 2002. "Hydrologic Method, Addendum to the 1991 Hydrology/Sedimentation Manual", Los Angeles County Department of Public Works, Water Resources Division, June 2002.

LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division, September 2002.

Personal Communication, Telephone conversation with Dr. Iraj Nasseri, Chief of Hydrology, LACDPW, October 31, 2000.

Personal Communication, Telephone conversation with Mr. Mike Miranda, LACDPW, December 3, 2002.

Personal Communication, Telephone conversation with Mr. Curtis Page, LACDPW, August 13, 2003.

USGS, 1974. Ritter Ridge Quadrangle, California – Los Angeles Co., 7.5 minute series, United States Dept. of Interior.

TABLES

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS

Design rainfall depths computed for the 50-year Capital Flood using the isohyetal method[1/].

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
601A	4.20			
		3.75	4.25	15.92
	4.30			
		6.49	4.35	28.24
	4.40			
		3.06	4.45	13.62
	4.50			
Totals		13.30		57.78

	50-Yr
Subbasin 601A Average Depth (in)	4.34

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
602A	4.20			
		0.46	4.25	1.95
	4.30			
		4.37	4.35	19.01
	4.40			
Totals		4.83		20.97

	50-Yr
Subbasin 602A Average Depth (in)	4.34

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
701A	4.20			
		2.12	4.25	9.01
	4.30			
		0.54	4.35	2.35
	4.40			
Totals		2.66		11.36

	50-Yr
Subbasin 701A Average Depth (in)	4.27

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
702A	4.20			
		5.73	4.25	24.37
	4.30			
		18.39	4.35	80.00
	4.40			
		3.95	4.45	17.58
	4.50			
Totals		28.08		121.95

	50-Yr
Subbasin 702A Average Depth (in)	4.34

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
703A	4.20			
		0.06	4.25	0.25
	4.30			
		12.46	4.35	54.21
	4.40			
		0.69	4.45	3.08
	4.50			
Totals		13.21		57.55

	50-Yr
Subbasin 703A Average Depth (in)	4.35

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
704B	4.30			
		8.97	4.35	39.03
	4.40			
		6.82	4.45	30.34
	4.50			
Totals		15.79		69.38

	50-Yr
Subbasin 704B Average Depth (in)	4.39

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
706A	4.30			
		2.93	4.35	12.72
	4.40			
		24.06	4.45	107.05
	4.50			
		8.00	4.55	36.39
	4.60			
Totals		34.98		156.16

	50-Yr
Subbasin 706A Average Depth (in)	4.46

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
801A	4.30			
		23.25	4.35	101.13
	4.40			
		20.08	4.45	89.36
	4.50			
		2.49	4.55	11.33
	4.60			
Totals		45.82		201.82

50-Yr
4.40

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
802B	4.30			
		4.23	4.35	18.42
	4.40			
		11.13	4.45	49.54
	4.50			
		13.82	4.55	62.87
	4.60			
Totals		29.18		130.83

50-Yr
4.48

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
804A	4.30			
		0.24	4.35	1.03
	4.40			
		10.84	4.45	48.23
	4.50			
		16.61	4.55	75.59
	4.60			
		3.00	4.65	13.97
	4.70			
Totals		30.69		138.82

50-Yr
4.52

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: T. Lewis

TABLE 1 - PRE-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
901A	4.40			
		11.85	4.45	52.75
	4.50			
		21.65	4.55	98.49
	4.60			
		11.22	4.65	52.17
	4.70			
Totals		44.72		203.40

50-Yr
4.55

1/ LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

Table 2: Pre-Development 50-Yr Capital Flood Time Of Concentration Input

Project	Subarea	Area (acres)	%imp	Frequency (years)	Soil Type	Length (feet)	Slope (ft/ft)	Isohyet (inches)
Pre-Development	601A	13.3	0.01	50	109	2834	0.060	4.34
Pre-Development	602A	4.8	0.01	50	309	641	0.034	4.34
	600 Series	**18.1**						
Pre-Development	701A	2.7	0.01	50	309	284	0.190	4.27
Pre-Development	702A	28.1	0.01	50	109	2345	0.061	4.34
Pre-Development	703A	13.2	0.01	50	309	1557	0.159	4.35
Pre-Development	704B	15.8	0.01	50	309	1690	0.158	4.39
Pre-Development	706A	35.0	0.01	50	309	2572	0.049	4.46
	700 Series	**94.7**						
Pre-Development	801A	45.8	0.01	50	309	2522	0.117	4.40
Pre-Development	802B	29.2	0.01	50	309	2906	0.105	4.48
Pre-Development	804A	30.7	0.01	50	309	2419	0.117	4.52
	800 Series	**105.7**						
Pre-Development	901A	44.7	0.01	50	309	2753	0.083	4.55
	900 Series	**44.7**						

Total **263.2**

Table 3: Pre-Development 50-Yr Capital Flood Time Of Concentration Output

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)	Tc Equation
Pre-Development	601A	13.2976726	0.01	50	109	2833.79	0.0599903	4.3448431	25	1.22	0.59	0.59	10	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	602A	4.83022197	0.01	50	309	640.74	0.0343353	4.3404981	10	1.87	0.68	0.68	7	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	701A	2.66088677	0.01	50	309	284.17	0.1900271	4.2703066	5	2.55	0.73	0.73	6	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	702A	28.0756905	0.01	50	109	2344.82	0.060559	4.3436484	22	1.29	0.6	0.6	23	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	703A	13.2147184	0.01	50	309	1557.48	0.1585895	4.354796	13	1.66	0.65	0.65	17	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	704B	15.7916803	0.01	50	309	1689.95	0.1579928	4.3931809	14	1.62	0.64	0.64	20	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	706A	34.9786603	0.01	50	309	2571.74	0.0489941	4.4645003	24	1.27	0.59	0.59	35	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	801A	45.8195081	0.01	50	309	2522.2	0.1173579	4.4046945	20	1.37	0.61	0.61	48	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	802B	29.1842536	0.01	50	309	2905.53	0.1046281	4.482833	22	1.33	0.6	0.6	30	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	804A	30.6916041	0.01	50	309	2418.52	0.1174272	4.5229316	19	1.44	0.62	0.62	35	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Pre-Development	901A	44.7176046	0.01	50	309	2753.19	0.082813	4.5485814	22	1.35	0.61	0.61	46	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TML

TABLE 4 - PRE- & POST-DEVELOPMENT PEAK CLEARWATER FLOWS AT REPORTING LOCATIONS

Pre- and Post-Development peak flows, adjusted for burning, are presented for comparison.

Reporting Location	Computed Peak Flow Rate		
	Pre-Development (ft^3/s)	Post-Development[1,2] w/o basins (ft^3/s)	Post-Development[3] w/ basins (ft^3/s)
A	16.0	156.0	120.0
B	93.0	97.0	3.0
C	111.0	7.0	7.0
D	46.0	30.0	30.0
Anaverde Creek[4]	**266.0**	**290.0**	**160.0**
85% Attenuation of Pre-development		226.0	226.0
Meets Attenuation Criteria:		NO	**YES**

[1] Post-Development computed peak flow rate for reporting location A derived by adding hydrograph peaks from 105A and 204A. This results in a minor acceptible loss in accuracy because:
a) The time-to-peaks of the hydrographs are less than 5 minutes apart, and
b) Negligible attenuation occurs in the channel segment between the outfall of the West Pond and reporting location A

[2] The peak flows DO NOT account for the effects of any attenuation caused by proposed detention ponds.

[3] The peak flows DO account for the effects of any attenuation caused by proposed detention ponds.

[4] Pre- and Post-Development peak flow rates to Anaverde Creek were conservatively estimated by summing the peak values at the various reporting points.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TML

TABLE 5 - PRE- & POST-DEVELOPMENT DEBRIS PRODUCTION

Debris production calculations are performed for the 50-year Capital Flood using procedures outlined in the LACDPW Hydrology Sedimentation Manual Addendum[1/]. First, identify the equations to be used for each sub-watershed.

Site Condition	Outfall Location ID	Contributary Area (Acres)	Contributary Area (mi^2)	Undeveloped or Partially Developed?	Single or Multiple DPA's?	Selected[1/] Debris Equation
Pre-Development	602A	18.1	0.028	Partially Developed	Multiple	Equation 3.5
	706A	94.7	0.148	Partially Developed	Multiple	Equation 3.5
	804A	105.7	0.165	Undeveloped	Multiple	Equation 3.4
	902A	44.7	0.070	Undeveloped	Single	Equation 3.1
	Total	263.2	0.4			
Post- Development	105A	99.8	0.156	Undeveloped	Single	Equation 3.1
	204A	33.6	0.053	Undeveloped	Single	Equation 3.1
	309AB	23.5	0.037	Partially Developed	Multiple	Equation 3.5
	413AC	105.3	0.165	Undeveloped	Multiple	Equation 3.4
	502A	3.7	0.006	Partially Developed	Single	Equation 3.3
	Total	265.9	0.4			

Determine the debris produced for each sub-watershed for the 50-year Capital Flood.

Site Condition	Outfall Location ID	1st Identified Debris Potential Area	2nd Identified Debris Potential Area	DPR_1[2/] for (A_1+A_2) (yd^3/mi^2)	DPR_1[2/] for (A_1-A_{d1}) (yd^3/mi^2)	DPR_2[2/] for (A_1+A_2) (yd^3/mi^2)	DPR_2[2/] for (A_2-A_{d2}) (yd^3/mi^2)	Area A_1 (mi^2)	Area A_{d1} (mi^2)	Area A_2 (mi^2)	Area A_{d2} (mi^2)	Debris Production (DP) (yd^3)
Pre-Development	602A	DPA-9	DPA-10	16500	16500	6300	6300	0.021	0.000	0.008	0.004	363
	706A	DPA-9	DPA-10	13500	16500	5600	5900	0.135	0.000	0.013	0.003	1,917
	804A	DPA-9	DPA-10	12900	13000	5500	6300	0.160	0.000	0.005	0.000	2,100
	902A	DPA-9	-	16500	-	-	-	0.070	0.000	0.000	0.000	1,153
	Total to Anaverde Creek											5,534
Post- Development	105A	DPA-9	-	13100	-	-	-	0.156	0.000	0.000	0.000	2,043
	204A	DPA-9	-	16500	16500	-	-	0.052	0.000	0.000	0.000	866
	309AB	DPA-9	DPA-10	16500	16500	6300	6300	0.026	0.010	0.010	0.004	316
	413AC	DPA-9	DPA-10	12900	13100	5500	6300	0.157	0.000	0.008	0.000	2,073
	502A	DPA-10	-	6300	6300	-	-	0.006	0.003	0.000	0.000	18
	Total											5,317
	Captured in Debris Basins (204A and 413AC)											2,939
	Total to Anaverde Creek											2,378

1/ LACDPW, June 1993. "Sedimentation Manual", Los Angeles County Department of Public Works, Water Resources Division (Sedimentation Manual Chapter 3 - Sediment Production and Delivery.

2/ LACDPW, June 1993. "Sedimentation Manual", Los Angeles County Department of Public Works, Water Resources Division (Debris Production Rates taken from Appendix P-3: "Debris Production Rates for Antelope Valley")

Equation 3.1 : $DP = DPR_1 \times A_1$

Equation 3.2 : $DP = DPR_1 \times A_1 + DPR_2 \times A_2$

Equation 3.3 : $DP = DPR_1 \times [(A_1-A_{d1}) \times ((A_1-A_{d1})/A_1)] + DPR_{1(A1-Ad1)} \times (A_1-A_{d1}) \times (A_{d1}/A_1)$

Equation 3.4 : $DP = DPR_1 \times A_1 \times (A_1/(A_1+A_2)) + DPR_{1(A1-Ad1)} \times A_1 \times (A_2/(A_1+A_2)) + DPR_2 \times A_2 \times (A_2/(A_1+A_2)) + DPR_{2(A2-Ad2)} \times A_2 \times (A_1/(A_1+A_2))$

Equation 3.5: $DP = DPR_1 \times (A_1 - A_{d1}) \times ((A_1-A_{d1})/(A_1 + A_2)) + DPR_{1(A1-Ad1)} \times (A_1 - A_{d1}) \times ((A_2+ A_{d1})/(A_1+A_2)) + DPR_2 \times (A_2 - A_{d2}) \times ((A_2-A_{d2})/(A_1 + A_2)) + DPR_{2(A2-Ad2)} \times (A_2 - A_{d2}) \times ((A_1+ A_{d2})/(A_1+A_2))$

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TML

TABLE 6 - PRE- & POST-DEVELOPMENT BULKING CALCULATION

Bulking calculations are performed for the 50-year Capital Flood using procedures outlined in the LACDPW Hydrology Sedimentation Manual Addendum[1/]. First, identify the equations to be used for each sub-watershed.

Site Condition	Outfall Location ID	Contributary Area (Acres)	Contributary Area (mi^2)	Undeveloped or Partially Developed?	Single or Multiple DPA's?	Selected[1/] Bulking Equation
Pre-Development	602A	18.1	0.028	Partially Developed	Multiple	Equation 3.12
	706A	94.7	0.148	Partially Developed	Multiple	Equation 3.12
	804A	105.7	0.165	Undeveloped	Multiple	Equation 3.11
	902A	44.7	0.070	Undeveloped	Single	Equation 3.8
	Total	263.2	0.4			
Post- Development	105A	99.8	0.156	Undeveloped	Single	Equation 3.8
	204A	33.6	0.053	Undeveloped	Single	Equation 3.8
	309AB	23.5	0.037	Partially Developed	Multiple	Equation 3.12
	413AC	105.3	0.165	Undeveloped	Multiple	Equation 3.11
	502A	3.7	0.006	Partially Developed	Single	Equation 3.10
	Total	265.9	0.4			

Next, determine the bulked peak flows for each sub-watershed for the 50-year Capital Flood.

Site Condition	Outfall Location ID	50-Year Unbulked[2/] Peak Flow Rate (ft^3/s)	1st Identified Debris Potential Area	2nd Identified Debris Potential Area	BF_1[3/] for (A_1+A_2)	BF_1[3/] for (A_1-A_{d1})	BF_2[3/] for (A_1+A_2)	BF_2[3/] for (A_2-A_{d2})	Area A_1 (mi^2)	Area A_{d1} (mi^2)	Area A_2 (mi^2)	Area A_{d2} (mi^2)	50-Year Bulked Peak Flow Rate (ft^3/s)
Pre-Development	602A	16.0	DPA-9	DPA-10	1.270	1.270	1.125	1.125	0.021	0.000	0.008	0.004	19.4
	706A	93.0	DPA-9	DPA-10	1.250	1.270	1.105	1.125	0.135	0.000	0.013	0.003	115.1
	804A	111.0	DPA-9	DPA-10	1.242	1.245	1.100	1.125	0.160	0.000	0.005	0.000	137.5
	902A	46.0	DPA-9	-	1.270	-	-	-	0.070	0.000	0.000	0.000	58.4
												Total	330.5
Post- Development	105A	117.0	DPA-9	-	1.245	#N/A	-	-	0.156	0.000	0.000	0.000	145.7
	204A	39.0	DPA-9	-	1.270	1.270	-	-	0.052	0.000	0.000	0.000	49.5
	309AB	30.0	DPA-9	DPA-10	1.270	1.270	1.125	1.125	0.026	0.010	0.010	0.004	34.3
	413AC	97.0	DPA-9	DPA-10	1.242	1.245	1.100	1.125	0.157	0.000	0.008	0.000	119.9
	502A	7.0	DPA-10	-	1.125	1.125	-	-	0.006	0.003	0.000	0.000	7.4
												Total	356.9

1/ LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.
2/ Unbulked peak flow rates reported include the effects of the burn adjustment factor to off-site runoff coefficients, as recommended in LACDPW, 2002 (see Table 4)
3/ LACDPW, June 1993. "Hydrology/Sedimentation Appendix", Los Angeles County Department of Public Works, Water Resources Division. (Peak Bulking Factors taken from Appendix P-6: "Peak Bulking Factors for Antelope Valley")

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS

Design rainfall depths computed for the 50-year Capital Flood using the isohyetal method[1/].

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
101A	4.30			
		16.34	4.35	71.06
	4.40			
		2.69	4.45	11.98
	4.50			
Totals		19.03		83.04

	50-Yr
Subbasin 101A Average Depth (in)	4.36

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
102A	4.30			
		14.88	4.35	64.71
	4.40			
		9.05	4.45	40.29
	4.50			
Totals		23.93		105.00

	50-Yr
Subbasin 102A Average Depth (in)	4.39

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
103A	4.30			
		4.23	4.35	18.42
	4.40			
		13.31	4.45	59.22
	4.50			
		3.09	4.55	14.08
	4.60			
Totals		20.64		91.72

	50-Yr
Subbasin 103A Average Depth (in)	4.44

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
104A	4.40			
		13.51	4.45	60.10
	4.50			
		17.49	4.55	79.59
	4.60			
		4.15	4.65	19.29
	4.70			
Totals		35.14		158.97

	50-Yr
Subbasin 104A Average Depth (in)	4.52

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
105A	4.60			
		1.09	4.65	5.08
	4.70			
Totals		1.09		5.08

	50-Yr
Subbasin 105A Average Depth (in)	4.65

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
201A	4.30			
		3.96	4.35	17.25
	4.40			
		2.54	4.45	11.28
	4.50			
Totals		6.50		28.53

	50-Yr
Subbasin 201A Average Depth (in)	4.39

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
202A	4.40			
		6.12	4.45	27.23
	4.50			
Totals		6.12		27.23

	50-Yr
Subbasin 202A Average Depth (in)	4.45

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
203A	4.40			
		7.38	4.45	32.82
	4.50			
		6.99	4.55	31.81
	4.60			
		0.92	4.65	4.29
	4.70			
Totals		15.29		68.92

	50-Yr
Subbasin 203A Average Depth (in)	4.51

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
204A	4.40			
		0.04	4.45	0.19
	4.50			
		1.69	4.55	7.71
	4.60			
		3.94	4.65	18.33
	4.70			
Totals		5.68		26.24

	50-Yr
Subbasin 204A Average Depth (in)	4.62

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
301A	4.30			
		3.53	4.35	15.35
	4.40			
Totals		3.53		15.35

	50-Yr
Subbasin 301A Average Depth (in)	4.35

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
302A	4.30			
		2.48	4.35	10.80
	4.40			
Totals		2.48		10.80

	50-Yr
Subbasin 302A Average Depth (in)	4.35

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
303A	4.20			
		1.83	4.25	7.77
	4.30			
		0.55	4.35	2.39
	4.40			
Totals		2.38		10.15

	50-Yr
Subbasin 303A Average Depth (in)	4.27

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
304A	4.25			
		2.27	4.27	9.69
	4.30			
Totals		2.27		9.69

	50-Yr
Subbasin 304A Average Depth (in)	4.27

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
305B	4.25			
		1.00	4.28	4.28
	4.30			
		1.00	4.33	4.33
	4.35			
Totals		2.00		8.60

	50-Yr
Subbasin 305B Average Depth (in)	4.30

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
306C	4.25			
		0.87	4.28	3.72
	4.30			
		3.81	4.35	16.57
	4.40			
		0.50	4.43	2.21
	4.45			
Totals		5.18		22.51

	50-Yr
Subbasin 306C Average Depth (in)	4.34

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
308B	4.30			
		5.62	4.35	24.45
	4.40			
Totals		5.62		24.45

	50-Yr
Subbasin 308B Average Depth (in)	4.35

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
401A	4.40			
		4.81	4.45	21.42
	4.50			
Totals		4.81		21.42

	50-Yr
Subbasin 401A Average Depth (in)	4.45

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
402A	4.40			
		15.66	4.45	69.67
	4.50			
		9.73	4.55	44.26
	4.60			
Totals		25.38		113.93

	50-Yr
Subbasin 402A Average Depth (in)	4.49

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
403B	4.50			
		8.14	4.55	37.06
	4.60			
		3.55	4.65	16.49
	4.70			
Totals		11.69		53.55

	50-Yr
Subbasin 403B Average Depth (in)	4.58

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
405A	4.50			
		4.15	4.55	18.90
	4.60			
		2.13	4.65	9.93
	4.70			
Totals		6.29		28.83

	50-Yr
Subbasin 405A Average Depth (in)	4.58

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
406C	4.30			
		6.53	4.35	28.42
	4.40			
Totals		6.53		28.42

	50-Yr
Subbasin 406C Average Depth (in)	4.35

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
407C	4.25			
		2.41	4.28	10.29
	4.30			
		6.08	4.35	26.44
	4.40			
		1.22	4.43	5.40
	4.45			
Totals		9.70		42.13

	50-Yr
Subbasin 407C Average Depth (in)	4.34

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
408D	4.30			
		5.76	4.35	25.06
	4.40			
		1.80	4.43	7.97
	4.45			
Totals		7.56		33.02

	50-Yr
Subbasin 408D Average Depth (in)	4.37

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
409D	4.25			
		3.60	4.30	15.48
	4.35			
		1.02	4.38	4.46
	4.40			
Totals		4.62		19.94

	50-Yr
Subbasin 409D Average Depth (in)	4.32

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
411C	4.25			
		1.95	4.28	8.34
	4.30			
		12.28	4.35	53.42
	4.40			
		3.58	4.43	15.85
	4.45			
Totals		17.81		77.61

	50-Yr
Subbasin 411C Average Depth (in)	4.36

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857.2
MADE BY: T. Lewis

TABLE 7 - POST-DEVELOPMENT DESIGN RAINFALL DEPTHS (CONTINUED)

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
412C	4.40			
		6.32	4.45	28.12
	4.50			
		4.47	4.55	20.34
	4.60			
Totals		10.79		48.46

	50-Yr
Subbasin 412C Average Depth (in)	4.49

Subbasin Description	50-Yr Isohyet Depth (in)	Area Between 2 Isohyets (acres)	Ave. 50-Yr Isohyet Depth (in)	50-Yr Precip x Area (acre-in)
501A	4.30			
		1.07	4.35	4.64
	4.40			
		2.68	4.45	11.93
	4.50			
Totals		3.75		16.58

	50-Yr
Subbasin 501A Average Depth (in)	4.42

[1/] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.

Table 8: Post-Development 50-Yr Capital Flood Time Of Concentration Input

Project	Subarea	Area	%imp	Frequency	Soil Type	Length	Slope	Isohyet
Post-Dev: 50-Yr Capital Flood	101A	19.0	0.01	50	309	1626	0.127	4.36
Post-Dev: 50-Yr Capital Flood	102A	23.9	0.01	50	309	1574	0.139	4.39
Post-Dev: 50-Yr Capital Flood	103A	20.6	0.01	50	309	1863	0.104	4.44
Post-Dev: 50-Yr Capital Flood	104A	35.1	0.01	50	309	2221	0.111	4.52
Post-Dev: 50-Yr Capital Flood	105A	1.1	0.01	50	309	387	0.151	4.65
	100 Series	**99.8**						
Post-Dev: 50-Yr Capital Flood	201A	6.5	0.01	50	109	749	0.092	4.39
Post-Dev: 50-Yr Capital Flood	202A	6.1	0.01	50	109	569	0.094	4.45
Post-Dev: 50-Yr Capital Flood	203A	15.3	0.01	50	109	891	0.020	4.51
Post-Dev: 50-Yr Capital Flood	204A	5.7	0.01	50	109	685	0.081	4.62
	200 Series	**33.6**						
Post-Dev: 50-Yr Capital Flood	301A	3.5	0.01	50	309	616	0.133	4.35
Post-Dev: 50-Yr Capital Flood	302A	2.5	0.01	50	309	447	0.192	4.35
Post-Dev: 50-Yr Capital Flood	303A	2.4	0.01	50	309	448	0.163	4.27
Post-Dev: 50-Yr Capital Flood	304A	2.3	0.01	50	309	1785	0.144	4.27
Post-Dev: 50-Yr Capital Flood	305B	2.0	0.01	50	109	780	0.144	4.30
Post-Dev: 50-Yr Capital Flood	306C	5.2	0.01	50	109	1425	0.079	4.34
Post-Dev: 50-Yr Capital Flood	308B	5.6	0.01	50	109	816	0.051	4.35
	300 Series	**23.5**						
Post-Dev: 50-Yr Capital Flood	401A	4.8	0.01	50	109	659	0.144	4.45
Post-Dev: 50-Yr Capital Flood	402A	25.4	0.01	50	109	921	0.080	4.49
Post-Dev: 50-Yr Capital Flood	403B	11.7	0.01	50	109	1263	0.045	4.58
Post-Dev: 50-Yr Capital Flood	405A	6.3	0.01	50	109	1972	0.032	4.58
Post-Dev: 50-Yr Capital Flood	406A	6.5	0.01	50	109	899	0.070	4.35
Post-Dev: 50-Yr Capital Flood	407C	9.7	0.01	50	109	2275	0.044	4.30
Post-Dev: 50-Yr Capital Flood	408D	7.6	0.01	50	109	747	0.067	4.37
Post-Dev: 50-Yr Capital Flood	409D	4.6	0.01	50	109	1095	0.051	4.30
Post-Dev: 50-Yr Capital Flood	411C	17.8	0.01	50	109	3060	0.074	4.34
Post-Dev: 50-Yr Capital Flood	412C	10.8	0.01	50	109	2883	0.031	4.49
	400 Series	**105.3**						
Post-Dev: 50-Yr Capital Flood	501A	3.7	0.01	50	109	510	0.141	4.42
	500 Series	**3.7**						

Total **266.0**

Table 9: Post-Development 50-Yr Capital Flood Time Of Concentration Output

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)	Tc Equation
Post-Dev: 50-Yr Capital Flood	101A	19.0286985	0.01	50	309	1626.28	0.1266695	4.36415049	14	1.6	0.64	0.64	24	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	102A	23.9297427	0.01	50	309	1573.76	0.1385218	4.38783437	14	1.61	0.64	0.64	30	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	103A	20.6359876	0.01	50	309	1862.61	0.1041549	4.44447478	16	1.53	0.63	0.63	24	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	104A	35.144929	0.01	50	309	2221.4	0.110741	4.52337343	18	1.48	0.62	0.62	41	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	105A	1.09331644	0.01	50	309	386.88	0.1512097	4.65	5	2.77	0.74	0.74	3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	201A	6.5003486	0.01	50	109	749.11	0.0921296	4.3890054	9	1.99	0.7	0.7	9	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	202A	6.1197229	0.01	50	109	569.11	0.0938126	4.45	7	2.27	0.71	0.71	10	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	203A	15.2893926	0.01	50	109	890.82	0.02	4.50778636	13	1.72	0.66	0.66	18	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	204A	5.6806445	0.01	50	109	685.01	0.0807451	4.61863916	8	2.21	0.71	0.71	9	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	301A	3.52874725	0.01	50	309	616.31	0.1330499	4.35	7	2.22	0.71	0.71	6	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	302A	2.48235579	0.01	50	309	447.48	0.1921874	4.35	6	2.38	0.72	0.72	5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	303A	2.40038567	0.01	50	309	448.22	0.1628664	4.27310764	6	2.34	0.71	0.71	5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	304A	2.27813131	0.01	50	309	1785	0.1439776	4.27	15	1.52	0.63	0.63	3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	305B	1.96661616	0.01	50	109	780	0.1435897	4.3	9	1.95	0.69	0.69	3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	306C	5.21799357	0.01	50	109	1425	0.0785965	4.34	15	1.55	0.63	0.63	5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	308B	5.62099115	0.01	50	109	815.92	0.0514756	4.35	11	1.79	0.67	0.67	7	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	401A	4.81368392	0.01	50	109	659.02	0.1444894	4.45	7	2.27	0.71	0.71	8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	402A	25.3834852	0.01	50	109	921.15	0.079734	4.48832088	10	1.93	0.69	0.69	33	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	403B	11.6912358	0.01	50	109	1262.76	0.0445231	4.58033283	14	1.68	0.65	0.65	13	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	405A	6.28887008	0.01	50	109	1972.02	0.032454	4.58394566	21	1.39	0.61	0.61	6	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	406A	6.53400802	0.01	50	109	899.32	0.0702499	4.35	11	1.79	0.67	0.67	8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	407C	9.73943067	0.01	50	109	2275	0.043956	4.3	23	1.25	0.59	0.59	8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	408D	7.60511708	0.01	50	109	747.3	0.0669075	4.37	10	1.88	0.68	0.68	10	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	409D	4.62515152	0.01	50	109	1095.17	0.0511336	4.3	13	1.64	0.65	0.65	5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	411C	17.8121878	0.01	50	109	3060	0.0735294	4.34	25	1.22	0.59	0.59	13	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	412C	10.7914301	0.01	50	109	2882.76	0.0308732	4.49143232	28	1.19	0.58	0.58	8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Post-Dev: 50-Yr Capital Flood	501A	3.74927141	0.01	50	109	509.56	0.1412984	4.42153351	6	2.42	0.72	0.72	7	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Table 10 - CMP, Downchutes and Culverts Design Summary

Maximum Pipe Flow Calculations (Q_{full})

Using: Manning Equation ($Q = 1.486/n*A*R^{2/3}*S^{1/2}$)

$n = 0.024$ (for corrugated metal pipe, or CMP)

Note: See Figure 8 for location of drainage structures.

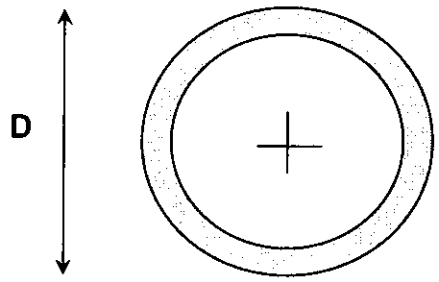
Structure No.	Slope	Pipe Diameter (3) (D)		Area	Hydraulic Radius	Q_{full}	Q_{max} (2) calculated
	(%)	inches	(ft)	(ft^2)	(ft)	(cfs)	(cfs)
7 (3)	0.05	24	2.00	3.142	0.500	27.40	38
	0.05	**36**	3.00	7.069	0.750	80.79	38
8 (3)	0.01	24	2.00	3.142	0.500	12.25	30
	0.01	**36**	3.00	7.069	0.750	36.13	30
9 (3)	0.03	24	2.00	3.142	0.500	21.23	30
	0.03	**36**	3.00	7.069	0.750	62.58	30
10 (4)	0.1	**24**	2.00	3.142	0.500	38.75	33
10 (4)	0.4	**24**	2.00	3.142	0.500	77.50	33

(1) The minimum suggested pipe diameter is shown in **BOLD**.

(2) A factor of 1.12 has been applied to the 50-year isohyet presented in the Los Angeles County Hydrology Manual in order to calcualte the peak flow of the 100-yr 24-hr storm event.

(3) Drainage structures 7, 8, 9 may consist of CMP or concrete channels. See Table 5 for channel alternative.

(4) Drainage structures 10 corresponds to the CMP downchute having to the maximum anticipated peak flow.



WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TML

TABLE 11 - TYPICAL POST-DEVELOPMENT EARTH BENCHES - MAXIMUM LENGTH EVALUATION

All earth bench calculations performed for the 100-year, 24-hour rainfall event.
Benches are considered acceptable if the velocity is less than 3.5 ft/sec and flow depth less than 0.5-feet

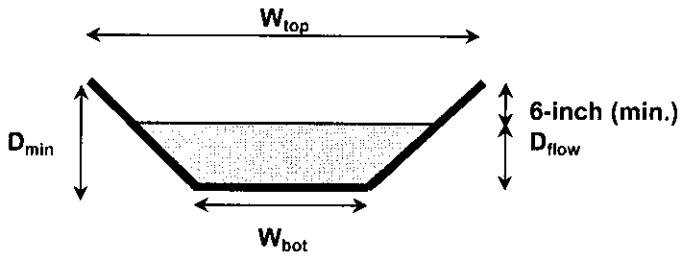
Time of Concentration & Runoff Calculations									*Channel Stability Calculations*								
Subbasin Description	Subbasin Area (acres)	Percent Impervious (decimal)	LACDPW Soil Type	Runoff Length (ft)	Runoff Slope (ft/ft)	50-yr, 24-hr[1] Rainfall Depth (in)	100-yr, 24-hr Rainfall Depth (in)	Flow[2] Rate (ft^3/s)	Channel Length (ft)	Channel Slope (ft/ft)	Left Side Slope (H:1V)	Right Side Slope (H:1V)	Bottom Width (ft)	Manning's n	Normal[3] Depth (ft)	Flow Area at Normal Depth (ft^2)	Flow Velocity at Normal Depth (ft/s)
Earth Bench 1	0.643	0.01	109	335	0.173	4.400	4.928	1.0	200	0.02	15.0	2.5	0	0.024	0.23	0.48	2.08
Earth Bench 2	1.286	0.01	109	535	0.116	4.400	4.928	3.0	400	0.02	15.0	2.5	0	0.024	0.35	1.10	2.74
Earth Bench 3	1.929	0.01	109	735	0.090	4.400	4.928	3.0	600	0.02	15.0	2.5	0	0.024	0.35	1.10	2.74
Earth Bench 4	2.572	0.01	109	935	0.075	4.400	4.928	4.0	800	0.02	15.0	2.5	0	0.024	0.39	1.36	2.94
Earth Bench 5	3.215	0.01	109	1135	0.065	4.400	4.928	4.0	1000	0.02	15.0	2.5	0	0.024	0.39	1.36	2.94
Earth Bench 6	3.858	0.01	109	1335	0.058	4.400	4.928	5.0	1200	0.02	15.0	2.5	0	0.024	0.43	1.61	3.11
Earth Bench 7	4.501	0.01	109	1535	0.053	4.400	4.928	5.0	1400	0.02	15.0	2.5	0	0.024	0.43	1.61	3.11
Earth Bench 8	5.144	0.01	109	1735	0.050	4.400	4.928	6.0	1600	0.02	15.0	2.5	0	0.024	0.46	1.84	3.25
Earth Bench 9	5.787	0.01	109	1935	0.047	4.400	4.928	6.0	1800	0.02	15.0	2.5	0	0.024	0.46	1.84	3.25
Earth Bench 10	6.430	0.01	109	2135	0.044	4.400	4.928	6.0	2000	0.02	15.0	2.5	0	0.024	0.46	1.84	3.25
Earth Bench 11	7.073	0.01	109	2335	0.042	4.400	4.928	7.0	2200	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 12	7.716	0.01	109	2535	0.040	4.400	4.928	7.0	2400	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 13	8.359	0.01	109	2735	0.039	4.400	4.928	7.0	2600	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 14	8.520	0.01	109	2785	0.038	4.400	4.928	7.0	2650	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 15	8.681	0.01	109	2835	0.038	4.400	4.928	7.0	2700	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 16	8.842	0.01	109	2885	0.038	4.400	4.928	7.0	2750	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 17	8.874	0.01	109	2895	0.038	4.400	4.928	7.0	2760	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 18	8.906	0.01	109	2905	0.038	4.400	4.928	7.0	2770	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 19	8.909	0.01	109	2906	0.038	4.400	4.928	7.0	2771	0.02	15.0	2.5	0	0.024	0.49	2.07	3.38
Earth Bench 20	8.912	0.01	109	2907	0.038	4.400	4.928	8.0	2772	0.02	15.0	2.5	0	0.024	0.51	2.29	3.50

[1] LACDPW, 2002. "CD-2 North County, Hydrology/Sedimentation Manual Addendum", Los Angeles County Department of Public Works, Water Resources Division.
[2] Flow rates computed using TC_calc_depth.xls - LACDPW standard spreadsheet
[3] Normal depth computed using the Manning Equation

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TML

Table 12 - Concrete Channels Design Summary

Assume : See Figure 8 for Channel Locations
Concrete lined channels (Manning number = 0.014)
Minimum 6-inch freeboard



Results:

Channel/ Run No.	Type	Manning	Min. Slope (%)	W_{bot} (ft)	Qpeak 50-yr storm	Qpeak (1) 100-yr storm	Velocity (fps)	D_{flow} (ft)	Contributing Areas
1	Concrete	0.014	1	5	117	142	11.7	2.01	101 to 104
2	Concrete	0.014	4	10	39	47	9.9	0.46	201 to 204
3	Concrete	0.014	12	5	30	36	15.6	0.50	301 to 305
3 (opt.)	Concrete	0.014	12	3	30	36	17.6	0.73	301 to 305
4	Concrete	0.014	0.5	3	33	40	6.5	1.42	402
5	Concrete	0.014	0.5	0	8	10	4.5	1.33	401
6	Concrete	0.014	0.5	3	5	6	3.0	0.50	306
7	Concrete	0.014	5	3	13	16	9.2	0.60	403
8	Concrete	0.014	1	5	30	36	7.1	0.85	301 to 305
8 (opt.)	Concrete	0.014	1	3	30	36	7.1	0.85	301 to 305
9	Concrete	0.014	3	5	30	36	8.1	0.75	301 to 306, 308

(1) A factor of 1.12 has been applied to the 50-year isohyet presented in the Los Angeles County Hydrology Manual in order to calculate the peak flow of the 100-yr 24-hr storm event.

Conclusions / Recommendations:

Channel	W_{bot} (ft)	D_{min} (ft)	Side-slope (?H:1V)	W_{top} (ft)
1	5	2.5	0	5
2	10	1	0	10
3	3	1.2	0	3
4	3	1.4	0	3
5	0	1.8	1	3.6
6	3	1.5	0	3
7	3	1.6	0	3
8	3	2.3	0	3
9	5	1.5	0	5

WMI / ENG SUPPORT SVC ANTELOPE
LOS ANGELES COUNTY, CALIFORNIA
PROJECT NO.: 033-1857
MADE BY: TAC

TABLE 13 - POST -DEVELOPMENT DISCHARGE VELOCITIES AND EROSION CONTROL

	CHANNEL DESIGN								HYDRAULIC PARAMETERS						
REACH	50-Year Capital Flood (cfs)	CHANNEL MATERIAL	STD RIPRAP TYPE (1)	SLOPE (ft/ft)	LEFT SIDE SLOPE (H:1V)	RIGHT SIDE SLOPE (H:1V)	CHANNEL DEPTH (ft)	BOTTOM WIDTH (ft)	MANNING n FOR CAPACITY	MANNING n FOR STABILITY	MAX VELOCITY (fps)	MAX NORMAL FLOW DEPTH (ft)	SHEAR STRESS (lb/ft^2)	AVAILABLE FREEBOARD (ft)	TOP WIDTH OF FLOW (ft)
C Outfall	7.0	Riprap	Type VL	0.050	3.0	3.0	2.0	0	0.040	0.035	4.6	0.7	2.34	1.3	4.5
D Outfall	30.0	Riprap	Type VL	0.044	3.0	3.0	2.0	8	0.040	0.035	5.4	0.6	1.69	1.4	11.7
$A_{combined}$ Outfall	120.0	Riprap	Type VL	0.042	3.0	3.0	2.0	8	0.040	0.035	8.3	1.3	3.52	0.7	16.0

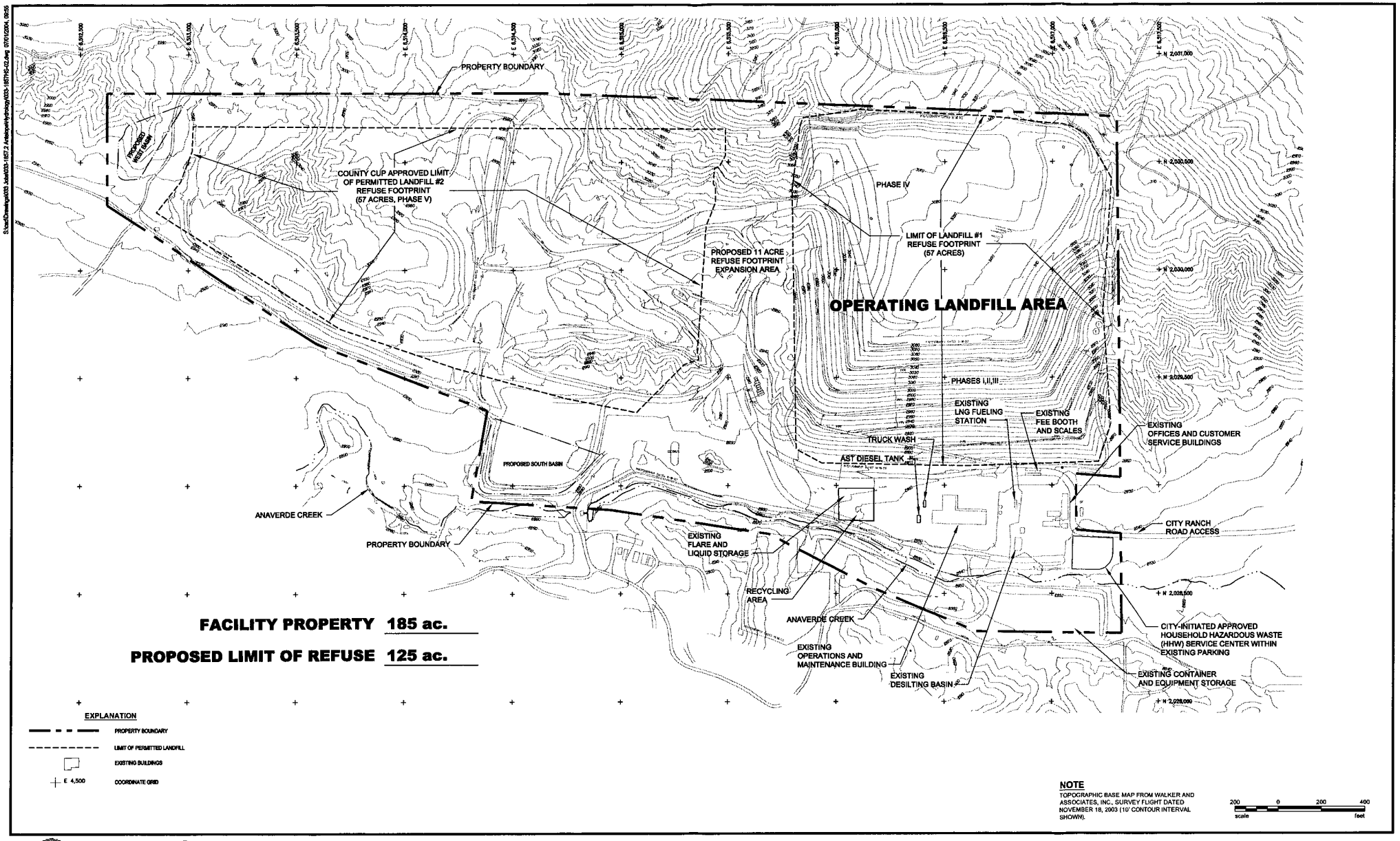
(1) See Table below for riprap type

	DISCHARGE CULVERT DESIGN					HYDRAULIC PARAMETERS			
REACH	50-Year Capital Flood	CONDUIT MATERIAL	NUMBER OF PIPES	SLOPE (ft/ft)	PIPE DIAMETER (ft)	MANNING n FOR CAPACITY	FLOW AREA (ft^2)	VELOCITY (fps)	NORMAL FLOW DEPTH (ft)
Basin A_{pipe}	4.0	CSP	1	0.020	4.0	0.024	0.96	4.2	0.5
Basin B_{pipe}	9.0	CSP	1	0.020	4.0	0.024	1.70	5.3	0.8

Standard Rip Rap Types

	Percent Smaller Than Given Size By Weight	Intermediate Rock Dimension (inches)	D_{50} Dia. (inches)
Type VL	70 - 100	12	6
	50 - 70	9	
	35 - 50	6	
	2 - 10	2	
Type L	70 - 100	15	9
	50 - 70	12	
	35 - 50	9	
	2 - 10	3	
Type M	70 - 100	21	12
	50 - 70	18	
	35 - 50	12	
	2 - 10	4	
Type H	100	30	18
	50 - 70	24	
	35 - 50	18	
	2 - 10	6	
Type VH	100	42	24
	50 - 70	33	
	35 - 50	24	
	2 - 10	9	

FIGURES



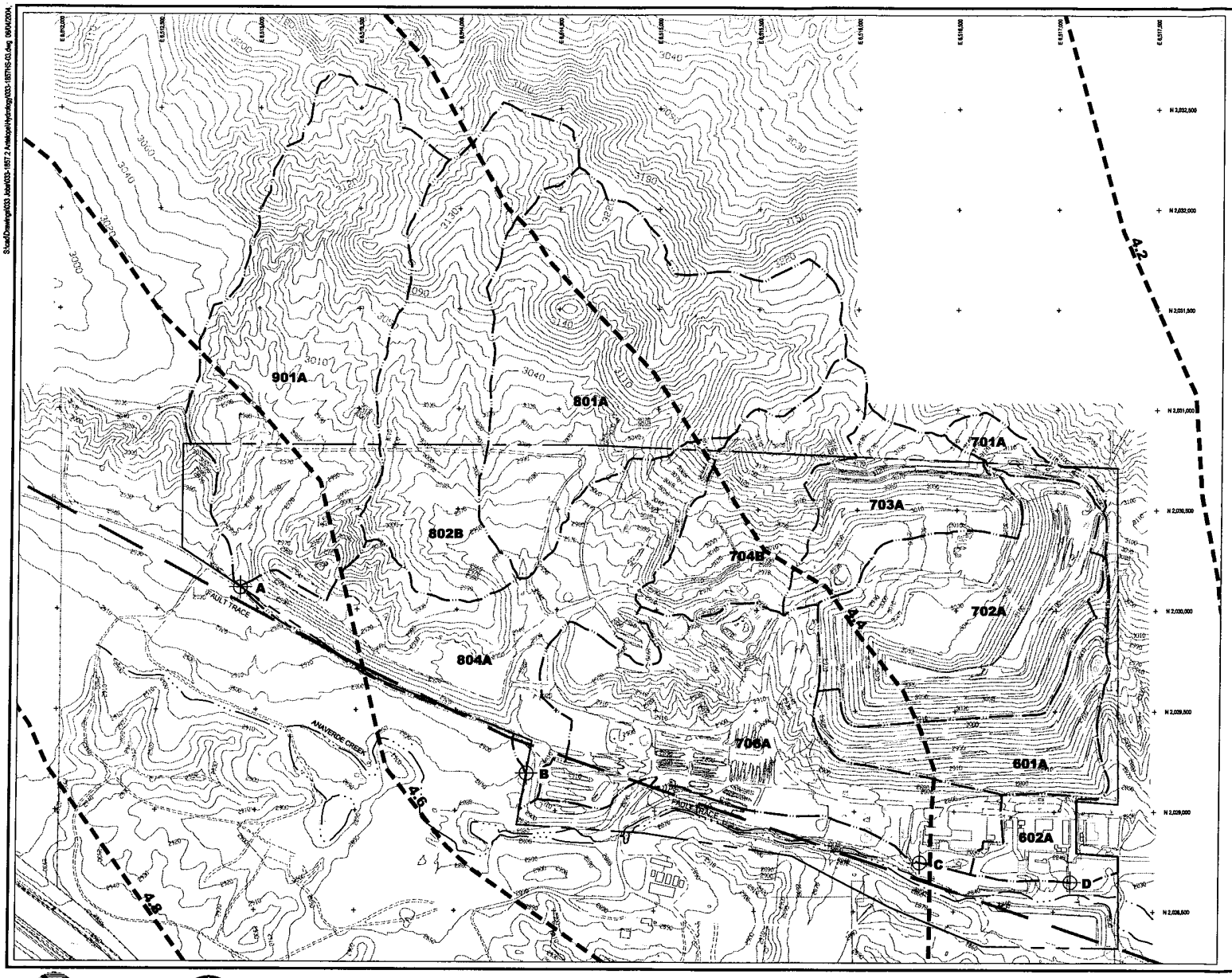
Golder Associates

N

Figure 1
Site Map

ANTELOPE VALLEY PUBLIC LANDFILL

June 2004



LEGEND

- PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE EXISTING
- INDEX TOPOGRAPHIC CONTOUR
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- HISTORICAL "BLUE" LINE
- E 6,514,500 — COORDINATE GRID
- A — REPORTING LOCATION
- HYDROLOGIC SUBBASIN BOUNDARY
- 701A — HYDROLOGIC SUBBASIN DESIGNATION
- 4.4 — 50-YR CAPITAL FLOOD ISOHYET (DEPTH IN INCHES)

NOTES

1. TOPOGRAPHIC BASE MAP COMPOSITE FROM ANAYLITCAL PHOTOGRAMMETRIC SURVEYS, INC., SURVEY FLIGHTS DATED JUNE 11, 1992 (FOR WESTERN AREAS) AND NOVEMBER 8, 2001 (FOR OPERATING LANDFILL AREA). CONTOUR INTERVAL 10 FEET.
2. LACDPW SOIL TYPE BOUNDARIES TAKEN FROM "ANAVERDE CREEK BASIN HYDROLOGY STUDY, UPSTREAM OF ANTELOPE VALLEY FREEWAY", AKM CONSULTING ENGINEERS, 1991 AND ORTHO-RECTIFIED TO CALIFORNIA STATE PLANE.

N

250 0 250 500
scale feet

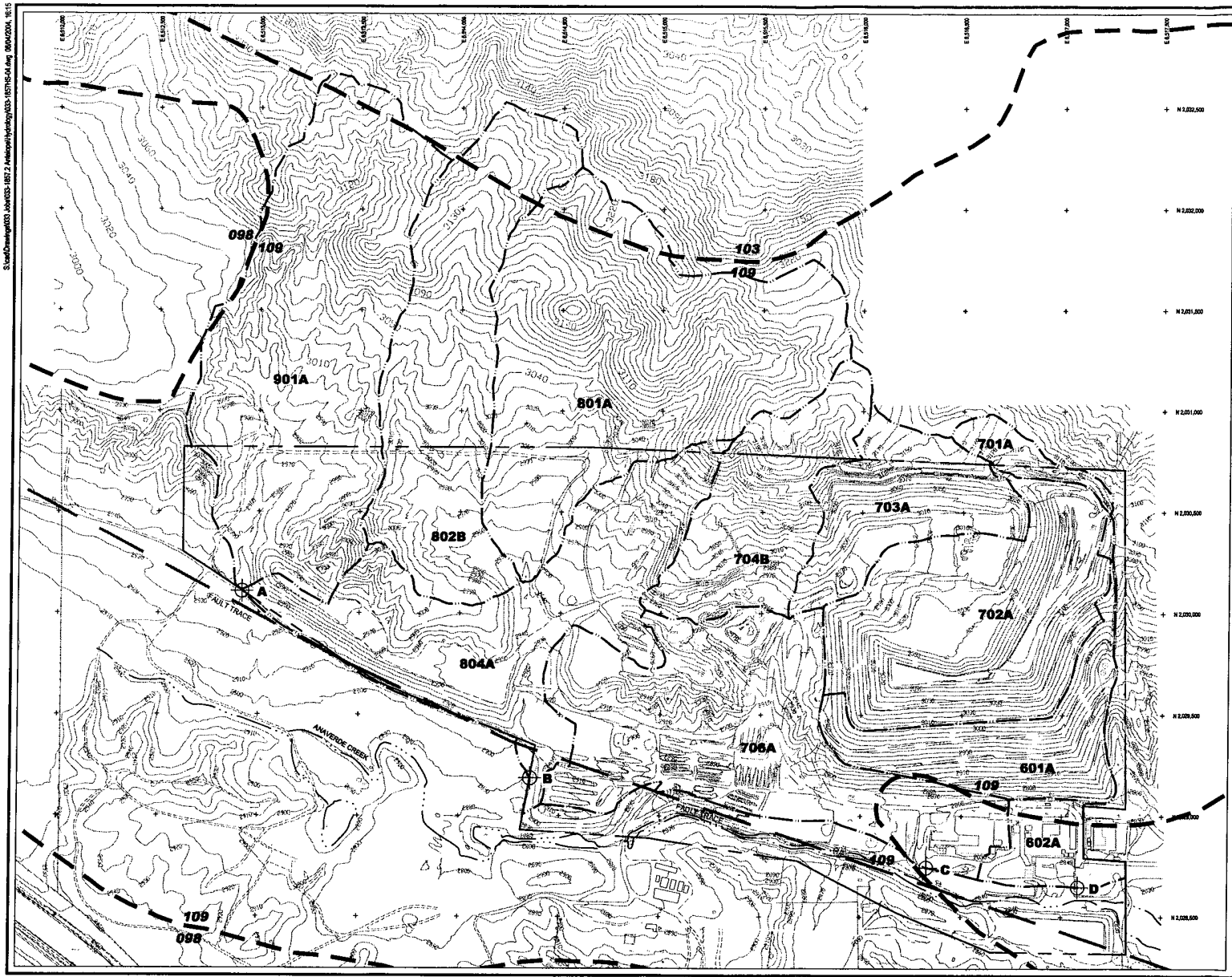
Golder Associates

N

Figure 2
Pre-Development Hydrology Map with 50-year Capital Flood Isohyets

ANTELOPE VALLEY PUBLIC LANDFILL

June 2004



LEGEND

- PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE EXISTING
- INDEX TOPOGRAPHIC CONTOUR
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- HISTORICAL "BLUE" LINE
- E 6,514,500 — COORDINATE GRID
- A — REPORTING LOCATION
- HYDROLOGIC SUBBASIN BOUNDARY
- 701A — HYDROLOGIC SUBBASIN DESIGNATION
- 098/109 — LACDPW SOIL TYPE BOUNDARY WITH SOIL TYPES

NOTES

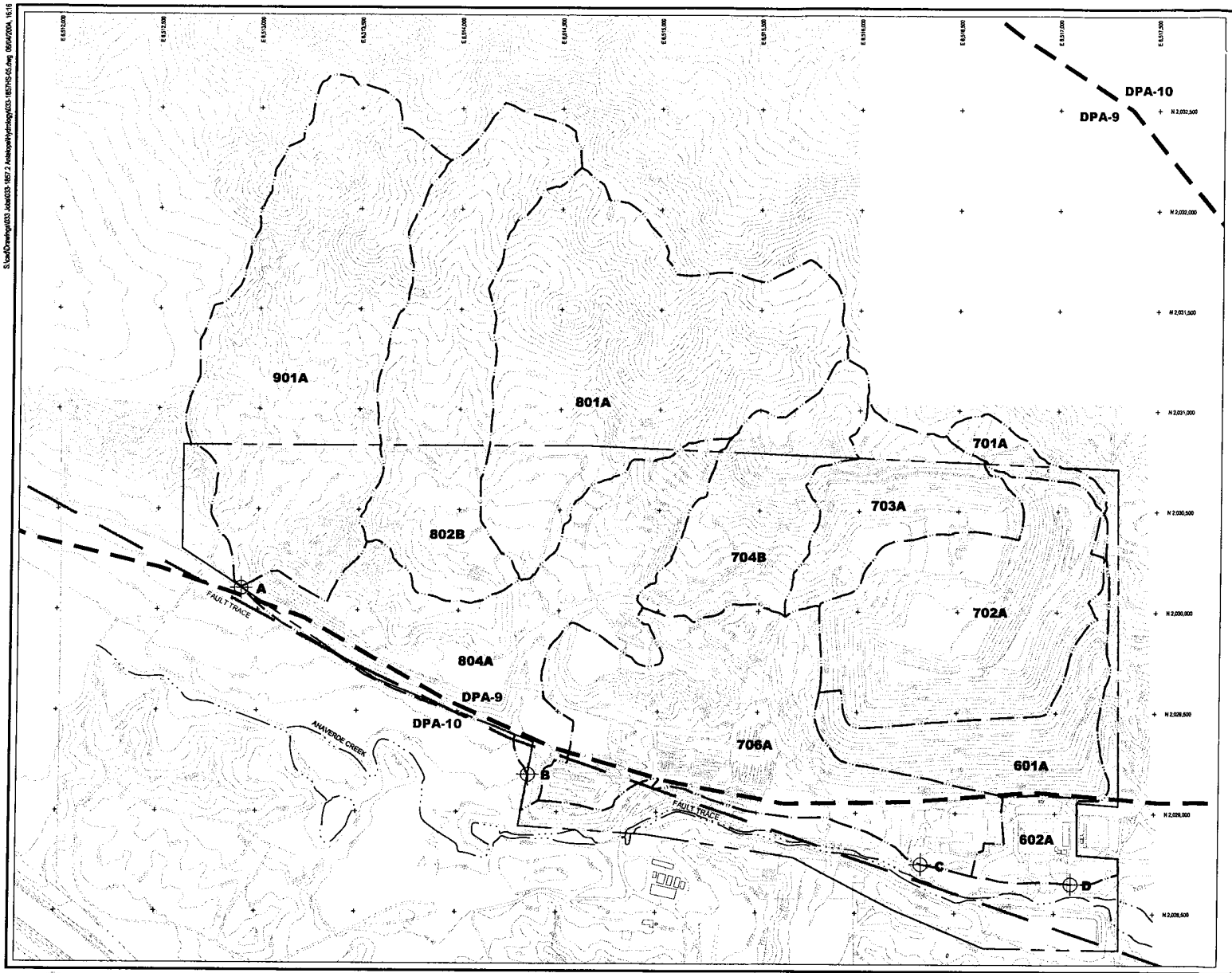
1. TOPOGRAPHIC BASE MAP COMPOSITE FROM ANAYLITCAL PHOTOGRAMMETRIC SURVEYS, INC., SURVEY FLIGHTS DATED JUNE 11, 1992 (FOR WESTERN AREAS) AND NOVEMBER 8, 2001 (FOR OPERATING LANDFILL AREA). CONTOUR INTERVAL 10 FEET.
2. LACDPW SOIL TYPE BOUNDARIES TAKEN FROM "ANAVERDE CREEK BASIN HYDROLOGY STUDY, UPSTREAM OF ANTELOPE VALLEY FREEWAY", AKM CONSULTING ENGINEERS, 1991 AND ORTHO-RECTIFIED TO CALIFORNIA STATE PLANE.

N

250 0 250 500
scale feet

Golder Associates

Figure 3
Pre-Development Hydrology Map with LACDPW Soil Types



LEGEND

- PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE EXISTING
- INDEX TOPOGRAPHIC CONTOUR
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- HISTORICAL "BLUE" LINE
- E 514,500 — COORDINATE GRID
- A — REPORTING LOCATION
- HYDROLOGIC SUBBASIN BOUNDARY
- 701A — HYDROLOGIC SUBBASIN DESIGNATION
- DPA-9 / DPA-10 — LACDPW DEBRIS POTENTIAL AREAS BOUNDARY WITH DPA's

NOTES

1. TOPOGRAPHIC BASE MAP COMPOSITE FROM ANAYLITCAL PHOTOGRAMMETRIC SURVEYS, INC., SURVEY FLIGHTS DATED JUNE 11, 1992 (FOR WESTERN AREAS) AND NOVEMBER 8, 2001 (FOR OPERATING LANDFILL AREA). CONTOUR INTERVAL 10 FEET.
2. LACDPW SOIL TYPE BOUNDARIES TAKEN FROM "ANAVERDE CREEK BASIN HYDROLOGY STUDY, UPSTREAM OF ANTELOPE VALLEY FREEWAY", AKM CONSULTING ENGINEERS, 1991 AND ORTHO-RECTIFIED TO CALIFORNIA STATE PLANE.

N

250 0 250 500
scale feet

Golder Associates

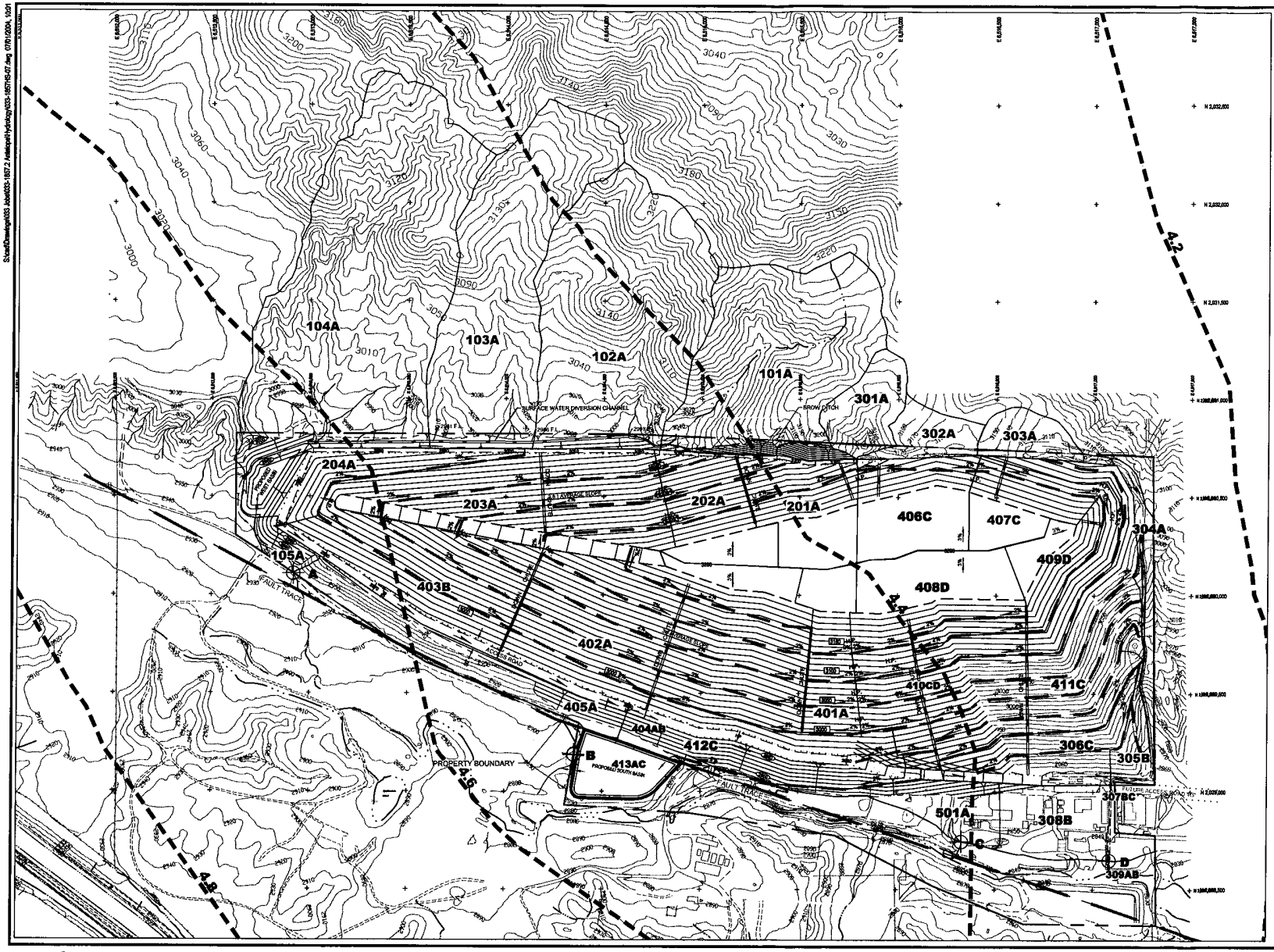
N

Figure 4
Pre-Development Hydrology Map with Debris Potential Areas

ANTELOPE VALLEY PUBLIC LANDFILL

June 2004

S:\Local\Drawings\033 Jobs\033-1857-2 Antelope\Hydrology\033-1857H5-05.dwg 06/04/2004, 16:16



LEGEND

- PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE EXISTING
- INDEX TOPOGRAPHIC CONTOUR
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- HISTORICAL "BLUE" LINE
- E 6,514,500 — COORDINATE GRID
- 3290 — PROPOSED BASE GRADE CONTOURS
- 3230 — PROPOSED REFUSE FILL GRADE CONTOURS
- 3:1 — SLOPE INDICATOR
- 5.0% — GRADE INDICATOR
- A — REPORTING LOCATION
- HYDROLOGIC SUBBASIN BOUNDARY
- 701A — HYDROLOGIC SUBBASIN DESIGNATION
- 4.2 — 50-YEAR CAPITAL FLOOD ISOHYET (DEPTH IN INCHES)

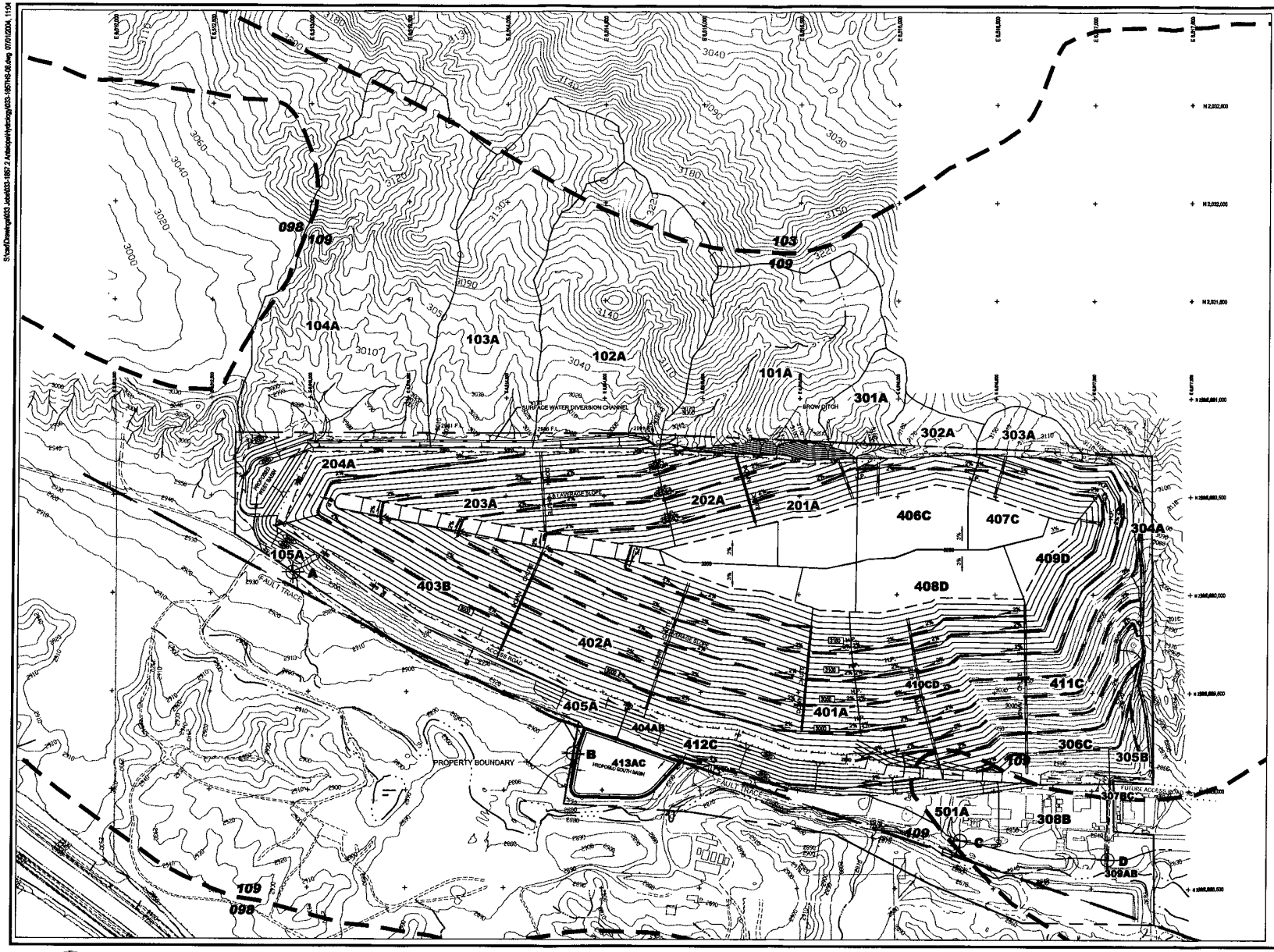
NOTES

1. TOPOGRAPHIC BASE MAP COMPOSITE FROM ANAYLITCAL PHOTOGRAMMETRIC SURVEYS, INC., SURVEY FLIGHTS DATED JUNE 11, 1992 (FOR WESTERN AREAS) AND NOVEMBER 8, 2001 (FOR OPERATING LANDFILL AREA). CONTOUR INTERVAL 10 FEET.
2. LACDPW SOIL TYPE BOUNDARIES TAKEN FROM "ANAVERDE CREEK BASIN HYDROLOGY STUDY, UPSTREAM OF ANTELOPE VALLEY FREEWAY", AKM CONSULTING ENGINEERS, 1991 AND ORTHO-RECTIFIED TO CALIFORNIA STATE PLANE.

250 0 250 500
scale feet

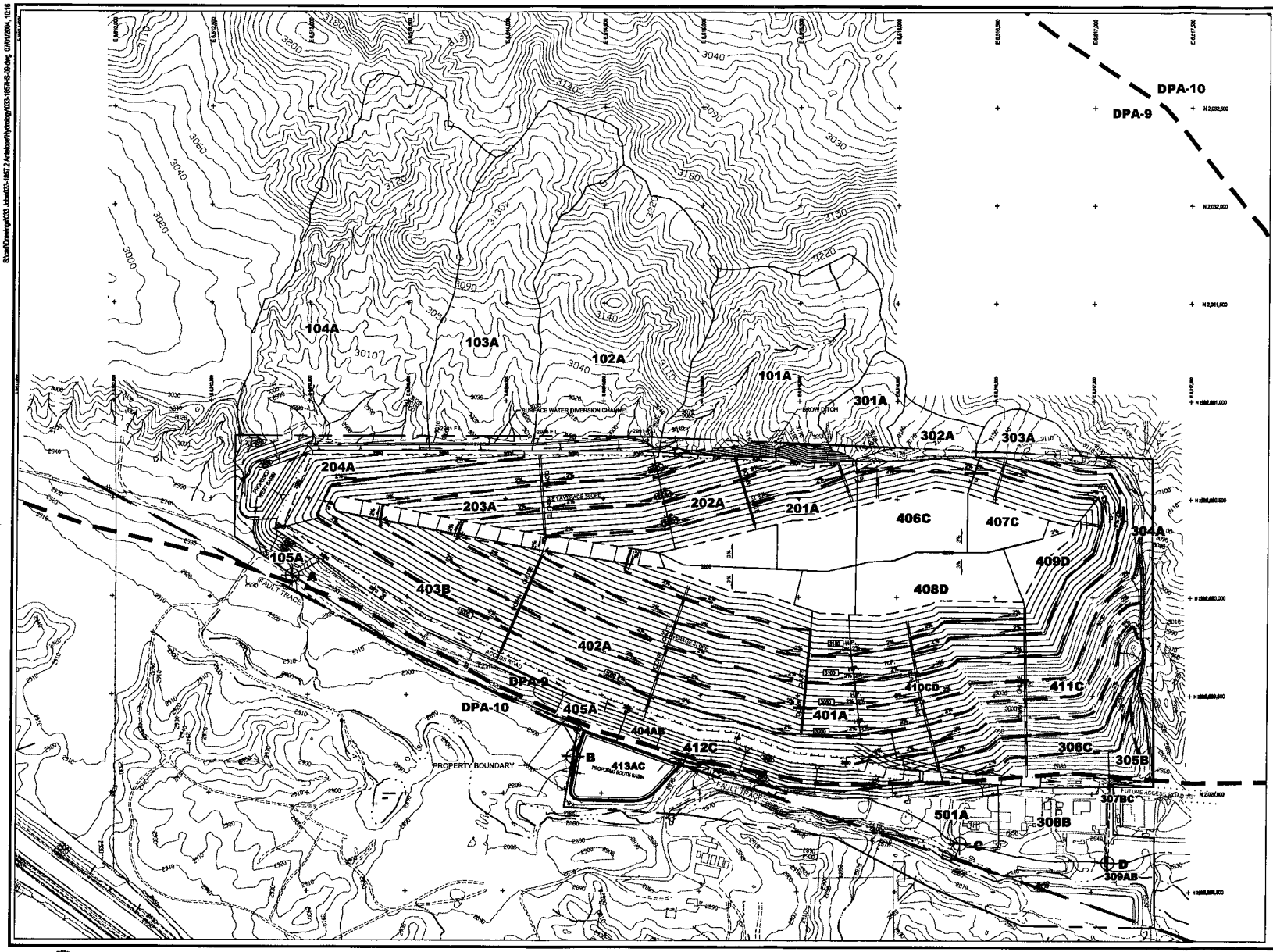
Golder Associates

Figure 5
Post Development Hydrology Map with 50-Year Capital Flood Isohyets



Golder Associates

Figure 6
Post Development Hydrology Map with LACDPW Soil Types



LEGEND

- PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE EXISTING
- INDEX TOPOGRAPHIC CONTOUR
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING FENCE LINE
- HISTORICAL "BLUE" LINE
- COORDINATE GRID (E 6,514,500)
- PROPOSED BASE GRADE CONTOURS (3250)
- PROPOSED REFUSE FILL GRADE CONTOURS (3230)
- SLOPE INDICATOR (3:1)
- GRADE INDICATOR (5.0%)
- REPORTING LOCATION (A)
- HYDROLOGIC SUBBASIN BOUNDARY
- 701A — HYDROLOGIC SUBBASIN DESIGNATION
- DPA-9 / DPA-10 — LACDPW DEBRIS POTENTIAL AREA BOUMDARY WITH DPA's

NOTES

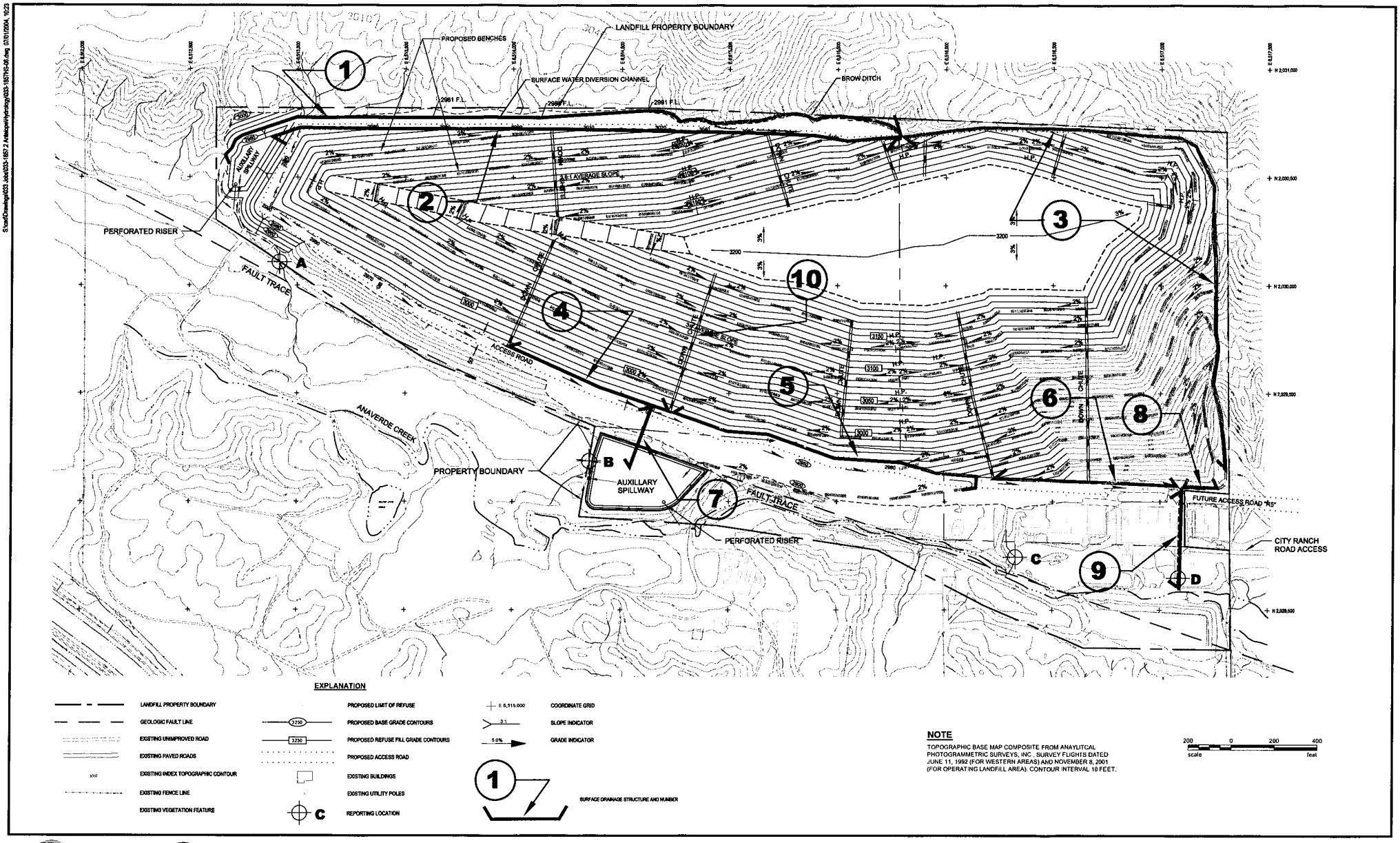
1. TOPOGRAPHIC BASE MAP COMPOSITE FROM ANAYLITCAL PHOTOGRAMMETRIC SURVEYS, INC., SURVEY FLIGHTS DATED JUNE 11, 1992 (FOR WESTERN AREAS) AND NOVEMBER 8, 2001 (FOR OPERATING LANDFILL AREA). CONTOUR INTERVAL 10 FEET.
2. LACDPW SOIL TYPE BOUNDARIES TAKEN FROM "ANAVERDE CREEK BASIN HYDROLOGY STUDY, UPSTREAM OF ANTELOPE VALLEY FREEWAY", AKM CONSULTING ENGINEERS, 1991 AND ORTHO-RECTIFIED TO CALIFORNIA STATE PLANE.

250 0 250 500
scale feet

Golder Associates

N

Figure 7
Post Development Hydrology Map with Debris Potential Areas



Golder Associates

ANTELOPE VALLEY PUBLIC LANDFILL

Figure 8
Post-Developemnt Surface Water Control Plan

June 2004

Figure 9: Pre-Development Hydrographs at Reporting Points (50-Year Capital Flood, Day 4 - Antelope Valley Public Landfill)

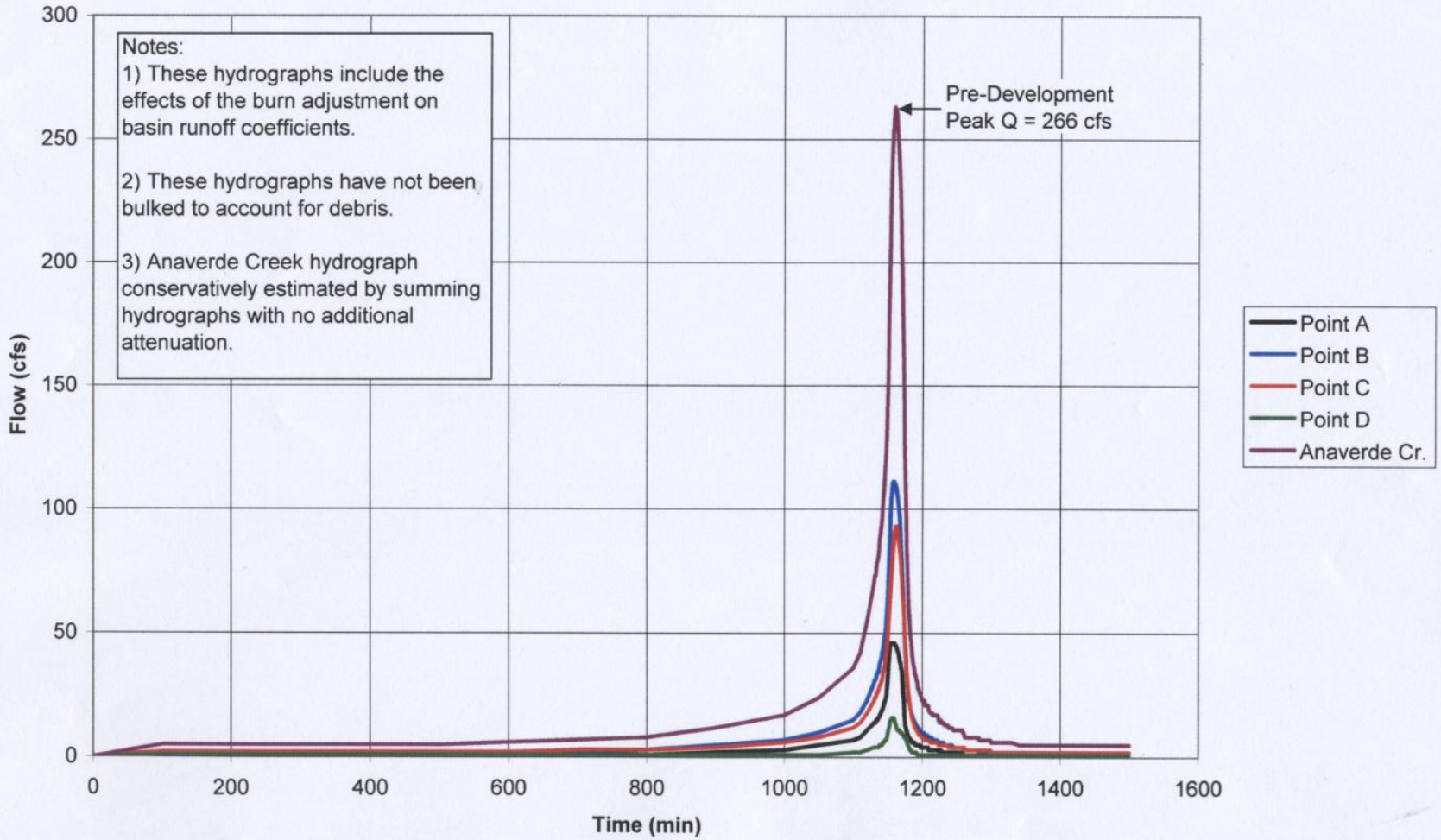
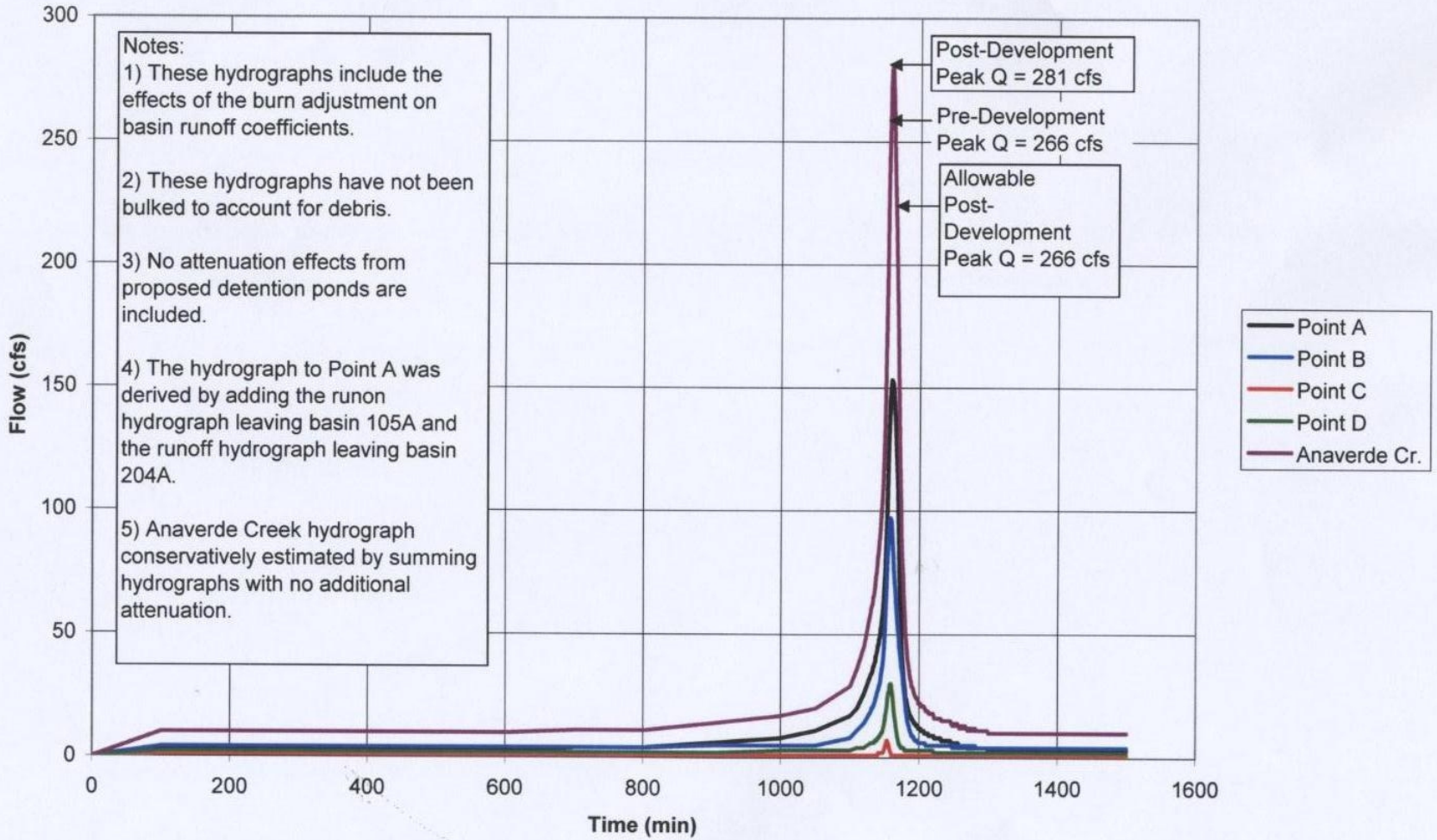
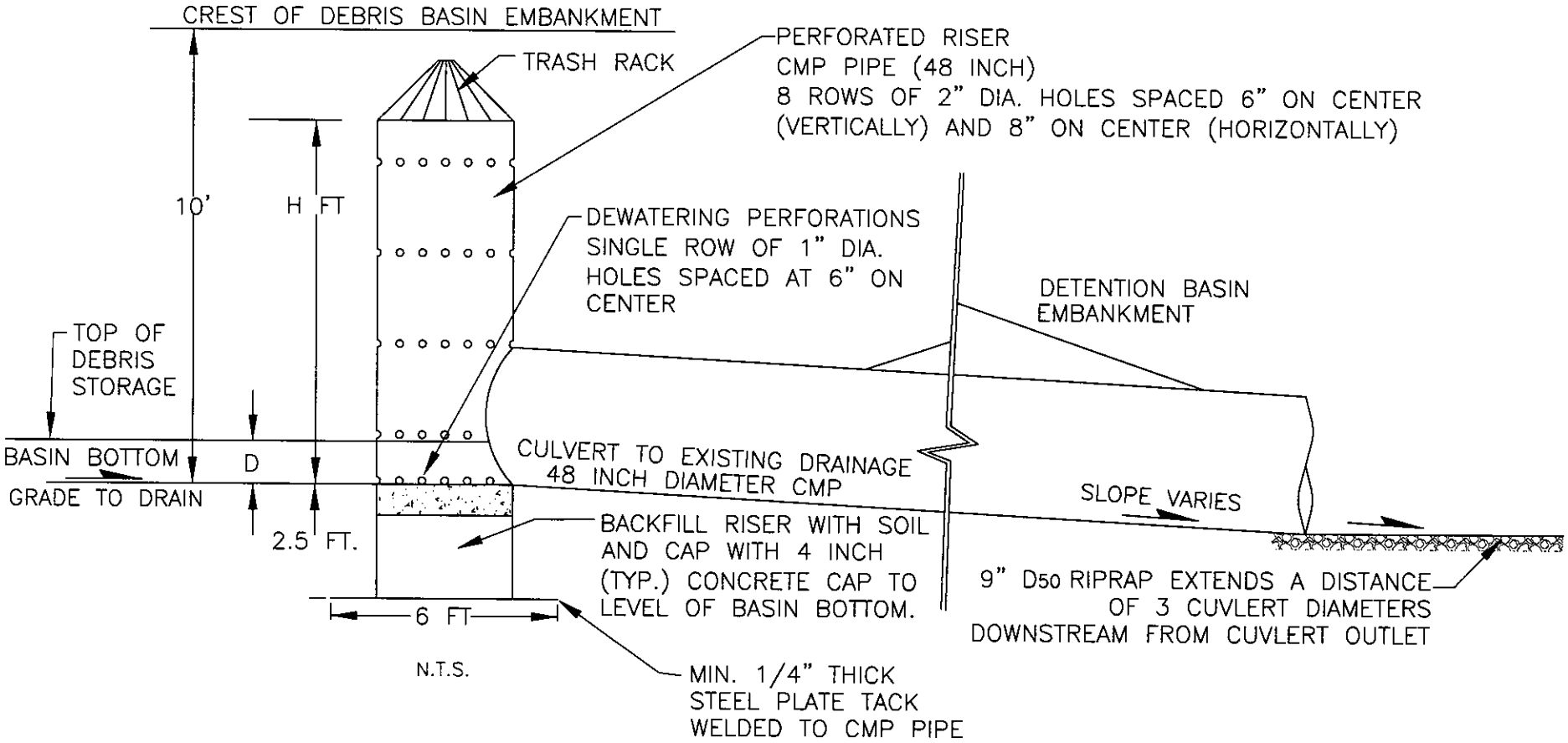


Figure 10: Post-Development Hydrographs at Reporting Points (50-Year Capital Flood, Day 4 - Antelope Valley Public Landfill)





BASIN	DEBRIS DEPTH D (ft)	MIN. RISER HEIGHT H (ft)
WEST	1.1	6.0
SOUTH	0.5	5.5

Golder Associates

Project No.: 033-1857

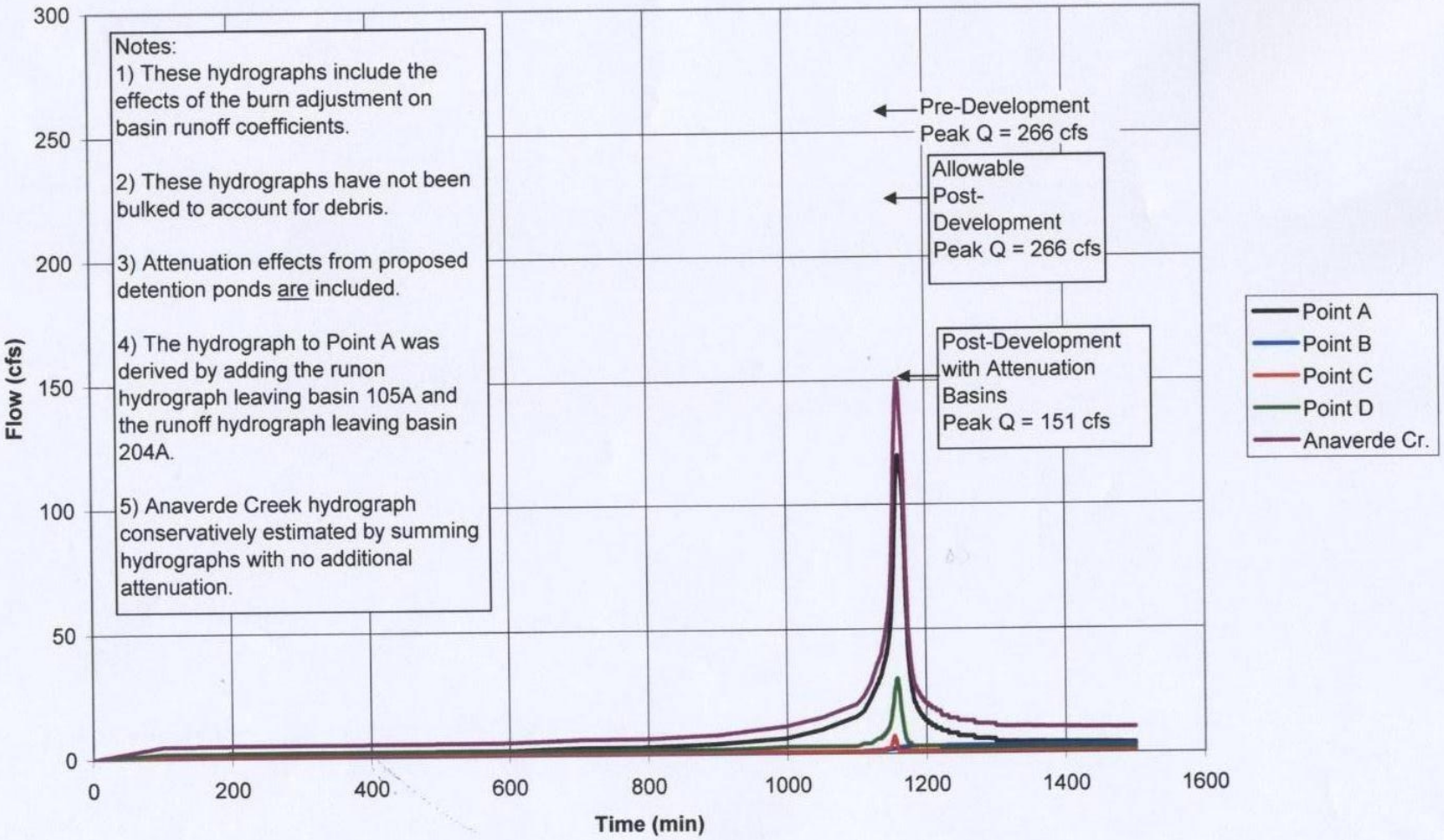
Date: MAY 2004

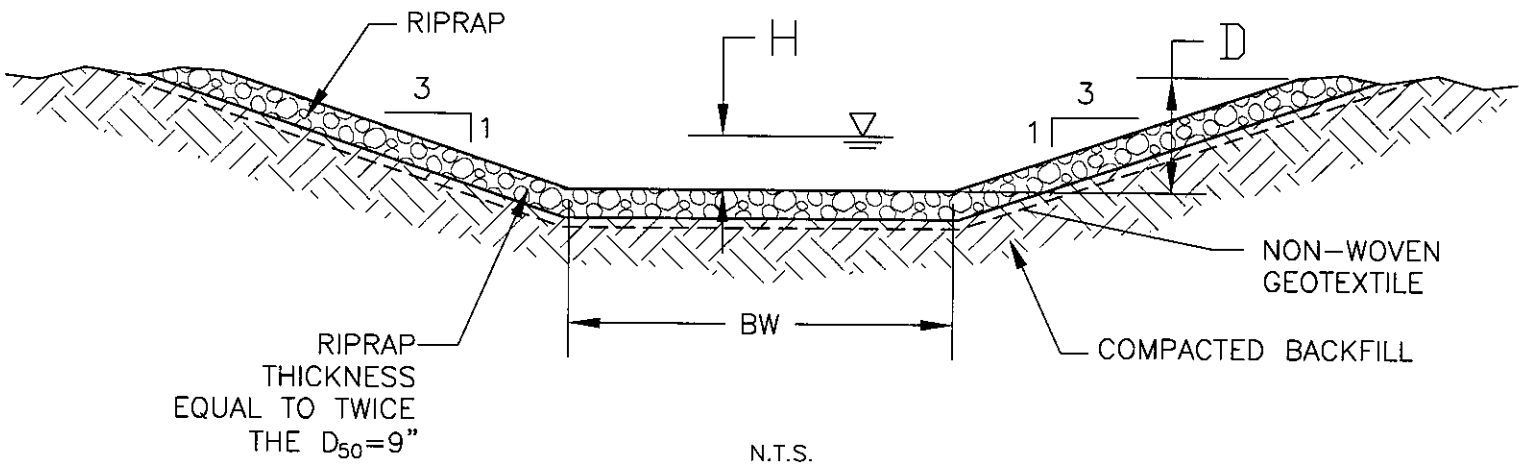
Drawn by: JWR
Checked by: TAC

FIGURE 11
BASIN OUTLET DETAILS

ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

Figure 12: Post-Development Hydrographs with Basins at Reporting Points (50-Year Capital Flood, Day 4 - Antelope Valley Public Landfill)





BASIN	Q_{DESIGN} (cfs)	BW (ft)	H (ft)	D (ft)
WEST	39	14	1.0	2
SOUTH	97	19	1.5	2

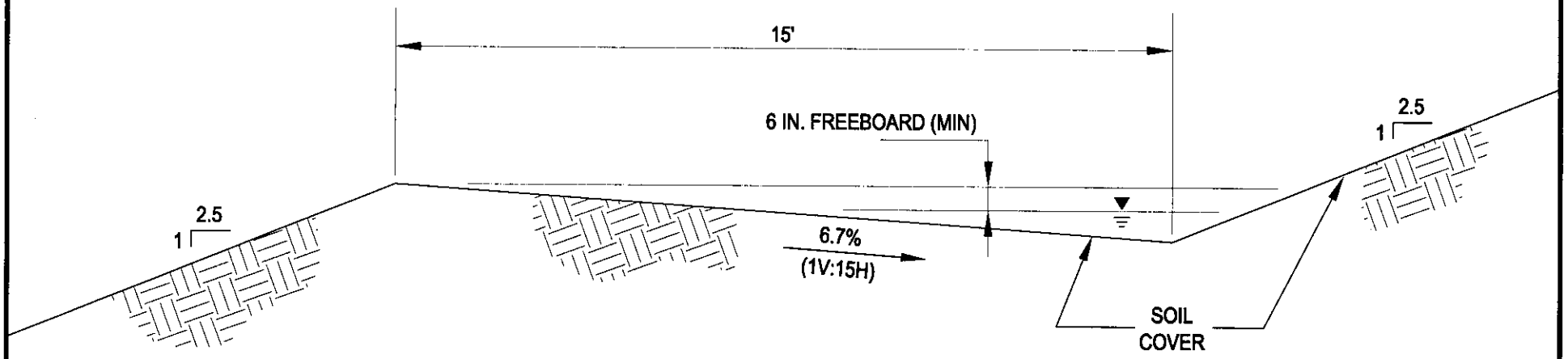
Golder Associates

Project No.: 033-1857 | Date: MaY 2004

Drawn by: JWR | Checked by: TAC

FIGURE 13 - TYPICAL RIPRAP-LINED AUXILIARY SPILLWAY

ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA



NOTE: MAX. FLOW VELOCITY = 3.5 FT/SEC

Golder Associates	Project No.: 033-1857	Date: March 2003
	Drawn by: JS	Checked by: KER

FIGURE 14 - SOIL LINED BENCH FLOWING FULL (TYP) (CROSS-SECTION)

ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

APPENDIX A

PRE-DEVELOPMENT HYDROLOGY
F0601 OUTPUT FILES

Program Package Serial Number: 2035
08/18/03 FILE: 602-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR PRE-DEV EAST BASIN RUN-OFF HYDROLOGY MODEL

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
1 601A	13.3	10.	13.3	10.	2	641.	.03400	.00	.00	0.	109	25	A22	.01
1 602A	4.8	7.	18.1	16.	0	0.	.00000	.00	.00	0.	309	10	A22	.01

PEAK Q: 16 cfs

Program Package Serial Number: 2035

08/18/03 FILE: 706-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR PRE-DEV SOUTH BASIN #2 RUN-OFF HYDROLOGY MODEL STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 701A	2.7	6.	2.7	6.	5	2889.	.04800	30.00	.00	0.	309	5	A22	.01
1 702A	28.1	23.	30.8	27.	5	180.	.08300	30.00	.00	0.	109	22	A22	.01
1 703A	13.2	17.	44.0	44.	0	0.	.00000	.00	.00	0.	309	13	A22	.01
1 704B	15.8	20.	15.8	20.	0	0.	.00000	.00	.00	0.	309	14	A22	.01

```
*                                                    CONFLUENCE Q'S                                                    *
*     1  705A  TA 1157 QA      44. QAB      63. QB      20.      1  705B  TB 1155 QB      20. QBA      63. QA      43.  *
*                                1  705AB TAB 1157 QAB      63. QA      44. QB      20.                                 *
```

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 705AB	15.8	20.	59.8	63.	5	1802.	.02800	30.00	.00	0.	309	0	A22	.00
1 706A	35.0	35.	94.8	93.	0	0.	.00000	.00	.00	0.	309	24	A23	.01

PEAK Q = 93 cfs.

```
 Program Package Serial Number:  2035
 08/18/03   FILE: 804-50   INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE
1
                                     LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                                       MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50
 AVL 50-YR PRE-DEV SOUTH BASIN #1 RUN-OFF HYDROLOGY MODEL
                                                                                                              STORM DAY 4
               SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV      CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
 LOCATION      AREA(Ac) Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft)  SLOPE   SIZE(Ft)   Z    Q(CFS)  NAME  TC  ZONE  IMPV
    1  801A     45.8      48.      45.8      48.   0       0.   .00000      .00    .00       0.  309   20   A22   .01
    1  802B     29.2      30.      29.2      30.   0       0.   .00000      .00    .00       0.  309   22   A23   .01
*********************************************************************************************************************
*
*     1  803A  TA 1156 QA     48. QAB     78. QB    30.     1  803B  TB 1156 QB      30. QBA      78. QA      48.   *
*                                1  803AB TAB 1156 QAB     78. QA     48. QB     30.                                *
*********************************************************************************************************************
               SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV      CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
 LOCATION      AREA(Ac) Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft)  SLOPE   SIZE(Ft)   Z    Q(CFS)  NAME  TC  ZONE  IMPV
    1  803AB    29.2      30.      75.0      78.   2    1059.   .04100      .00    .00       0.  309    0   A23   .00
    1  804A     30.7      35.     105.7     111.   0       0.   .00000      .00    .00       0.  309   19   A23   .01
```

PEAK Q= 111

Program Package Serial Number: 2035
08/18/03 FILE: 902-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR PRE-DEV WEST BASIN RUN-OFF HYDROLOGY MODEL

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
1 901A	44.7	46.	44.7	46.	2	5.	.01000	.00	.00	0.	309	22	A23	.01
1 902A	.0	0.	44.7	46.	0	0.	.00000	.00	.00	0.	309	22	A23	.00

PEAK Q = 46cfs.

APPENDIX B

POST-DEVELOPMENT HYDROLOGY
F0601 OUTPUT FILES

Program Package Serial Number: 2035
08/18/03 FILE: 105-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR POST-DEV WEST BASIN RUN-ON HYDROLOGY MODEL

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
1	101A	19.0	24.	19.0	24.	5	545.	.01000	5.00	.00	0.	309	14	A22	.01
1	102A	23.9	30.	42.9	54.	5	265.	.01000	5.00	.00	0.	309	14	A22	.01
1	103A	20.6	24.	63.5	78.	5	996.	.01000	5.00	.00	0.	309	16	A22	.01
1	104A	35.1	41.	98.6	117.	5	1057.	.01000	5.00	.00	0.	309	18	A23	.01
1	105A	1.1	3.	99.7	117.	0	0.	.00000	.00	.00	0.	309	5	A24	.01

PEAK Q = 117 cfs

Program Package Serial Number: 2035
08/18/03 FILE: 204-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR POST-DEV WEST BASIN RUN-OFF HYDROLOGY MODEL

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1	201A	6.5	9.	6.5	9.	5	535.	.04000	10.00	.00	0.	109	9	A22	.01
1	202A	6.1	10.	12.6	19.	5	1000.	.04000	10.00	.00	0.	109	7	A23	.01
1	203A	15.3	18.	27.9	35.	5	1159.	.04000	10.00	.00	0.	109	13	A23	.01
1	204A	5.7	9.	33.6	39.	5	94.	.04000	10.00	.00	0.	109	8	A23	.01

PEAK Q = 39 cfs

Program Package Serial Number: 2035
08/18/03 FILE: 204-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR POST-DEV WEST BASIN RUN-OFF HYDROLOGY MODEL

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM RAIN ZONE	DAY 4 PCT IMPV
1	201A	6.5	9.	6.5	9.	5	535.	.04000	10.00	.00	0.	109	9	A22	.01
1	202A	6.1	10.	12.6	19.	5	1000.	.04000	10.00	.00	0.	109	7	A23	.01
1	203A	15.3	18.	27.9	35.	5	1159.	.04000	10.00	.00	0.	109	13	A23	.01
1	204A	5.7	9.	33.6	39.	5	94.	.04000	10.00	.00	0.	109	8	A23	.01

PEAK Q = 39 cfs

Program Package Serial Number: 2035
12/11/03 FILE: 309AB INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL POST-DEV EAST BASIN RUN-ON & RUN-OFF HYDROLOGY MODEL (REV 1)

STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 301A	3.5	6.	3.5	6.	5	517.	.12000	3.00	.00	0.	309	7	A22	.01
1 302A	2.5	5.	6.0	11.	5	475.	.12000	3.00	.00	0.	309	6	A22	.01
1 303A	2.4	5.	8.4	15.	5	1950.	.12000	3.00	.00	0.	309	6	A21	.01
1 304A	2.3	3.	10.7	17.	4	543.	.01000	3.00	.00	0.	309	15	A21	.01
1 305B	2.0	3.	2.0	3.	0	0.	.00000	.00	.00	0.	109	9	A22	.01
1 306C	5.2	5.	5.2	5.	0	0.	.00000	.00	.00	0.	109	15	A22	.01

```
*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*     1  307B  TB 1153 QB       3. QBC       8. QC       5.       1  307C  TC 1155 QC       5. QCB       8. QB       3.  *
*                                1  307BC TBC 1154 QBC       8. QB       3. QC       5.                                 *
*****************************************************************************************************************
```

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 307BC	5.2	5.	7.2	8.	5	448.	.03000	5.00	.00	0.	109	0	A22	.00
1 308B	5.6	7.	12.8	15.	0	0.	.00000	.00	.00	0.	109	11	A22	.01

```
*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*     1  309A  TA 1159 QA      16. QAB      30. QB      14.       1  309B  TB 1156 QB      15. QBA      27. QA      13.  *
*                                1  309AB TAB 1158 QAB      30. QA      16. QB      14.                                 *
*****************************************************************************************************************
```

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 309AB	12.8	15.	23.5	30.	2	295.	.03400	5.00	.00	0.	109	0	A22	.00

PEAK Q = 30 cfs

```
Program Package Serial Number:  2035
12/11/03   FILE: 413AC    INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                   LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                          PROG F0601M

                                   MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50
    AVL POST-DEV SOUTH BASIN #1 RUN-OFF HYDROLOGY MODEL (REV 1)                                                   STORM DAY 4
                 SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL        RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac) Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       1  401A     4.8        8.       4.8       8.   6     793.   .02000      .01  2.50       0.  109   7   A22   .01
       1  402A    25.4       33.      30.2      38.   5      92.   .00500     3.00   .00       0.  109  10   A22   .01
       1  403B    11.7       13.      11.7      13.   5     714.   .00500     3.00   .00       0.  109  14   A23   .01
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*      1  404A  TA 1156 QA      38. QAB      50. QB      12.       1  404B  TB 1159 QB      13. QBA      47. QA      34.   *
*                                1  404AB TAB 1157 QAB      50. QA      38. QB      13.                                     *
*****************************************************************************************************************************
                 SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL        RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac) Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       1  404AB   11.7       13.      41.9      50.   5     212.   .05000     3.00   .00       0.  109   0   A23   .00
       1  405A     6.3        6.      48.2      56.   0       0.   .00000      .00   .00       0.  109  21   A23   .01
       1  406C     6.5        8.       6.5       8.   6    2454.   .02000      .01  2.50       0.  109  11   A22   .01
       1  407C     9.7        8.      16.2      13.   0       0.   .00000      .00   .00       0.  109  23   A22   .01
       1  408D     7.6       10.       7.6      10.   0       0.   .00000      .00   .00       0.  109  10   A22   .01
       1  409D     4.6        5.      12.2      15.   0       0.   .00000      .00   .00       0.  109  13   A22   .01
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*      1  410C  TC 1165 QC      13. QCD      16. QD       3.       1  410D  TD 1154 QD      15. QDC      25. QC       9.   *
*                                1  410CD TCD 1155 QCD      25. QC      10. QD      15.                                     *
*****************************************************************************************************************************
                 SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL        RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac) Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       1  410CD   12.2       15.      28.4      25.   0       0.   .00000      .00   .00       0.  109   0   A22   .00
       1  411C    17.8       13.      46.2      38.   5    1453.   .00700     3.00   .00       0.  109  25   A22   .01
       1  412C    10.8        8.      57.0      44.   0       0.   .00000      .00   .00       0.  109  28   A22   .01
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*      1  413A  TA 1157 QA      56. QAC      96. QC      40.       1  413C  TC 1161 QC      44. QCA      88. QA      44.   *
*                                1  413AC TAC 1158 QAC      97. QA      55. QC      42.                                     *
*****************************************************************************************************************************
                 SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL        RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac) Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       1  413AC   57.0       44.     105.2      97.   0       0.   .00000      .00   .00       0.  109   0   A22   .00
```

PEAK Q = 97 cfs

Program Package Serial Number: 2035
08/18/03 FILE: 502-50 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

AVL 50-YR POST-DEV SOUTH BASIN #2 RUN-OFF HYDROLOGY MODEL

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
1 501A	3.7	7.	3.7	7.	2	5.	.01000	.00	.00	0.	109	6	A23	.01
1 502A	.0	0.	3.7	7.	0	0.	.00000	.00	.00	0.	109	6	A23	.00

PEAK Q = 7 cfs

APPENDIX C

COVER SOIL EROSION LOSS CALCULATIONS

ATTACHMENT C

COVER SOIL EROSION LOSS CALCULATIONS

C.1 INTRODUCTION

Soil loss potential at the Antelope Valley Sanitary Landfill site due to water erosion was evaluated using the Revised Universal Soil Loss Equation (RUSLE), developed by the U.S. Department of Agriculture (USDA), which considers soil and vegetation type as well as physical and climatic features of the landfill area. A brief discussion of this method is given below.

C.2 SOIL LOSS EVALUATION

The RUSLE can be used to evaluate landfill cover soil loss. This equation may be stated as:
A = R K LS C P, where

A = average annual soil loss, in tons per acre per year

R = rainfall and runoff erosivity index

K = soil erodibility factor

LS = hillslope length and steepness factor

C = cover-management factor

P = support practice factor

For the purpose of soil loss analysis, the landfill was divided into lots based upon the average slopes of the final cover and surface drainage characteristics as shown in Figure C-1. The results of the analysis are shown in Table C-1.

The RUSLE factors for the Antelope Valley Sanitary Landfill were assigned as follows:

R = 10 Index for the Palmdale area provided by the USDA, which best represents weather conditions at the site.

K = 0.238 It is assumed that the textural class of the final cover material will be of a "sandy loam" based on the average grain size distribution curve of the proposed final cover material (see Attachment C-A).

LS Dependent upon length and average gradient of lot under consideration. Values range from 0.49 to 8.38 for this application.

C = 0.135 "C" represents the effects of plants (California annual grass), soil cover, soil biomass (roots and incorporated residue), and soil-disturbing activities on soil loss.

P = 1.0 "P" accounts for reduction of erosion due to land management practices and is conservatively assumed to be 1.0 (highest value) for the entire landfill site.

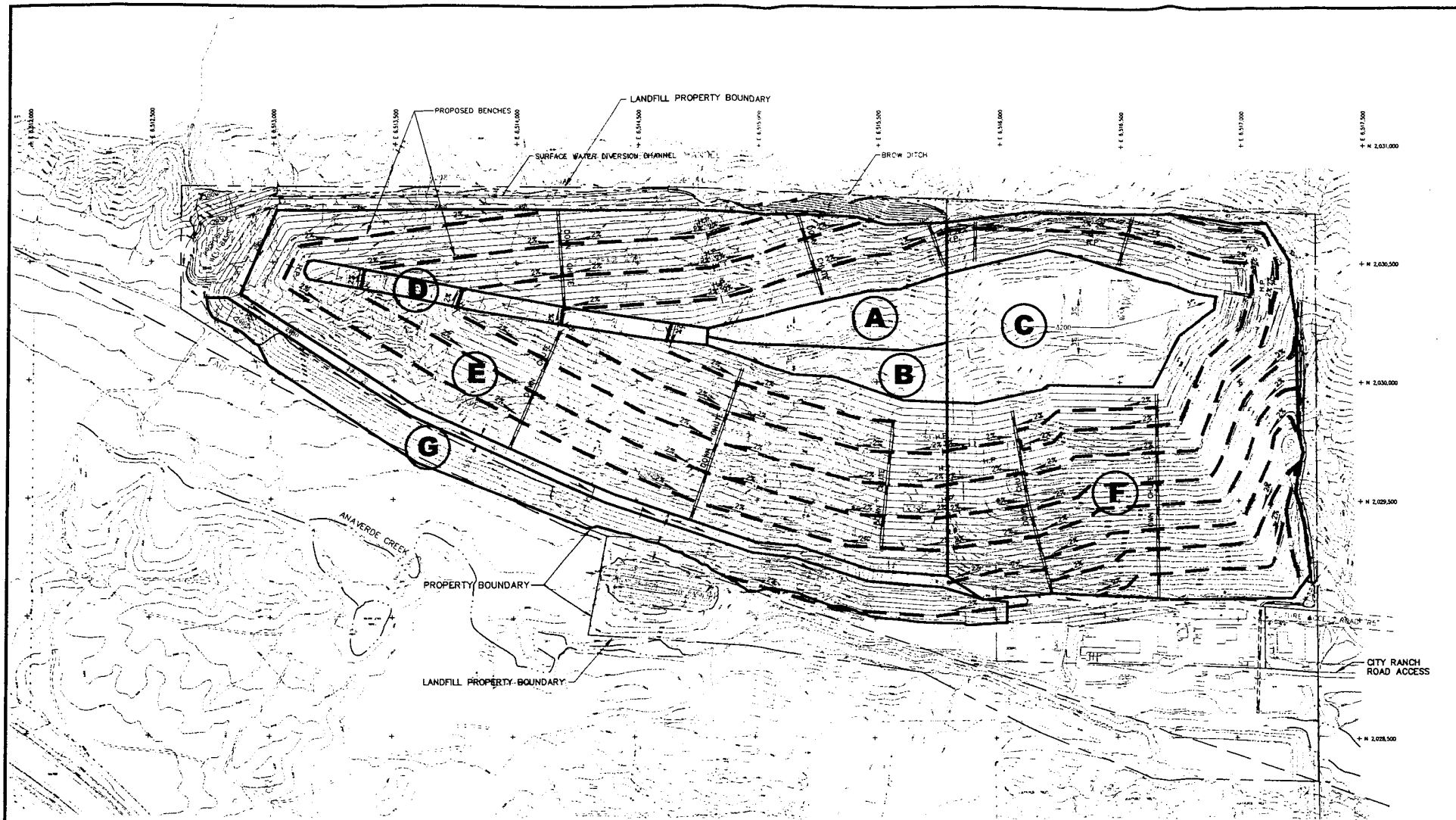
Using the values listed above, the average soil loss depth due to water erosion is estimated to be 0.01 inch per year in the presence of vegetation.

C.3 DISCUSSION

Based on the above soil erosion analysis, the average soil loss depth for a soil density of 120 pounds per cubic foot is about 0.01 inch per year or 2.22 ton/acre/year for the entire vegetated landfill site. Over the 30-year post-closure maintenance period, the average soil loss over the entire site is conservatively estimated at approximately 0.31 inch. The 30-year loss represents less than one (1) percent of the proposed final cover layer of 36 inches.

TABLE C-1
SOIL LOSS ESTIMATES
ANTELOPE VALLEY SANITARY LANDFILL

Area No.	Area (acres)	Slope Length (ft)	Average gradient (%)	R	K	LS	C	P	Soil Loss (tons/acre/year)	Soil Loss (tons/year)	Soil Loss (CY/year)	Soil Loss (inches/year)
A	5.06	200	3	10	0.238	0.49	0.135	1	0.16	0.80	0.49	0.0007
B	5.22	200	3	10	0.238	0.49	0.135	1	0.16	0.82	0.51	0.0007
C	12.82	280	3	10	0.238	0.546	0.133	1	0.17	2.22	1.37	0.0008
D	3.95	400	10	10	0.238	2.885	0.129	1	0.89	3.50	2.16	0.0041
E	59.09	135	40	10	0.238	8.383	0.135	1	2.69	159.15	98.24	0.0124
F	39.45	135	40	10	0.238	8.383	0.135	1	2.69	106.26	65.59	0.0124
G	11.48	135	40	10	0.238	8.383	0.135	1	2.69	30.92	19.09	0.0124
Total	137.07								Weighted average 2.2154	303.67	187.45	Weighted average 0.0102
											30 year cover loss (inch):	0.3052



EXPLANATION

- LANDFILL PROPERTY BOUNDARY
- GEOLOGIC FAULT LINE
- LANDFILL PARCEL BOUNDARY
- EXISTING INTERMEDIATE TOPOGRAPHIC CONTOUR
- EXISTING INDEX TOPOGRAPHIC CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING UNIMPROVED ROAD
- EXISTING PAVED ROADS
- EXISTING BUILDINGS
- EXISTING UTILITY POLES
- EXISTING FENCE LINE
- EXISTING VEGETATION FEATURE
- APPROVED LIMIT OF PERMITTED LANDFILL
- PROPOSED LIMIT OF REFUSE
- PROPOSED BASE GRADE CONTOURS
- PROPOSED REFUSE FILL GRADE CONTOURS
- PROPOSED ACCESS ROAD
- HISTORICAL "BLUE" LINE
- COORDINATE GRID
- SLOPE INDICATOR
- GRADE INDICATOR
- EROSION LOSS CALCULATION AREAS AND NUMBERS

REV	DATE	DESCRIPTION	DESIGN	DRAWN	REVIEW
-	3/07/03	HYDROLOGY REPORT	KEP	JWS	SGS

Golder Associates
10 Chrysler, Suite B
Irvine, California 92618
(949) 583-2700

WASTE MANAGEMENT, INC.

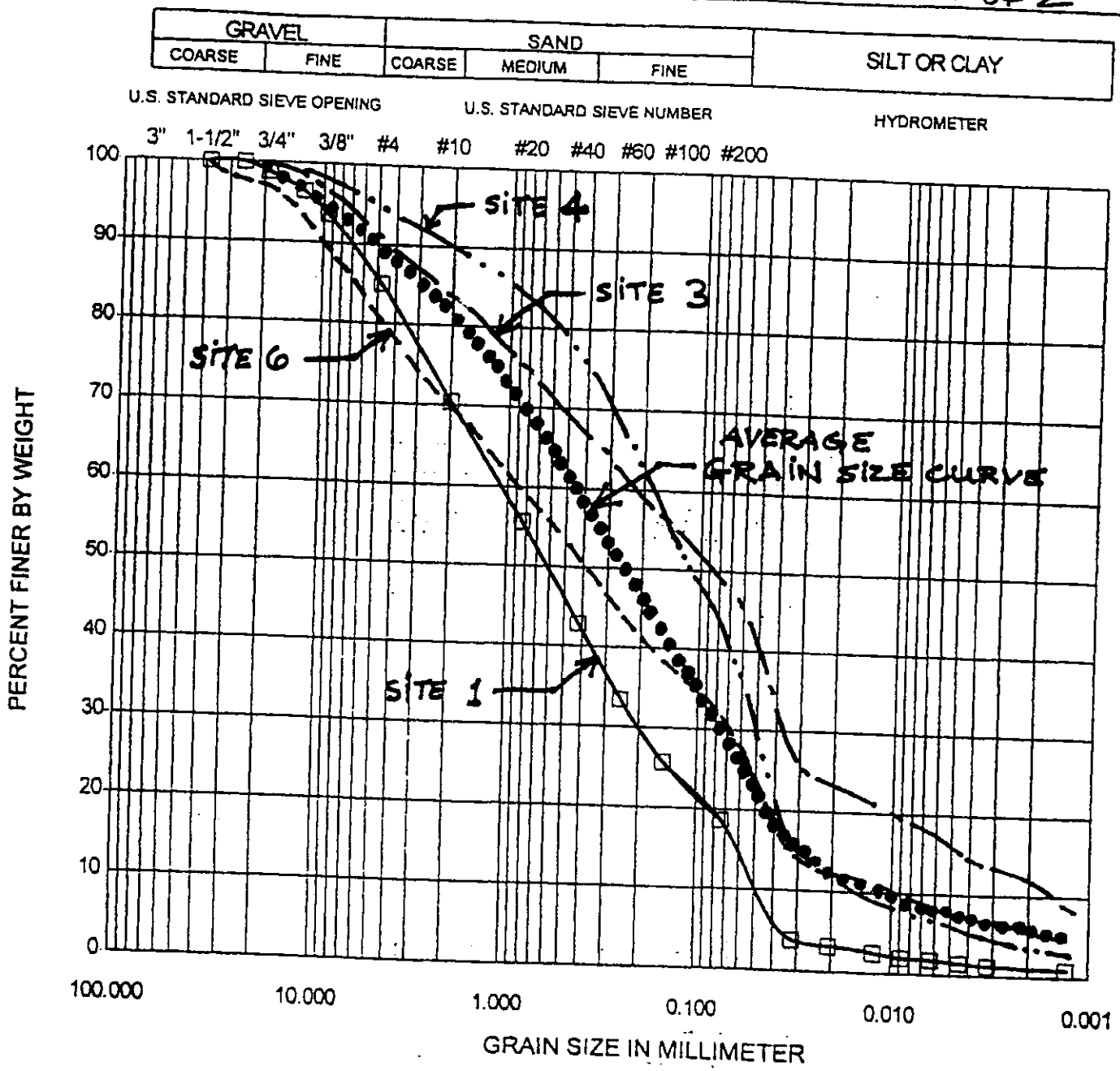
ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

AREAS FOR COVER SOIL
EROSION LOSS CALCULATIONS

FIGURE

C-1

ATTACHMENT C-A 1 of 2



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	SITE #1	N/A	BULK	SM	N/A	N/A

GRAVEL	10%	—
SAND	60%	66%
SILT	24%	27%
CLAY	6%	7%
	100%	100%

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

Client Name: Golder & Associates
Project Name: Antelope Valley Landfill
Project No.: 003-1971
EGL Job No.: 00-099-003

GRAIN SIZE DISTRIBUTION CURVE

[HILLEL, D. (1982). INTRODUCTION TO ... PH... ..., A... ...IC ...INC

0.09 mEq/gm. The greater specific surface area of montmorillonite is due to its lattice expansion and consequent exposure of internal (interlamellar) surfaces, which are not so exposed in the case of kaolinite. Other clay minerals (such as illite, micas, palygorskite, etc.) often exhibit properties intermediate between those of kaolinite and montmorillonite.

The attraction of a cation to a negatively charged clay micelle generally increases with increasing valency of the cation. Thus, monovalent cations are replaced more easily than divalent or trivalent cations. Highly hydrated cations, which tend to be farther from the surface, are also more easily replaced than less hydrated ones. The order of preference of cations in exchange reactions is generally as follows (Jenny, 1932, 1938):

$$Al^{3+} > Ca^{2+} > Mg^{2+} > K^{+} > Na^{+} > Li^{+}$$

When confined clays are allowed to sorb water, swelling pressures develop, which are related to the osmotic pressure difference between the double layer and the external solution (Aylmore and Quirk, 1959). Depending upon their state of hydration and the composition of their exchangeable cations, clay particles may either flocculate or disperse (Jenny and Reitemeier, 1935). Dispersion generally occurs with monovalent and highly hydrated cations (e.g., sodium). Conversely, flocculation occurs at high solute concentrations and/or in the presence of divalent and trivalent cations (e.g., Ca^{2+}, Al^{3+}) when the double layer is compressed so that its repulsive effect is lessened and any two micelles can approach each other more closely. Thus, the short-range attractive forces (known as the London–van der Waals forces) can come into play and join the individual micelles into *flocs*.

When a dispersed clay is dehydrated, it forms a dense and hard mass, or crust. On the other hand, when flocculated clay is dehydrated, it forms a crumbly and loose assemblage of small aggregates. Under rainfall action in the field, the dispersed clay will tend to become muddy, less pervious, and more highly erodible than flocculated clay. Thus, the desirable condition of a clayey soil is the flocculated one. Flocculation alone does not create an optimal structure, however, as will be explained in Chapter 4.

D. Soil Classes

The overall textural designation of a soil, called the *textural class*, is conventionally determined on the basis of the mass ratios of the three fractions. Soils with different proportions of sand, silt, and clay are assigned to different classes, as shown in the triangular diagram of Fig. 3.5. To illustrate the use of the textural triangle, let us assume that a soil is composed of 50% sand, 20% silt, and 30% clay. Note that the lower left apex of the triangle

represents 100% sand and the right side of the triangle represents 0% sand. Now find the point of 50% sand on the bottom edge of the triangle and follow the diagonally leftward line rising from that point and parallel to the zero line for sand. Next, identify the 20% line for silt, which is parallel to the zero line for silt, namely, the left edge of the triangle. Where the two lines intersect each other, as well as the 30% line for clay, is the point we are seeking. In this particular example, it happens to fall within the realm of "sandy clay loam."

Note that a class of soils called *loam* occupies a rather central location in the textural triangle. It refers to a soil which contains a "balanced" mixture of coarse and fine particles, so that its properties are intermediate among

SAND: 66%
SILT: 27%
CLAY: 7%
SANDY LOAM

ATTACHMENT C-A
2 of 2

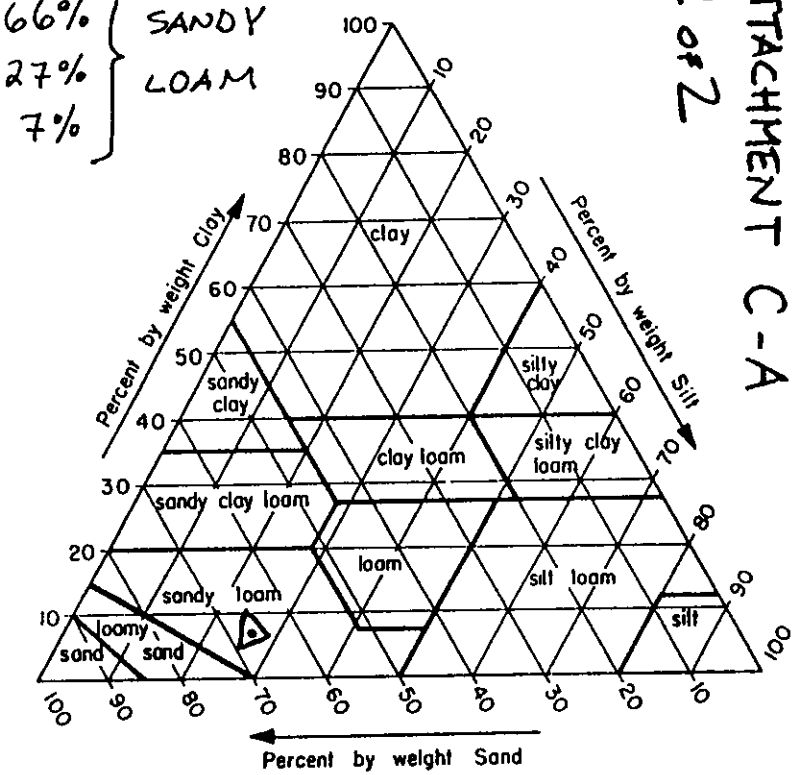


Fig. 3.5. Textural triangle, showing the percentages of clay (below 0.002 mm), silt (0.002–0.05 mm), and sand (0.05–2.0 mm) in the basic soil textural classes.

those of a sand, a silt, and a clay. As such, loam is often considered to be the optimal soil for plant growth and for agricultural production, as its capacity to retain water and nutrients is better than that of sand while its drainage, aeration, and tillage properties are more favorable than those of clay. This

APPENDIX D

POST-DEVELOPMENT HYDROLOGY
SEDCAD & RETARD OUTPUT FILES

Antelope Valley West Pond

Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)	
0.00	0.516	0.000	1
0.50	0.554	0.267	
1.00	0.588	0.553	
1.50	0.606	0.852	
2.00	0.624	1.159	2
2.50	0.642	1.476	3
3.00	0.660	1.801	4
3.50	0.679	2.136	5
4.00	0.698	2.481	6
4.50	0.717	2.835	7
5.00	0.736	3.198	8
5.50	0.756	3.571	9
6.00	0.776	3.954	10
6.50	0.796	4.347	11
7.00	0.816	4.750	12
7.50	0.837	5.163	13
8.00	0.857	5.587	14
8.50	0.878	6.021	15
9.00	0.895	6.464	16

Antelope Valley Public Landfill -- West Pond

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Number of Holes per Elev
48.00	4.50	48.00	162.00	2.00	0.0240	5.50	18

Detailed Discharge Table

Elevation	Perf. Riser (cfs)	Combined Total Discharge (cfs)	
0.00	0.000	0.000	1
0.50	0.000	0.000	
1.00	0.000	0.000	
1.50	1.00>0.000	0.000	
2.00	1.00>0.334	0.334	2
2.50	1.00>0.807	0.807	3
3.00	1.00>1.386	1.386	4
3.50	1.00>2.054	2.054	5
4.00	1.00>2.802	2.802	6
4.50	1.00>3.621	3.621	7
5.00	1.00>4.505	4.505	8
5.50	5.450	5.450	9
6.00	13.773	13.773	10
6.50	38.956	38.956	11
7.00	71.566	71.566	12
7.50	85.570	85.570	13
8.00	95.670	95.670	14
8.50	104.801	104.801	15
9.00	113.198	113.198	16

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1997-2002 Version 6.3

Study Date : 05/28/04 Input hydrograph file name : 204-50.HYD
Output hydrograph file name: AVPLWestPond.hin
Antelope Valley Public Landfill West Pond

User entry of depth-outflow-storage data

Hydrograph time unit varies
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data @ 1 Min. Intervals:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
2.000	1.159	0.334	1.159	1.159
2.500	1.476	0.807	1.475	1.477
3.000	1.801	1.386	1.800	1.802
3.500	2.136	2.054	2.135	2.137
4.000	2.481	2.802	2.479	2.483
4.500	2.835	3.621	2.833	2.837
5.000	3.198	4.505	3.195	3.201
5.500	3.571	5.450	3.567	3.575
6.000	3.954	13.773	3.945	3.963
6.500	4.347	38.956	4.320	4.374
7.000	4.750	71.566	4.701	4.799
7.500	5.163	85.570	5.104	5.222
8.000	5.587	95.670	5.521	5.653
8.500	6.021	104.801	5.949	6.093
9.000	6.464	113.198	6.386	6.542

Hydrograph Detention Basin Routing
Hydrograph at 1 204 A Storm Day: 4 Drainage Area = 33.60
Total flood hydrograph volume this storm day = 3.71 Ac. Ft.

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Min)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 9.8 19.5 29.3 39.0	Depth (Ft.)
0	0.0	0.0	0.000	O	0.0
100	1.0	0.0	0.069	O	0.1
200	1.0	0.1	0.201	O	0.3
300	1.0	0.1	0.328	O	0.6
400	1.0	0.1	0.450	O	0.8
500	1.0	0.2	0.568	O	1.0
600	1.0	0.2	0.681	O	1.2
700	1.0	0.2	0.789	O	1.4
800	1.0	0.3	0.894	O	1.5
900	2.0	0.3	1.063	OI	1.8
1000	2.0	0.5	1.285	OI	2.2
1050	2.0	0.7	1.382	OI	2.4
1100	3.0	0.9	1.503	O I	2.5
1110	4.0	0.9	1.540	O I	2.6
1120	5.0	1.0	1.589	O I	2.7
1130	7.0	1.1	1.659	O I	2.8

1131	7.0	1.1	1.667	O I	2.8
1132	7.0	1.2	1.675	O I	2.8
1133	8.0	1.2	1.684	O I	2.8
1134	8.0	1.2	1.693	O I	2.8
1135	8.0	1.2	1.703	O I	2.8
1136	8.0	1.2	1.712	|O I	2.9
1137	9.0	1.2	1.723	|O I|	2.9
1138	9.0	1.3	1.734	|O I|	2.9
1139	9.0	1.3	1.744	|O I|	2.9
1140	10.0	1.3	1.756	|O I	2.9
1141	10.0	1.3	1.768	|O I	2.9
1142	11.0	1.4	1.781	|O |I	3.0
1143	11.0	1.4	1.795	|O |I	3.0
1144	12.0	1.4	1.809	|O |I	3.0
1145	12.0	1.4	1.824	|O |I	3.0
1146	13.0	1.5	1.840	|O | I	3.1
1147	14.0	1.5	1.857	|O | I	3.1
1148	15.0	1.5	1.876	|O | I	3.1
1149	17.0	1.6	1.897	|O | I	3.1
1150	19.0	1.6	1.921	|O | I|	3.2
1151	21.0	1.7	1.948	|O |I	3.2
1152	24.0	1.7	1.978	|O | I	3.3
1153	27.0	1.8	2.013	|O | I	3.3
1154	30.0	1.9	2.052	|O | I	3.4
1155	35.0	2.0	2.097	|O | I	3.4
1156	38.0	2.1	2.147	|O | I|	3.5
1157	39.0	2.2	2.198	|O | I	3.6
1158	39.0	2.3	2.248	|O | I	3.7
1159	39.0	2.4	2.299	|O | I	3.7
1160	37.0	2.5	2.346	| O | I |	3.8
1161	35.0	2.6	2.391	| O | I |	3.9
1162	33.0	2.7	2.433	| O | I |	3.9
1163	30.0	2.8	2.470	| O | I	4.0
1164	27.0	2.9	2.504	| O | I |	4.0
1165	24.0	2.9	2.533	| O | I	4.1
1166	21.0	3.0	2.558	| O |I	4.1
1167	18.0	3.0	2.578	| O | I	4.1
1168	15.0	3.1	2.595	| O | I	4.2
1169	13.0	3.1	2.608	| O | I	4.2
1170	11.0	3.1	2.619	| O |I	4.2
1171	9.0	3.1	2.627	| O I|	4.2
1172	8.0	3.2	2.634	| O I |	4.2
1173	7.0	3.2	2.639	| O I |	4.2
1174	6.0	3.2	2.643	| O I |	4.2
1175	5.0	3.2	2.646	| O I |	4.2
1176	5.0	3.2	2.648	| O I |	4.2
1177	4.0	3.2	2.649	| OI |	4.2
1178	4.0	3.2	2.650	| OI |	4.2
1179	4.0	3.2	2.652	| OI |	4.2
1180	3.0	3.2	2.651	| O |	4.2
1181	3.0	3.2	2.651	| O |	4.2
1182	3.0	3.2	2.651	| O |	4.2
1183	3.0	3.2	2.650	| O |	4.2
1184	3.0	3.2	2.650	| O |	4.2
1185	2.0	3.2	2.649	|IO |	4.2
1186	2.0	3.2	2.647	|IO |	4.2
1187	2.0	3.2	2.645	|IO |	4.2
1188	2.0	3.2	2.644	|IO |	4.2
1189	2.0	3.2	2.642	|IO |	4.2
1190	2.0	3.2	2.640	|IO |	4.2
1191	2.0	3.2	2.639	|IO |	4.2
1192	2.0	3.2	2.637	|IO |	4.2
1193	2.0	3.2	2.636	|IO |	4.2
1194	2.0	3.2	2.634	|IO |	4.2
1195	2.0	3.2	2.632	|IO |	4.2
1196	2.0	3.1	2.631	|IO |	4.2
1197	2.0	3.1	2.629	|IO |	4.2
1198	2.0	3.1	2.628	|IO |	4.2
1199	2.0	3.1	2.626	|IO |	4.2
1200	2.0	3.1	2.625	|IO |	4.2
1201	2.0	3.1	2.623	|IO |	4.2
1202	2.0	3.1	2.621	|IO |	4.2
1203	2.0	3.1	2.620	|IO |	4.2

1204	2.0	3.1	2.618	IO				4.2
1205	2.0	3.1	2.617	IO				4.2
1206	2.0	3.1	2.615	IO				4.2
1207	2.0	3.1	2.614	IO				4.2
1208	2.0	3.1	2.612	IO				4.2
1209	2.0	3.1	2.611	IO				4.2
1210	2.0	3.1	2.609	IO				4.2
1211	2.0	3.1	2.608	IO				4.2
1212	2.0	3.1	2.606	IO				4.2
1213	2.0	3.1	2.605	IO				4.2
1214	2.0	3.1	2.603	IO				4.2
1215	2.0	3.1	2.602	IO				4.2
1216	2.0	3.1	2.600	IO				4.2
1217	2.0	3.1	2.599	IO				4.2
1218	2.0	3.1	2.597	IO				4.2
1219	2.0	3.1	2.596	IO				4.2
1220	2.0	3.1	2.594	IO				4.2
1221	2.0	3.1	2.593	IO				4.2
1222	2.0	3.1	2.591	IO				4.2
1223	2.0	3.1	2.590	IO				4.2
1224	2.0	3.1	2.588	IO				4.2
1225	2.0	3.0	2.587	IO				4.1
1226	2.0	3.0	2.586	IO				4.1
1227	2.0	3.0	2.584	IO				4.1
1228	2.0	3.0	2.583	IO				4.1
1229	2.0	3.0	2.581	IO				4.1
1230	2.0	3.0	2.580	IO				4.1
1231	2.0	3.0	2.578	IO				4.1
1232	2.0	3.0	2.577	IO				4.1
1233	2.0	3.0	2.576	IO				4.1
1234	2.0	3.0	2.574	IO				4.1
1235	2.0	3.0	2.573	IO				4.1
1236	2.0	3.0	2.571	IO				4.1
1237	2.0	3.0	2.570	IO				4.1
1238	2.0	3.0	2.569	IO				4.1
1239	2.0	3.0	2.567	IO				4.1
1240	2.0	3.0	2.566	IO				4.1
1241	2.0	3.0	2.565	IO				4.1
1242	2.0	3.0	2.563	IO				4.1
1243	2.0	3.0	2.562	IO				4.1
1244	2.0	3.0	2.560	IO				4.1
1245	2.0	3.0	2.559	IO				4.1
1246	2.0	3.0	2.558	IO				4.1
1247	2.0	3.0	2.556	IO				4.1
1248	2.0	3.0	2.555	IO				4.1
1249	2.0	3.0	2.554	IO				4.1
1250	2.0	3.0	2.552	IO				4.1
1251	2.0	3.0	2.551	IO				4.1
1252	2.0	3.0	2.550	IO				4.1
1253	2.0	3.0	2.548	IO				4.1
1254	2.0	3.0	2.547	IO				4.1
1255	2.0	3.0	2.546	IO				4.1
1256	2.0	2.9	2.544	IO				4.1
1257	1.0	2.9	2.542	I O				4.1
1258	1.0	2.9	2.539	I O				4.1
1259	1.0	2.9	2.536	I O				4.1
1260	1.0	2.9	2.534	I O				4.1
1261	1.0	2.9	2.531	I O				4.1
1262	1.0	2.9	2.528	I O				4.1
1263	1.0	2.9	2.526	I O				4.1
1264	1.0	2.9	2.523	I O				4.1
1265	1.0	2.9	2.521	I O				4.1
1266	1.0	2.9	2.518	I O				4.1
1267	1.0	2.9	2.515	I O				4.0
1268	1.0	2.9	2.513	I O				4.0
1269	1.0	2.9	2.510	I O				4.0
1270	1.0	2.9	2.508	I O				4.0
1271	1.0	2.9	2.505	I O				4.0
1272	1.0	2.9	2.503	I O				4.0
1273	1.0	2.8	2.500	I O				4.0
1274	1.0	2.8	2.497	I O				4.0
1275	1.0	2.8	2.495	I O				4.0
1276	1.0	2.8	2.492	I O				4.0

1277	1.0	2.8	2.490	I O	|	|	|	|	4.0
1278	1.0	2.8	2.487	I O	|	|	|	|	4.0
1279	1.0	2.8	2.485	I O	|	|	|	|	4.0
1280	1.0	2.8	2.482	I O	|	|	|	|	4.0
1281	1.0	2.8	2.480	I O	|	|	|	|	4.0
1282	1.0	2.8	2.477	I O	|	|	|	|	4.0
1283	1.0	2.8	2.475	I O	|	|	|	|	4.0
1284	1.0	2.8	2.473	I O	|	|	|	|	4.0
1285	1.0	2.8	2.470	I O	|	|	|	|	4.0
1286	1.0	2.8	2.468	I O	|	|	|	|	4.0
1287	1.0	2.8	2.465	I O	|	|	|	|	4.0
1288	1.0	2.8	2.463	I O	|	|	|	|	4.0
1289	1.0	2.8	2.460	I O	|	|	|	|	4.0
1290	1.0	2.8	2.458	I O	|	|	|	|	4.0
1291	1.0	2.7	2.456	I O	|	|	|	|	4.0
1292	1.0	2.7	2.453	I O	|	|	|	|	4.0
1293	1.0	2.7	2.451	I O	|	|	|	|	4.0
1294	1.0	2.7	2.448	I O	|	|	|	|	4.0
1295	1.0	2.7	2.446	I O	|	|	|	|	3.9
1296	1.0	2.7	2.444	I O	|	|	|	|	3.9
1297	1.0	2.7	2.441	I O	|	|	|	|	3.9
1298	1.0	2.7	2.439	I O	|	|	|	|	3.9
1299	1.0	2.7	2.436	I O	|	|	|	|	3.9
1300	1.0	2.7	2.434	I O	|	|	|	|	3.9
1310	1.0	2.7	2.411	I O	|	|	|	|	3.9
1320	1.0	2.6	2.389	I O	|	|	|	|	3.9
1330	1.0	2.6	2.367	I O	|	|	|	|	3.8
1340	1.0	2.5	2.346	I O	|	|	|	|	3.8
1350	1.0	2.5	2.325	I O	|	|	|	|	3.8
1360	1.0	2.4	2.305	IO	|	|	|	|	3.7
1370	1.0	2.4	2.286	IO	|	|	|	|	3.7
1380	1.0	2.3	2.267	IO	|	|	|	|	3.7
1390	1.0	2.3	2.249	IO	|	|	|	|	3.7
1400	1.0	2.3	2.232	IO	|	|	|	|	3.6
1420	1.0	2.2	2.198	IO	|	|	|	|	3.6
1440	1.0	2.1	2.166	IO	|	|	|	|	3.5
1460	1.0	2.1	2.136	IO	|	|	|	|	3.5
1500	1.0	1.9	2.080	IO	|	|	|	|	3.4

Remaining water in basin = 2.08 (Ac.Ft)
Peak flow out of basin = 3.20(CFS)
Peak flow time = 1179 Min., time interval # = 65
Maximum depth in basin = 4.24(Ft.)

Antelope Valley South Pond

Elevation-Area-Capacity Table

Elevation	Area (ac)	Capacity (ac-ft)	
0.00	2.542	0.000	1
0.50	2.579	1.280	
1.00	2.615	2.579	
1.50	2.652	3.895	2
2.00	2.689	5.231	3
2.50	2.725	6.584	4
3.00	2.762	7.956	5
3.50	2.799	9.346	6
4.00	2.836	10.755	7
4.50	2.872	12.182	8
5.00	2.893	13.623	9
5.50	2.914	15.074	10
6.00	2.934	16.536	11
6.50	2.955	18.009	12
7.00	2.976	19.491	13
7.50	2.996	20.984	14
8.00	3.017	22.488	15
8.50	3.038	24.001	16
9.00	3.059	25.525	17
9.50	3.079	27.060	18

Antelope Valley Public Landfill -- South Pond

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev	Number of Holes per Elev
48.00	4.50	48.00	162.00	2.00	0.0240	5.00	18

Detailed Discharge Table

Elevation	Perf. Riser (cfs)	Combined Total Discharge (cfs)	
0.00	0.000	0.000	1
0.50	0.000	0.000	
1.00	1.00>0.000	0.000	
1.50	1.00>0.334	0.334	2
2.00	1.00>0.807	0.807	3
2.50	1.00>1.386	1.386	4
3.00	1.00>2.054	2.054	5
3.50	1.00>2.802	2.802	6
4.00	1.00>3.621	3.621	7
4.50	1.00>4.505	4.505	8
5.00	5.450	5.450	9
5.50	13.773	13.773	10
6.00	38.956	38.956	11
6.50	71.566	71.566	12
7.00	85.570	85.570	13
7.50	95.670	95.670	14
8.00	104.801	104.801	15
8.50	113.198	113.198	16
9.00	121.014	121.014	17
9.50	128.354	128.354	18

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1997-2002 Version 6.3

Study Date : 05/28/04 Input hydrograph file name : 413AC.HYD
Output hydrograph file name: AVPLSouthPond.hin
Antelope Valley Public Landfill South Pond

User entry of depth-outflow-storage data

Hydrograph time unit varies
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data @ 1 Min. Intervals:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.500	3.895	0.334	3.895	3.895
2.000	5.231	0.807	5.230	5.232
2.500	6.584	1.386	6.583	6.585
3.000	7.956	2.054	7.955	7.957
3.500	9.346	2.802	9.344	9.348
4.000	10.755	3.621	10.753	10.757
4.500	12.182	4.505	12.179	12.185
5.000	13.623	5.450	13.619	13.627
5.500	15.074	13.773	15.065	15.083
6.000	16.536	38.956	16.509	16.563
6.500	18.009	71.566	17.960	18.058
7.000	19.491	85.570	19.432	19.550
7.500	20.984	95.670	20.918	21.050
8.000	22.488	104.801	22.416	22.560
8.500	24.001	113.198	23.923	24.079
9.000	25.525	121.014	25.442	25.608
9.500	27.060	128.354	26.972	27.148

Hydrograph Detention Basin Routing
Hydrograph at 1 413 A Storm Day: 4 Drainage Area = 105.20
Total flood hydrograph volume this storm day = 12.15 Ac. Ft.

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Min)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 24.3 48.5 72.8 97.0	Depth (Ft.)
0	0.0	0.0	0.000	O	0.0
100	4.0	0.0	0.277	OI	0.1
200	4.0	0.1	0.822	OI	0.3
300	4.0	0.1	1.360	OI	0.5
400	4.0	0.2	1.891	OI	0.7
500	4.0	0.2	2.417	OI	0.9
600	4.0	0.3	2.936	OI	1.1
700	4.0	0.3	3.449	OI	1.3
800	4.0	0.4	3.957	OI	1.5
900	5.0	0.6	4.515	OI	1.7
1000	5.0	0.8	5.113	OI	2.0
1050	5.0	0.9	5.401	OI	2.1
1100	8.0	1.0	5.785	O I	2.2
1110	11.0	1.1	5.903	O I	2.2

1120	14.0	1.2	6.061	2.3
1130	19.0	1.3	6.276	2.4
1131	20.0	1.3	6.301	2.4
1132	20.0	1.3	6.327	2.4
1133	21.0	1.3	6.354	2.4
1134	21.0	1.3	6.381	2.4
1135	22.0	1.3	6.410	2.4
1136	23.0	1.3	6.440	2.4
1137	24.0	1.3	6.471	2.5
1138	25.0	1.4	6.504	2.5
1139	26.0	1.4	6.538	2.5
1140	27.0	1.4	6.573	2.5
1141	28.0	1.4	6.610	2.5
1142	29.0	1.4	6.648	2.5
1143	30.0	1.4	6.687	2.5
1144	32.0	1.5	6.729	2.6
1145	34.0	1.5	6.774	2.6
1146	36.0	1.5	6.821	2.6
1147	38.0	1.5	6.872	2.6
1148	40.0	1.6	6.925	2.6
1149	44.0	1.6	6.983	2.6
1150	51.0	1.6	7.051	2.7
1151	57.0	1.7	7.127	2.7
1152	65.0	1.7	7.215	2.7
1153	75.0	1.7	7.316	2.8
1154	82.0	1.8	7.426	2.8
1155	88.0	1.9	7.545	2.9
1156	93.0	1.9	7.670	2.9
1157	96.0	2.0	7.800	2.9
1158	97.0	2.0	7.931	3.0
1159	96.0	2.1	8.060	3.0
1160	93.0	2.2	8.185	3.1
1161	88.0	2.2	8.303	3.1
1162	82.0	2.3	8.413	3.2
1163	76.0	2.4	8.515	3.2
1164	71.0	2.4	8.609	3.2
1165	67.0	2.5	8.698	3.3
1166	63.0	2.5	8.781	3.3
1167	59.0	2.5	8.859	3.3
1168	55.0	2.6	8.931	3.4
1169	52.0	2.6	9.000	3.4
1170	49.0	2.6	9.063	3.4
1171	45.0	2.7	9.122	3.4
1172	43.0	2.7	9.177	3.4
1173	40.0	2.7	9.229	3.5
1174	37.0	2.8	9.276	3.5
1175	35.0	2.8	9.320	3.5
1176	33.0	2.8	9.362	3.5
1177	30.0	2.8	9.399	3.5
1178	27.0	2.9	9.432	3.5
1179	24.0	2.9	9.462	3.5
1180	22.0	2.9	9.488	3.6
1181	19.0	2.9	9.510	3.6
1182	17.0	2.9	9.529	3.6
1183	15.0	2.9	9.546	3.6
1184	14.0	2.9	9.561	3.6
1185	13.0	2.9	9.575	3.6
1186	12.0	2.9	9.588	3.6
1187	11.0	2.9	9.599	3.6
1188	10.0	3.0	9.609	3.6
1189	9.0	3.0	9.617	3.6
1190	9.0	3.0	9.625	3.6
1191	9.0	3.0	9.633	3.6
1192	8.0	3.0	9.640	3.6
1193	8.0	3.0	9.647	3.6
1194	7.0	3.0	9.653	3.6
1195	7.0	3.0	9.658	3.6
1196	7.0	3.0	9.664	3.6
1197	7.0	3.0	9.669	3.6
1198	7.0	3.0	9.675	3.6
1199	6.0	3.0	9.679	3.6
1200	6.0	3.0	9.683	3.6
1201	6.0	3.0	9.687	3.6

1202	6.0	3.0	9.692	OI					3.6
1203	6.0	3.0	9.696	OI					3.6
1204	6.0	3.0	9.700	OI					3.6
1205	6.0	3.0	9.704	OI					3.6
1206	6.0	3.0	9.708	OI					3.6
1207	6.0	3.0	9.712	OI					3.6
1208	6.0	3.0	9.716	OI					3.6
1209	6.0	3.0	9.720	OI					3.6
1210	5.0	3.0	9.723	OI					3.6
1211	5.0	3.0	9.726	OI					3.6
1212	5.0	3.0	9.729	OI					3.6
1213	5.0	3.0	9.731	OI					3.6
1214	5.0	3.0	9.734	OI					3.6
1215	5.0	3.0	9.737	OI					3.6
1216	5.0	3.0	9.739	OI					3.6
1217	5.0	3.0	9.742	O					3.6
1218	5.0	3.0	9.745	O					3.6
1219	5.0	3.0	9.748	O					3.6
1220	5.0	3.0	9.750	O					3.6
1221	5.0	3.0	9.753	O					3.6
1222	5.0	3.0	9.756	O					3.6
1223	5.0	3.0	9.758	O					3.6
1224	5.0	3.0	9.761	O					3.6
1225	5.0	3.0	9.764	O					3.6
1226	5.0	3.0	9.766	O					3.6
1227	5.0	3.0	9.769	O					3.7
1228	5.0	3.0	9.772	O					3.7
1229	5.0	3.1	9.774	O					3.7
1230	5.0	3.1	9.777	O					3.7
1231	5.0	3.1	9.780	O					3.7
1232	5.0	3.1	9.783	O					3.7
1233	5.0	3.1	9.785	O					3.7
1234	5.0	3.1	9.788	O					3.7
1235	5.0	3.1	9.791	O					3.7
1236	5.0	3.1	9.793	O					3.7
1237	5.0	3.1	9.796	O					3.7
1238	5.0	3.1	9.799	O					3.7
1239	5.0	3.1	9.801	O					3.7
1240	5.0	3.1	9.804	O					3.7
1241	5.0	3.1	9.807	O					3.7
1242	5.0	3.1	9.809	O					3.7
1243	5.0	3.1	9.812	O					3.7
1244	5.0	3.1	9.814	O					3.7
1245	5.0	3.1	9.817	O					3.7
1246	5.0	3.1	9.820	O					3.7
1247	5.0	3.1	9.822	O					3.7
1248	4.0	3.1	9.824	O					3.7
1249	5.0	3.1	9.826	O					3.7
1250	4.0	3.1	9.828	O					3.7
1251	5.0	3.1	9.830	O					3.7
1252	4.0	3.1	9.832	O					3.7
1253	5.0	3.1	9.834	O					3.7
1254	4.0	3.1	9.835	O					3.7
1255	5.0	3.1	9.838	O					3.7
1256	4.0	3.1	9.839	O					3.7
1257	5.0	3.1	9.842	O					3.7
1258	4.0	3.1	9.843	O					3.7
1259	5.0	3.1	9.846	O					3.7
1260	4.0	3.1	9.847	O					3.7
1261	5.0	3.1	9.850	O					3.7
1262	4.0	3.1	9.851	O					3.7
1263	5.0	3.1	9.854	O					3.7
1264	4.0	3.1	9.855	O					3.7
1265	5.0	3.1	9.857	O					3.7
1266	4.0	3.1	9.859	O					3.7
1267	5.0	3.1	9.861	O					3.7
1268	4.0	3.1	9.863	O					3.7
1269	5.0	3.1	9.865	O					3.7
1270	4.0	3.1	9.866	O					3.7
1271	5.0	3.1	9.869	O					3.7
1272	4.0	3.1	9.870	O					3.7
1273	5.0	3.1	9.873	O					3.7
1274	4.0	3.1	9.874	O					3.7

1275	5.0	3.1	9.877	o					3.7
1276	4.0	3.1	9.878	o					3.7
1277	5.0	3.1	9.880	o					3.7
1278	4.0	3.1	9.882	o					3.7
1279	5.0	3.1	9.884	o					3.7
1280	4.0	3.1	9.886	o					3.7
1281	5.0	3.1	9.888	o					3.7
1282	4.0	3.1	9.889	o					3.7
1283	4.0	3.1	9.891	o					3.7
1284	4.0	3.1	9.892	o					3.7
1285	4.0	3.1	9.893	o					3.7
1286	4.0	3.1	9.894	o					3.7
1287	4.0	3.1	9.895	o					3.7
1288	4.0	3.1	9.897	o					3.7
1289	4.0	3.1	9.898	o					3.7
1290	4.0	3.1	9.899	o					3.7
1291	4.0	3.1	9.900	o					3.7
1292	4.0	3.1	9.901	o					3.7
1293	4.0	3.1	9.903	o					3.7
1294	4.0	3.1	9.904	o					3.7
1295	4.0	3.1	9.905	o					3.7
1296	4.0	3.1	9.906	o					3.7
1297	4.0	3.1	9.907	o					3.7
1298	4.0	3.1	9.909	o					3.7
1299	4.0	3.1	9.910	o					3.7
1300	4.0	3.1	9.911	o					3.7
1310	4.0	3.1	9.923	o					3.7
1320	4.0	3.1	9.935	o					3.7
1330	4.0	3.2	9.947	o					3.7
1340	4.0	3.2	9.958	o					3.7
1350	4.0	3.2	9.970	o					3.7
1360	4.0	3.2	9.981	o					3.7
1370	4.0	3.2	9.993	o					3.7
1380	4.0	3.2	10.004	o					3.7
1390	4.0	3.2	10.015	o					3.7
1400	4.0	3.2	10.026	o					3.7
1420	4.0	3.2	10.048	o					3.7
1440	4.0	3.2	10.070	o					3.8
1460	4.0	3.2	10.091	o					3.8
1500	4.0	3.3	10.127	o					3.8

Remaining water in basin = 10.13 (Ac.Ft)
Peak flow out of basin = 3.26(CFS)
Peak flow time = 1500 Min., time interval # = 200
Maximum depth in basin = 3.78(Ft.)

Section 2

Golder Associates Inc.

230 Commerce, Suite 200
Irvine, CA USA 92602
Telephone (714) 508-4400
Fax (714) 508-4401
www.golder.com

TECHNICAL REPORT
CAPITAL FLOOD FLOODPLAIN ANALYSIS
ANAVERDE CREEK
ANTELOPE VALLEY PUBLIC LANDFILL
PALMDALE, CALIFORNIA

Submitted to:

Waste Management, Inc.
1200 City Ranch Road
Palmdale, California 93551

Prepared by:

Golder Associates Inc.
230 Commerce, Suite 200
Irvine, California 92602

Distribution:
3 Copies - Waste Management Inc.
2 Copies – Golder Associates Inc.

Updated
June 2004
Initial Submittal
March 30, 2001

003-1971

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 BACKGROUND 2

3.0 PHYSICAL SETTING 3

4.0 DATA REVIEW AND FIELD RECONNAISSANCE 4
4.1 Data Review 4
4.2 Field Reconnaissance 5

5.0 ASSUMPTIONS AND METHODS USED IN ANALYSIS 6

6.0 RESULTS OF MODELING 9

7.0 CONCLUSIONS 10

8.0 REFERENCES 12

LIST OF FIGURES

Figure 1 Site Location Map
Figure 2 Permit Design Floodplain Delineation
Figure 3 Anaverde Creek Channel Photos 1 and 2
Figure 4 Anaverde Creek Channel Photos 3 and 4
Figure 5 Anaverde Creek Channel Photos 5 and 6
Figure 6 Typical Scour Protection Armoring Cross-Section

LIST OF APPENDICES

Appendix A HEC-RAS Summary Table – Anaverde Creek
Appendix B Anaverde Creek Antelope Valley Area Flood Profile & Cross-Sections
Appendix C Anaverde Creek Antelope Valley Area Flood Calculation Brief
Appendix D HEC-RAS Summary Table – Anaverde Creek Scour Limit
Appendix E Anaverde Creek Scour Limit Flood Profile & Cross-Sections
Appendix F Anaverde Creek Scour Limit Flood Calculation Brief

1.0 INTRODUCTION

Golder Associates Inc. (Golder) prepared this Capital Flood Floodplain analysis for Anaverde Creek for both the Los Angeles County Department of Public Works (LACDPW) 50-year bulked Capital and 100-year Flood event. The report was prepared for Waste Management Inc. (WMI). The purpose of this report is to identify the limits of the floodplain, quantify flood flow velocities in the Anaverde Creek channel, and present a feasibility level design to limit scour on the north bank of Anaverde Creek adjacent to the Antelope Valley Public Landfill (AVPL). For the purpose of this report, the term "landfill" is defined as only the area used for solid waste disposal. "Landfill facility" refers to the entire site owned by Waste Management Inc. The report presents the rationale, supporting data, assumptions, and results of engineering analyses.

The general scope of work performed in evaluating the flood flow in Anaverde Creek is summarized as follows:

- Development of Hydrologic and Hydraulic Design Criteria and Site Visit - Conducted a visit to the site to evaluate the vegetation, soil properties, and general topography of the Anaverde Creek watershed and the channel and overbank geometry in the area of the landfill. Profiles and cross-sections for hydraulic modeling were prepared from available topographic maps for the site and topographic surveys along sections through Anaverde Creek.

- Evaluation of Previous Hydrologic Modeling Studies of Anaverde Creek – The existing hydrologic studies were reviewed to obtain estimates of the peak flows in Anaverde creek associated with the design storm event(s).

- Hydraulic Modeling of the existing Anaverde Creek Floodplain – Using LACDPW 50-year bulked capital and 100-year peak flows, the extent of the Anaverde Creek floodplain adjacent to the landfill was calculated with the use of water surface profile modeling software. The modeling effort utilized HEC River Analysis System (HEC-RAS 1998) version 2.2, water surface profile modeling software from the U.S. Army Corps of Engineers Hydraulic Engineering Center.

- Hydraulic Modeling of the proposed feasibility level design to limit scour on the north bank of Anaverde Creek – Using LACDPW 50-year bulked capital and 100-year peak flows. The proposed Anaverde Creek scour limit flood elevations and channel velocities adjacent to the landfill were calculated using the channel modification utility available in HEC-RAS modeling software.

- Report Preparation – Preparation of this report summarizing floodplain results, HEC-RAS model results summary tables, and drawings depicting the floodplain, proposed armoring cross section, water surface profile cross-sections and water surface profiles (existing and armored conditions) in the area of the landfill.

2.0 BACKGROUND

The AVPL encompasses 185 acres of land (see Figure 1) comprising two separate landfills (Landfill I and Landfill II). Each landfill is currently operated under a separate Solid Waste Facilities Permit (SWFP) and a separate Waste Discharge Requirements (WDR) issued by the State of California. The site is located within the incorporated City of Palmdale. The ultimate landfill disposal area will occupy approximately 125 acres. The balance of 60 acres will contain the landfill operations facilities and remain partly undeveloped.

This document was prepared to support on going planning and permitting efforts for the site. To obtain various permits, evaluations of the site hydrology and hydraulics are required to address potential issues from flooding along Anaverde Creek. These evaluations are required to address:

- Potential for flooding of the landfill facility under existing site conditions;
- Possible changes to flood levels due to development of the site; and
- Development of a basis for evaluating improvement designs for Anaverde Creek.

This report presents the results of the hydraulic evaluation of the floodplain and channel velocities associated with the design storm events, and provides a basis for evaluation of proposed scour protection measures north of the Anaverde Creek channel within the landfill study area.

Golder understands that a preliminary analysis of flooding potential along Anaverde Creek resulting from a LACDPW capital storm event indicated that portions of the AVPL may become inundated with flood waters. The appropriate analytical tools for this type of analysis are considered by LACDPW to include their FO601 with RETARD software for determining peak flow rates and the US Army Corps of Engineers HEC-RAS software for determining flood water surface elevations.

The City of Palmdale Master Drainage Plan requires that peak flows discharging from developed areas be attenuated to 85 percent of the pre-development peak flow. Golder did not include this peak flow reduction in the Anaverde Creek flood study for two reasons.

First, the watershed area contributing to Anaverde Creek in the vicinity of the AVPL is nearly 15.5 square miles, which is approximately 50 times greater than the 185 acres (0.3 square miles)

to be developed by the AVPL. It is Golder's opinion that attenuating the peak flow discharging from the project property by 15 percent will have a negligible impact on the flood flows in Anaverde Creek. However, it should be noted that the site will be developed in accordance with the City of Palmdale Master Drainage Plan to meet this requirement.

Second, it is our understanding that the primary concern for flooding in Anaverde Creek relates to the present condition; hence, existing flood flows are appropriate for this study. In either case, the existing flood flows are more conservative since contributing discharges from the project are not attenuated. Therefore, the results of this investigation provide a defensible analysis of the issues and engineering solutions as these evaluations for consideration by the City of Palmdale and the regulatory agencies reviewing the landfill permits.

The City of Palmdale requested that the bulked LACDPW Capital Flood be used for the floodplain evaluation. Additionally, the design of on-site drainage systems must be evaluated in accordance with the California Code of Regulations (CCR) Title 27 requirement for the 100-year, 24-hour event. There are several hydrologic evaluations previously prepared by other consultants and agencies for Anaverde Creek (AKM, 1995). These documents formed the basis of the site hydrology utilized in Golder's analyses.

3.0 PHYSICAL SETTING

The AVPL is located immediately adjacent to the north bank of Anaverde Creek. Within the vicinity of the landfill, Anaverde Creek is a linear topographic depression formed by the San Andreas Fault. A linear northwest-southeast trending set of continuous ridges located immediately north of Anaverde Creek forms the northern boundary of the property. Surface elevations across the site range from approximately 2,840 feet near the toe of the landfill to 3,200 feet above mean sea level (msl) in the ridgeline to the north. The ground surface at the AVPL slopes towards Anaverde Creek to the south. Anaverde Creek drains to the east toward the City of Palmdale.

The flood study area encompasses regions within unincorporated Los Angeles County and the City of Palmdale (please refer to the Flood Insurance Rate Map (FIRM), City of Palmdale, California, Los Angeles County, Community Panel Numbers 060144 0020 D and 065043 0245

C). The flood elevations for Anaverde Creek were obtained from the Flood Insurance Study (FIS) (March 1998) for the City of Palmdale, California (See Figure 2).

4.0 DATA REVIEW AND FIELD RECONNAISSANCE

4.1 DATA REVIEW

Topographic Features

Topographic information for the study was obtained from three sources. Primary topography for Anaverde Creek cross-section geometry was obtained from ground survey information provided by JSA (September 2000) and augmented topographic information was supplied in 2-foot contour intervals from aerial surveying provided by Waste Management (Analytical Photogrammetric Surveys, Inc.; Survey flights June 11, 1992 and January 7, 2000). The USGS 7.5 minute quadrangle for Ritter Ridge, California (USGS 1974) provided base topographic data for reference to hydrologic mapping and modeling performed by AKM Consulting Engineers and FEMA.

It should be noted that some significant differences (as much as six feet) were found between the aerial topographic elevations and the ground survey elevations. These differences can be attributed to: 1) contouring method used by the aerial cartographer, 2) inaccuracies in contouring due to heavy brush and trees and/or, 3) being an active site, grades may have changed between the aerial fly-over and the ground survey. Section 5.0 describes how these differences were addressed.

Hydrologic Data

A hydrologic study for the Anaverde Creek Capital Flood was performed by AKM Consulting Engineers in 1991 and reviewed by B & E Engineers (ca. 1994) with adjustments made by AKM in 1994 (AKM 1995). As the City of Palmdale, B & E Engineers, and LACDPW have reviewed this hydrologic analysis extensively, the peak flood flows reported were used for this flood study.

Flood flows for the 100-year recurrence interval event were obtained from the FIS (FEMA 1998).

4.2 Field Reconnaissance

Golder conducted a field reconnaissance on August 22nd and 23rd, 2000, to obtain information on hydraulic structures and gain an understanding of the project environmental setting. Estimates of Manning's roughness coefficients in the flood study area were made by Golder personnel. These site specific estimates were used in the modeling as they are believed to be more accurate than the generalized "0.04" used int the FIS. Photographs taken during the field reconnaissance are presented in Figures 3 through 5. A meeting was also held during the course of the site visit with WMI personnel to discuss project related issues.

The Anaverde Creek reach adjacent to the AVPL is characterized by deep incised channels intermixed with wide, flat channels. The deep narrow sections have steep banks, some near vertical, particularly on the north bank between river stations 25+97 and 33+85 (see Figure 2). The north bank in this same area also shows signs of severe undercutting. The exposed bank material is typical of alluvial deposits except that there appears to be very few large cobbles (greater than six inches). This combined with the north bank elevated local topography suggests that this material is fill. Photo 5 in Figure 5 shows the sparse vegetation and steep slope typical of the north bank (left side of photo) in this section. Vegetation in the bottom and on the lower right bank of the channel in this reach consists of large brush and trees.

Some of the transitions from steep and narrow channels to wide and flat channels are very abrupt (particularly river stations 11+78 and 43+60, see Figure 2). The transitions at river stations 38+24, 35+46, 18+18, and 17+13 are also abrupt, but not to the extent of the aforementioned stations.

Other portions of Anaverde Creek have been historically been altered by placement of fill/rubble (i.e. south bank between station 11+78 and 11+85). As currently planned (i.e. off-set scour armor construction) there will be no modification within the channel resulting from this project.

The only hydraulic structures located during the field reconnaissance were a culvert and metal bridge (see Photo 6, Figure 5). The corrugated metal culvert is located upstream of the bridge (river station 37+49). It is approximately 30 inches in diameter and is currently blocked with tumbleweeds. Due to the relatively small diameter and high potential for plugging, the conveyance capacity of the culvert during an extreme flood event is expected to be negligible.

The culvert outlet is roughly 20 feet upstream of the bridge and a large bush is growing between the culvert and bridge (see Photo 6, Figure 5). The bridge is constructed of a stamped metal deck laid on I-beams. There is at most 2 feet of clearance from the center of the bridge to the channel bottom. However, due to the location of the bush and the proximity to the culvert, the conveyance capacity under the bridge during an extreme flood event is expected to be negligible. The bridge appears to have been in place for quite some time and therefore has likely been overtopped by flood flows. There is no evidence that the bridge has moved, it is outside the project limits, and so it is assumed that it will remain in place during the Capital Flood event.

5.0 ASSUMPTIONS AND METHODS USED IN ANALYSIS

The HEC-RAS software package (USACE 1998) was used to perform the hydraulic analysis of Anaverde Creek. The model computes water surface profiles for a given flow rate using the standard step method to solve the momentum and energy equations. This method is consistent with Los Angeles County Flood Control District Hydraulic Design Manual requirements.

Input data for channel slopes, channel reach lengths and channel cross-sections were obtained using ground survey data (JSA (September 2000) augmented by site aerial topographic maps provided by WMI and presented in Figure 2. Where significant differences in channel elevations between the ground and aerial survey occurred, professional judgment was used to ensure a reasonable depiction of the channel geometry in the HEC-RAS model. Ground survey generally held precedent over aerial survey. The cross-section stations are shown in Figure 2.

In-house developed software was used to generate channel cross-sections from the three dimensional vector maps. Other input parameters such as Manning's roughness coefficients for the channel, ineffective flow areas, and contraction/expansion coefficients were entered manually. The inclusion of blocked obstructions in the model is a technique required when structures (e.g. river station 36+98) reduce the conveyance capacity of the existing channel and/or its overbanks. This forces the model to confine flows to the channel and active conveyance areas. The design peak flows were estimated as described under Section 2.0. The existing bridge and culvert crossings (river station 37+49) were also modeled as blocked obstructions due to the expected negligible conveyance capacity discussed in Section 4.2. Areas that would flood, but have near zero flow velocity, such as the right overbank between river stations 38+24 and 35+46, were modeled as ineffective flow areas.

Manning's roughness coefficients for Anaverde Creek were selected based on field observations. Photos 1 through 5 (Figures 3 – 5) show Anaverde Creek and the associated Manning's roughness coefficient. The following coefficients were used used in the HEC-RAS model (Chow, 1959):

Description	Manning's Roughness Coefficient
Natural Stream – clean, straight	0.025
Natural Stream – stones/weeds, straight	0.030
Natural Stream – stones/weeds, winding	0.033 – 0.035
Natural Stream – cobbles/some boulders, winding	0.040 – 0.045
Very weedy to heavy timber and underbrush	0.060 – 0.080
Straight, dense willows/trees	0.110

The FIS (March 1998) presents a Manning's roughness coefficient of 0.04 for Anaverde Creek and Tributary. This is an average value for the stretch of Anaverde Creek analyzed in the study. As can be seen in the table above, a majority of the values for Manning's coefficient range from 0.025 to 0.045. The higher values are applicable to localized areas of dense underbrush and trees. Lower values for Manning's roughness coefficient produce higher flood flow velocities and greater scour potential and therefore the analysis is conservative.

Flood flows used for the LACDPW Capital Flood and the FEMA 100-year flood are as follows:

River Station	1995 Existing Condition Capital Flood – Bulked [1] (cfs)	100-Year Flood [2] (cfs)
52+86 – 46+92 (150AB)	4676	3050
44+77 (164AD) – 25+97	4595	3200
24+73 (194AB) – 10+00	4970	3630

AKM nodes shown in ( ).

[1]AKM 1995 peak clear flow bulked by a factor of 1.18 (see Appendix C)
[2]FEMA 1998

The increases in flood flows in the downstream direction are primarily a result of tributary flow entering Anaverde Creek. The discrepancy in flood flow changes between river stations 46+92 and 44+77 (comparing the capital flood and 100-year flood) is due to the different methods in which they were calculated. The Capital Flood was calculated using a model that accounts for channel storage and can attenuate flows where the channel has substantial storage such as the area

west of river station 43+60. The 100-year flood flow was obtained from a regional regression equation that is strictly dependent on the contributing area of the watershed. A calculation brief describing how the bulked Capital Flood and 100-year flood flows were obtained in included in Appendix C.

Anaverde Creek Scour Limit Assumptions and Analysis Method

The north bank of Anaverde Creek is sparsely vegetated. Thus, it is susceptible to erosion, undercutting, and scour, particularly during floods. The south bank of Anaverde Creek is protected from scour in most locations with well-established vegetation, to include large trees. Additionally existing concrete rubble, which acts as rip-rap, also protects portions of the south bank. The AVPL and ancillary facilities would be impacted in the event of substantial loss of the north embankment of Anaverde Creek.

To protect the AVPL and ancillary facilities, a slope protection design was developed that would not disturb the existing Anaverde Creek channel. The slope protection is required from approximately station 10+00 to station 43+60. The design involves digging a parallel trench to the north of the existing Anaverde Creek channel (see Figure 6). The trench will have 2H:1V (Horizontal:Vertical) side slopes and a ten-foot bottom width. Rock-filled gabions, rip-rap or a grouted rip-rap wall will be constructed along the north bank of the trench to a height of three feet above the estimated bulked Capital Flood elevation (as determined in this analysis). The armoring will also be extended below the existing bottom of channel elevation to prevent failure of the armored layer as a result of scour at the toe. The cutoff depth will be determined in accordance with LACDPW procedures. The trench will be backfilled after the slope protection is in place. Alternative slope protection methods, such as sheet piling (see Figure 6) may be used, where appropriate, in lieu of the rock wall. The scour barrier may be gradually exposed if Anaverde Creek flood events scour away the unprotected bank material. The design of the slope protection for the AVPL will be finalized at a later date. Final design of scour protection must comply with LACDPW requirements as well as maintain some flexibility given the proximity to geologic faulting. Some repair of the armoring is likely in the event of major ground rupture.

A biological survey of Anaverde Creek was performed by Ms. Lisa Kegarice to establish "stream bed" limits in accordance with California Department of Fish and Game guidelines and limits of jurisdictional waters in accordance with 33 CFR requirements. Both of these limits are shown on

Figure 2 and indicate that installation of the proposed armoring will be outside these jurisdictional limits and therefore stream bed alteration and other permits associated with working within these limits is not required.

As an additional alternative, a gabion, riprap or grouted riprap scour protection system could be constructed within the limits of the stream bed limits. Construction within the stream bed, as noted above, would require additional permits. However, the bank would be permanently stabilized and there would be no loss of material from the banks thereby minimizing the sediment concerns downstream of AVPL. Construction within the streambed would be similar to that shown on Figure 6.

The HEC-RAS channel modification utility was used to create the "scour limit" channel geometry from the existing channel geometry. The scour limit model assumes that the north bank is eroded away to the armored layer and the south bank of Anaverde Creek does not erode. This is a conservative assumption, as any erosion on the south bank would increase the channel conveyance thereby reducing both the flood elevation and velocity. A Manning's roughness coefficient of 0.027 was assumed for the armored layer. The Manning's roughness coefficient for gabions, rip-rap or grouted riprap would have a range encompassing 0.027. The exact value is not critical to the model as it only applies to the north bank of the channel and would not have an appreciable effect on the channel velocity or water surface elevation in the results. A Manning's roughness coefficient ranging from 0.030 to 0.035 was used to represent the roughness in the channel between the armored layer and the existing channel.

6.0 RESULTS OF MODELING

The flood level resulting from the LACDPW bulked Capital Flood is higher than the 100-year flood level as presented in Appendix A. The water surface profile is highly variable as shown in Appendix B. This variability is due to the abrupt channel contractions and expansions and the large differences in Manning's roughness coefficients. Appendix B also presents the HEC-RAS cross-sections resulting from both the LACDPW Capital Flood and the 100-year FEMA flood for Anaverde Creek.

The existing or proposed landfill is not expected to be impacted by either flood event.

There is a potential for scour in the channel. The HEC-RAS model calculated channel velocities for flood flows in the Anaverde Creek exceeding 18 feet per second (fps) (see Appendix A). Channel velocities during the LACDPW Capital Flood were estimated to range from about 3 fps to over 18 fps through stretches of Anaverde Creek adjacent to the AVPL (i.e., between river stations 10+00 and 43+60).

The results of the scour limit HEC-RAS model are presented in Appendices D – F. Appendix D presents a tabular summary of results. Channel velocities under the LACDPW Capital Flood in the scour limit model range from less than about 3 fps to about 20 fps with typical flood velocities in the scour limit study area in the 8 to 14 fps range. Appendices E and F present graphical model (river profile and cross-sections) results and a calculation brief, respectively.

7.0 CONCLUSIONS

The site hydrology and hydraulics were evaluated to address potential issues from flooding along Anaverde Creek. The results of these evaluations are discussed below.

Flooding Potential

The hydraulic analyses indicate that existing structures and the proposed project will not be inundated by either the LACDPW Capital Flood or the 100-year FEMA flood.

Possible Changes to Flood Levels Due to Development

The City of Palmdale Master Drainage Plan requires that developed areas attenuate peak discharges to 85 percent of the pre-development values. Therefore post-development discharges must be 85 percent of the pre-development values; thus, development of the AVPL would reduce the flood flow in Anaverde Creek. Additionally, the proposed project is outside the floodway and therefore would have no potential to increase flood depths. The Antelope Valley Public Landfill encompasses small area of entire Anaverde Creek watershed. The peak discharge from the AVPL is small compared to the Capital and 100-year Flood flows for Anaverde Creek. It is our opinion that a 15 percent reduction in the peak discharge from the AVPL will have a negligible impact on the flood flows. Thus, no attempt was made to account for flood level changes due to landfill development.

Scour Protection Design

The design goal of the slope protection system along the north bank of Anaverde Creek is to protect the AVPL and ancillary facilities. During extreme flood events in the main channel of Anaverde Creek, the analyses indicate that high velocities may occur. The high flow velocities will scour and continue to undercut the channel banks, as observed during the site reconnaissance between river stations 25+97 and 32+88.

A scour protection system constructed parallel to, and offset from, the north bank will limit creek bank erosion and protect both existing and future structures of the AVPL. Gabions, rip-rap, grouted rip-rap or sheet piling will be constructed parallel to the existing channel (see Figure 6). The off-set construction is preferred since it does not disturb the existing channel or establish vegetation. The armored layer would extend three feet above the estimated Capital Flood water surface elevation. The trench would be excavated, armored, and backfilled without disturbing the Anaverde Creek channel (see Figure 6). The design of the scour protection system will be finalized at a later date.

The results of the scour limit flood analysis indicate the average Capital Flood elevation will be lowered by over 4 feet. The Capital Flood flow velocities decrease by a maximum of about 13 fps with respect to existing conditions. The average decrease in flood velocity is less than one fps. The Capital Flood flow velocities increase locally by about 15 fps (e.g., river station 36+41). This is because this area experiences backwater conditions as a result of the current geometry. As the downstream channel becomes eroded to the armoring layer, the channel becomes wider and no longer causes a backwater condition. This simply means there is less variation in channel velocity as is expected in a more uniform channel. In a wider, relatively smoother, future channel the overall flow retarding effect caused by the trees on the south bank will be lessened because the percentage of the rougher wetted perimeter is less. Thus, smooth channel velocities should be relatively higher than for a rougher channel.

8.0 REFERENCES

AKM Consulting Engineers. 1995. "*Anaverde Creek Hydrology Study*" letter to George Wolfrank, City of Palmdale dated March 16, 1995.

Chow, V. T. 1959. *Open-channel hydraulics*. New York : McGraw Hill.

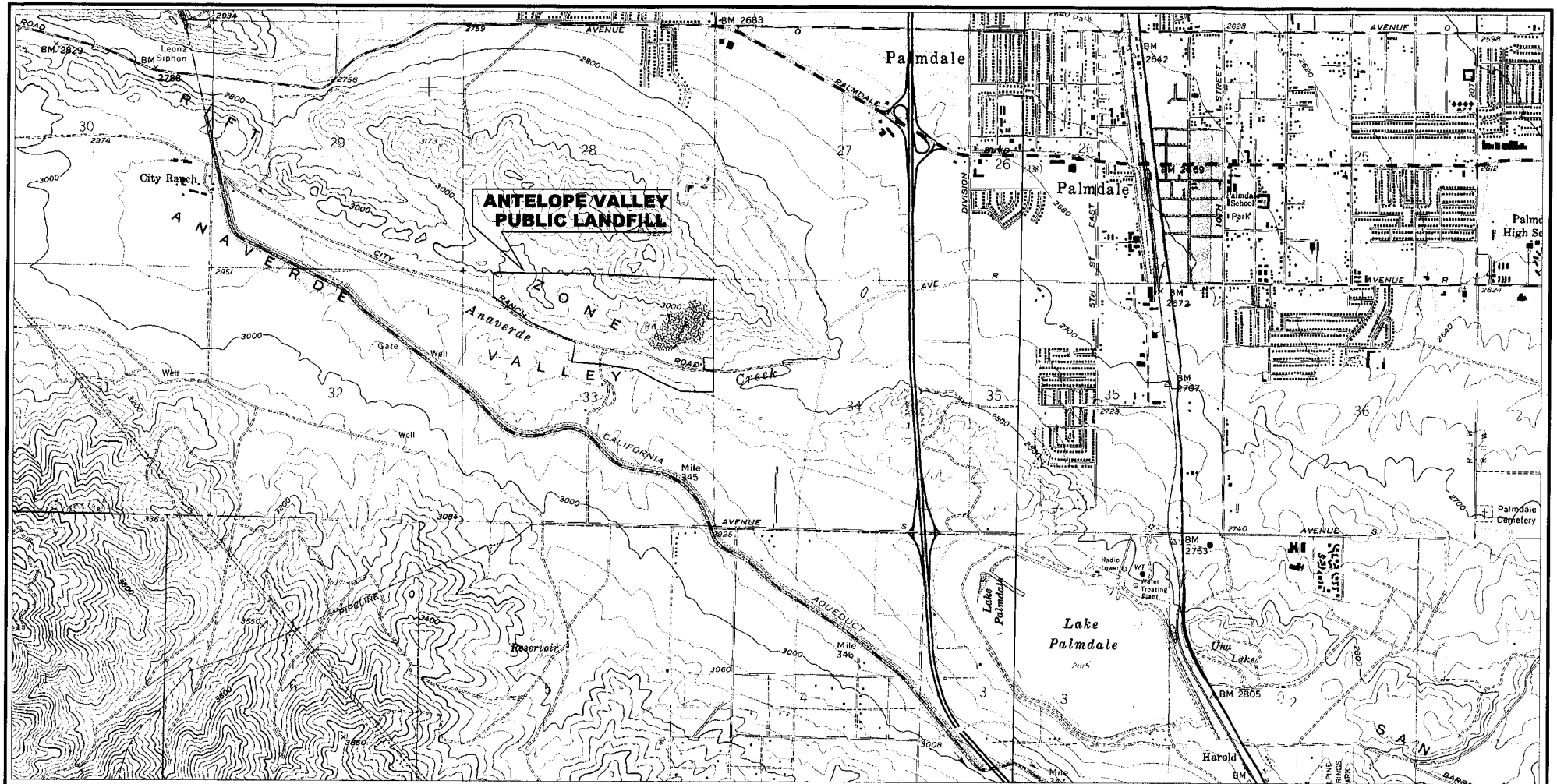
FEMA. 1998. Flood Insurance Study, City of Palmdale, California, Los Angeles County, Community Number - 060144.

JSA (September, 2000) Ground survey.

U.S. Army Corps of Engineers. 1998. *HEC-RAS River Analysis System, Version 2.2* [software package]. Hydrologic Engineering Center.

USGS. 1974. *Ritter Ridge Quadrangle*. California – Los Angeles Co., 7.5 minute series. United States Dept. of Interior.

FIGURES



REFERENCE

BASE MAP TAKEN FROM 7.5 MINUTE USGS TOPOGRAPHIC QUADRANGLE MAPS OF RITTER RIDGE, CALIFORNIA AND PALMDALE, CALIFORNIA. DATED 1958 PHOTO REVISED 1974, SCALE 1:24000

3000 0 3000
scale feet

N

WASTE MANAGEMENT, INC.

Date: JUNE 2004

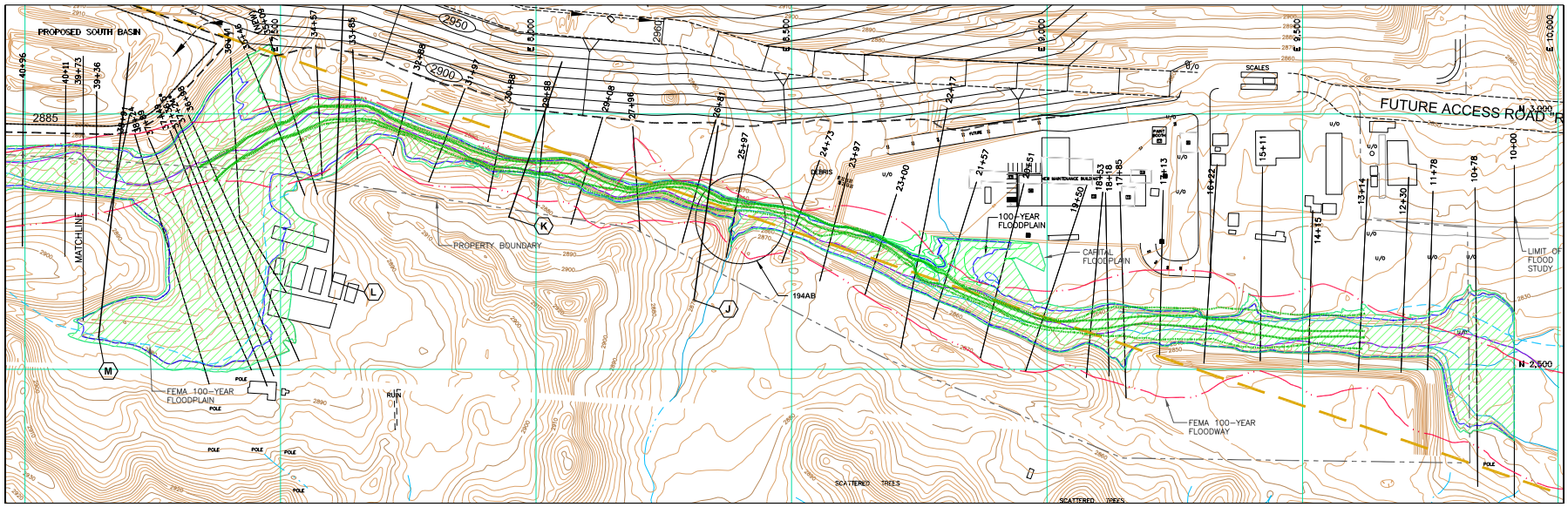
Project No. 003-1971

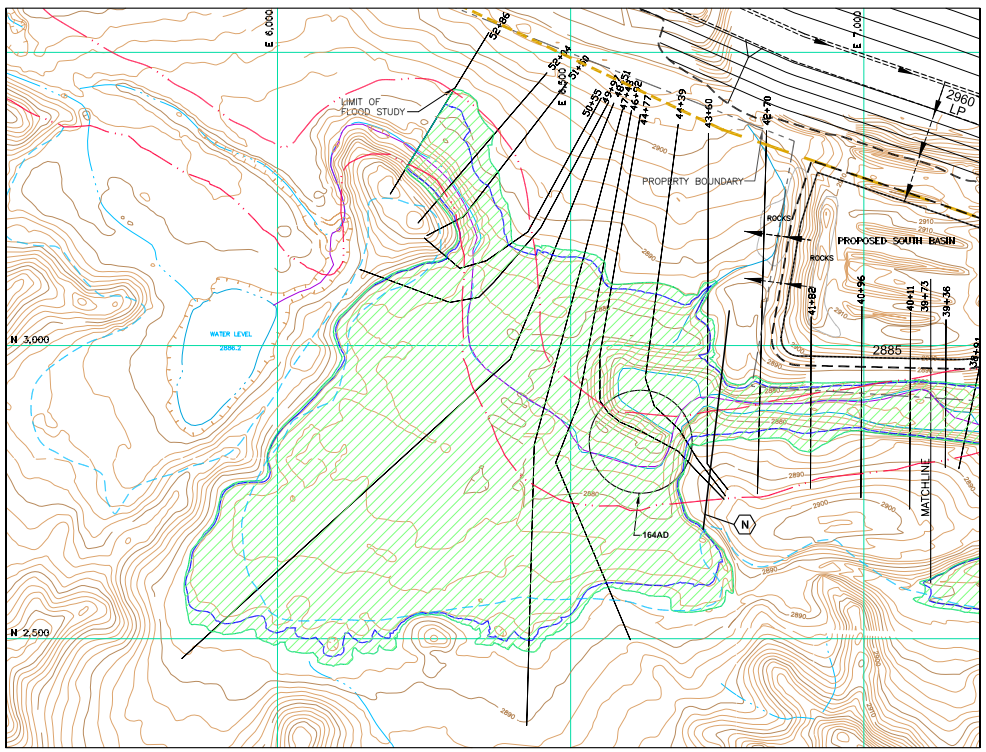
ANTELOPE VALLEY PUBLIC LANDFILL
Palmdale, California

Scale	Drawn By:	Checked By:	Reviewed By:
AS SHOWN	JS	-	SGS

Golder Associates
Irvine, California

FIGURE 1
SITE LOCATION MAP





RIVER STATION	LACDPW BULKED CAPITAL FLOOD (SEE NOTE 5)					100-YEAR FLOOD (SEE NOTE 5)				
	FLOW (cfs)	FLOOD ELEV. (ft)		CHANNEL VELOCITY (fps)		FLOW (cfs)	FLOOD ELEV. (ft)		CHANNEL VELOCITY (fps)	
		EXISTING	SCOUR LIMIT	EXISTING	SCOUR LIMIT		EXISTING	SCOUR LIMIT	EXISTING	SCOUR LIMIT
52+86	4676	2892.52	2892.52	8.2	8.2	3050	2891.11	2891.11	7.1	7.1
52+04	4676	2891.50	2891.50	10.6	10.6	3050	2889.34	2889.34	11.4	11.4
51+50	4676	2890.50	2890.50	12.7	12.7	3050	2888.84	2888.84	11.9	11.9
50+55	4676	2886.51	2886.51	16.4	16.4	3050	2885.99	2885.99	13.8	13.8
49+97	4676	2886.94	2887.05	5.6	5.4	3050	2886.37	2886.37	4.3	4.3
48+51	4676	2887.04	2887.14	2.2	2.2	3050	2886.41	2886.41	1.6	1.6
47+48	4676	2887.05	2887.15	1.6	1.6	3050	2886.41	2886.41	1.2	1.2
46+92	4676	2887.03	2887.14	1.8	1.8	3050	2886.40	2886.41	1.3	1.3
44+77	4595	2885.99	2885.44	6.8	8.4	3200	2884.94	2884.94	7.5	7.5
44+39	4595	2886.26	2883.27	3.5	5.6	3200	2884.89	2878.93	2.9	17.4
43+60	4595	2885.41	2880.98	7.5	11.5	3200	2884.12	2880.03	6.8	10.3
42+70	4595	2883.51	2880.82	11.8	6.9	3200	2882.35	2879.78	11.0	6.1
41+82	4595	2882.36	2880.85	14.5	5.7	3200	2880.88	2879.81	13.7	4.7
40+96	4595	2879.48	2880.85	18.0	5.0	3200	2878.50	2879.80	16.3	4.1
40+11	4595	2881.59	2880.82	8.0	4.7	3200	2880.40	2879.77	6.7	3.9
39+36	4595	2881.55	2880.85	8.1	4.0	3200	2880.36	2879.80	6.7	3.2
38+91	4595	2880.59	2880.88	11.6	3.5	3200	2879.57	2879.82	9.9	2.7
38+24	4595	2881.17	2880.89	5.2	3.1	3200	2879.90	2879.82	4.8	2.5
37+89	4595	2881.17	2880.90	3.2	2.7	3200	2879.93	2879.82	2.6	2.1
37+49	4595	2880.38	2880.54	5.3	4.5	3200	2879.03	2879.53	5.0	3.9
37+36.5	4595	2880.20	2879.54	5.2	6.1	3200	2878.59	2878.74	5.5	5.3
37+24	4595	2880.29	2879.69	3.9	4.5	3200	2878.71	2878.85	4.0	3.9
36+98	4595	2879.99	2878.18	3.6	5.8	3200	2877.90	2877.44	4.4	5.2
36+41	4595	2880.05	2870.05	4.6	20.0	3200	2877.80	2869.53	5.5	18.3
35+46	4595	2879.84	2871.38	4.7	8.6	3200	2877.50	2870.36	4.7	7.8
35+09	4595	2879.87	2871.16	3.2	8.6	3200	2877.53	2870.06	3.4	7.9
34+57	4595	2879.82	2871.02	3.5	7.8	3200	2877.45	2869.87	3.7	7.1
33+85	4595	2879.38	2869.17	5.3	11.5	3200	2876.96	2868.27	5.4	10.3
32+88	4595	2875.78	2868.83	13.4	8.6	3200	2874.85	2867.64	10.4	7.4
31+97	4595	2874.52	2866.52	15.0	12.4	3200	2872.71	2865.43	14.4	11.1
30+88	4595	2871.09	2864.23	18.6	13.5	3200	2868.40	2863.62	18.8	11.2
29+98	4595	2869.59	2861.27	10.8	15.4	3200	2862.66	2860.51	21.2	13.8
29+08	4595	2869.69	2859.16	9.0	14.8	3200	2867.05	2858.55	8.1	12.5
27+96	4595	2865.48	2856.20	17.6	15.0	3200	2863.26	2855.57	16.1	13.0
26+81	4595	2863.42	2855.86	9.7	8.2	3200	2861.27	2855.01	8.5	7.0
25+97	4595	2860.27	2854.36	15.9	10.7	3200	2858.46	2853.60	14.4	9.5
24+73	4970	2854.88	2851.74	18.0	12.5	3630	2854.08	2851.16	15.4	11.0
23+97	4970	2855.03	2849.42	13.3	13.8	3630	2853.82	2848.79	11.5	12.5
23+00	4970	2853.10	2848.93	13.5	11.4	3630	2851.87	2848.16	12.0	10.3
22+17	4970	2851.58	2847.01	13.2	12.9	3630	2850.37	2846.28	11.7	11.7
21+57	4970	2850.35	2846.13	10.4	13.1	3630	2849.42	2845.93	9.1	10.2
20+51	4970	2849.48	2844.88	11.7	11.2	3630	2848.07	2843.93	11.0	11.0
19+50	4970	2847.19	2842.54	14.2	12.8	3630	2845.96	2842.09	12.9	11.0
18+53	4970	2843.19	2841.56	18.1	10.9	3630	2842.41	2840.58	16.3	10.7
18+18	4970	2842.53	2841.65	16.9	9.1	3630	2842.07	2840.72	14.3	8.5
17+85	4970	2842.97	2841.50	14.8	9.0	3630	2842.71	2840.57	11.5	8.2
17+13	4970	2841.04	2840.11	15.8	11.6	3630	2839.96	2839.33	15.0	10.5
16+22	4970	2839.30	2838.21	16.5	13.8	3630	2838.42	2837.48	15.0	12.5
15+11	4970	2838.92	2835.33	13.8	15.0	3630	2837.74	2834.80	12.9	13.3
14+15	4970	2836.94	2835.13	15.2	11.6	3630	2836.05	2834.33	13.5	10.5
13+14	4970	2836.69	2832.53	10.5	13.9	3630	2835.39	2831.91	9.4	12.5
12+30	4970	2834.75	2831.27	13.7	12.9	3630	2833.56	2830.76	12.5	11.0
11+78	4970	2833.43	2830.22	15.1	13.2	3630	2832.96	2829.77	12.5	11.3
10+78	4970	2829.52	2827.01	9.1	13.3	3630	2828.00	2826.56	11.0	12.6
10+00	4970	2827.51	2825.21	13.3	11.9	3630	2826.83	2824.87	12.3	10.5

* INDICATES INTERPOLATED CROSS SECTION STATION

LEGEND

- 11+78 — CROSS SECTION LOCATION AND STATION
- EXISTING MINOR CONTOURS
- 2860 — EXISTING MAJOR CONTOURS
- EXISTING BUILDINGS
- WATER COURSE
- THALWEG (CROSS SECTION CENTER STATION)
- LACDPW 50-YEAR BULKED CAPITAL FLOODPLAIN
- 100-YEAR FEMA FLOODWAY LIMITS (MARCH 1998)
- 100-YEAR FEMA FLOODPLAIN LIMITS (MARCH 1998)
- 100-YEAR FLOODPLAIN AS ESTIMATED BY GOLDER
- SAN ANDREAS FAULTLINE
- CDFG – STREAMBED LIMITS
- COE – WATERS LIMITS
- N — FIRM CROSS SECTION LINE AND LABEL
- 194AB — AKM HYDROLOGIC STUDY NODE (SEE NOTE 1)

NOTES

1. LACDPW BULKED CAPITAL FLOOD FLOWS OBTAINED FROM AKM CONSULTING ENGINEERS ANAVERDE CREEK HYDROLOGY STUDY LETTER DATED MARCH 16, 1995 AND AKM PLATE 1, ANAVERDE CREEK BASIN HYDROLOGY, EXISTING CONDITION, DATED JULY, 1991.
2. 100-YEAR FLOOD FLOWS OBTAINED FROM FLOOD INSURANCE STUDY, CITY OF PALMDALE, CALIFORNIA, LOS ANGELES COUNTY – COMMUNITY NUMBER 060144.
3. AERIAL TOPOGRAPHY PROVIDED BY WASTE MANAGEMENT. SURVEY WAS PREPARED BU PHOTOGRGAMMETRIC INC., 1992 AND 2000.
4. WATER SURFACE PROFILE ELEVATIONS AND CHANNEL VELOCITIES OBTAINED FROM USACE HEC-RAS MODELING EFFORT BY GOLDER.
5. FLOOD ELEVATIONS AND CHANNEL VELOCITIES FOR "SCOUR LIMIT" REFLECT ANTICIPATED VALUES IF AN ARMORED LAYER IS PLACED NORTH OF THE EXISTING CHANNEL AT A 2H:1V SLOPE AND THE MATERIAL BETWEEN THE EXISTING CHANNEL AND THE ARMORED LAYER IS SCOURED AWAY. A TYPICAL SCOUR PROTECTION ARMORING CROSS SECTION IS SHOWN IN FIGURE 6. THE ARMORING WILL EXTEND FROM APPROXIMATELY STATION 10+00 TO STATION 43+60.

Scale in Feet
0 50 100 200
1" = 100 feet
CONTOUR INTERVAL = 2 FEET

NORTH

REV.	DATE	DESCRIPTION	DR. BY	APR. BY
D	6/7/04	ADDED PROPOSED PROJECT, COMBINED FIGURES 2 AND 7 AND REVISED BORES	SGS	SGS
C	5/5/03	UPDATED MAINTENANCE BUILDING TOPOGRAPHY AND ADDED FEMA BOUNDARY	GSL	TAC
B	3/7/03	UPDATED LACDPW CAPITAL FLOOD	GSL	TAC
A	2/18/01	SCOUR LIMIT UPDATE	RAJ	TAC

CLIENT/PROJECT
WASTE MANAGEMENT, INC.
ANTELOPE VALLEY PUBLIC LANDFILL

TITLE
PERMIT DESIGN FLOODPLAIN DELINEATION

Golder Associates

DRAWN	GSL	DATE	JUNE, 2004
CHECKED	TAC	SCALE	AS SHOWN
REVIEWED	SGS	JOB NO.	003-1971
APPROVED	SGS	DSN. NO.	D009
DWG NO.	D-03318857-HS001	REVISION	2

PHOTO 1: LOOKING UPSTREAM - RIVER STATION 18+18

PHOTO 2: LOOKING DOWNSTREAM - RIVER STATION 17+13

Golder Associates, Irvine, California	TITLE: ANAVERDE CREEK CHANNEL PHOTOS 1 AND 2		
CLIENT/PROJECT: WASTE MANAGEMENT, ANTELOPE VALLEY PUBLIC LANDFILL	DRAWN: DBS	DATE: OCTOBER 2000	JOB NO.: 003-1971
	CHECKED: TAC	SCALE: N/A	DWG NO./REV. NO.: A002
	REVIEWED: TAC	FILE NO.: 1971A002	FIGURE NO.: 3

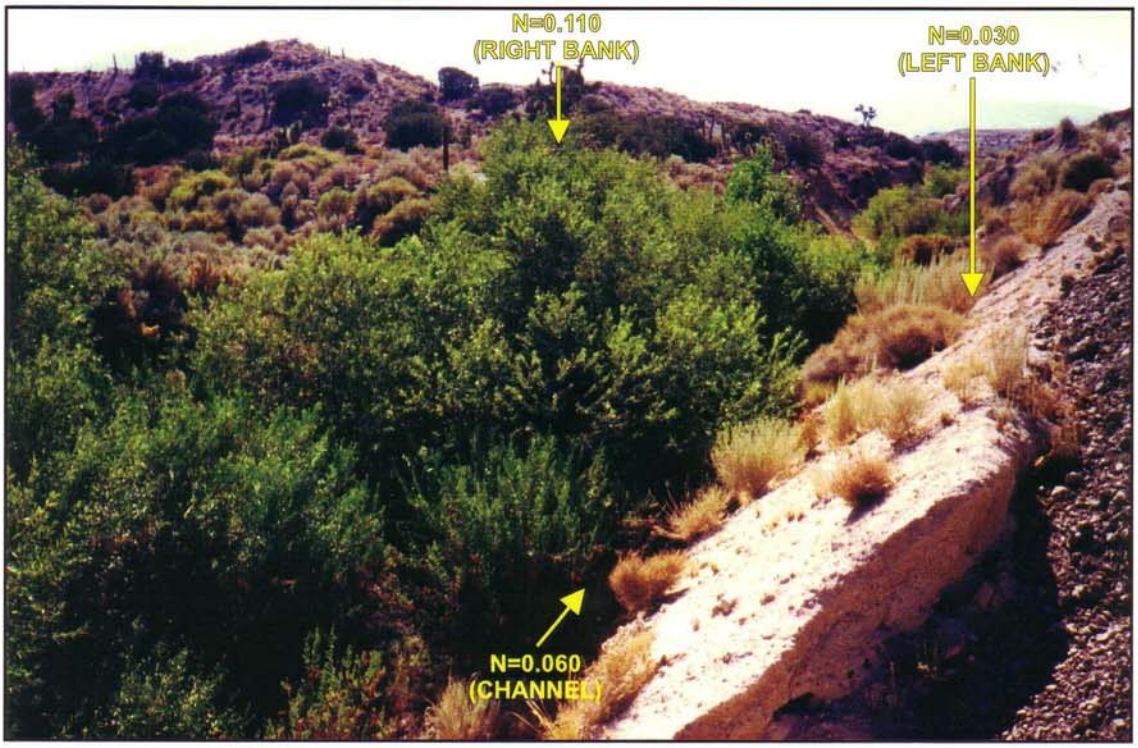


PHOTO 3: LOOKING UPSTREAM - RIVER STATION 23+97

PHOTO 4: LOOKING DOWNSTREAM - RIVER STATION 23+00

Golder Associates, Irvine, California	TITLE: ANAVERDE CREEK CHANNEL PHOTOS 3 AND 4			
CLIENT/PROJECT: WASTE MANAGEMENT, ANTELOPE VALLEY PUBLIC LANDFILL	DRAWN: DBS	DATE: OCTOBER 2000	JOB NO.: 003-1971	
	CHECKED: TAC	SCALE: N/A	DWG NO./REV. NO.: A003	
	REVIEWED: TAC	FILE NO.: 1971A003	FIGURE NO.: 4	

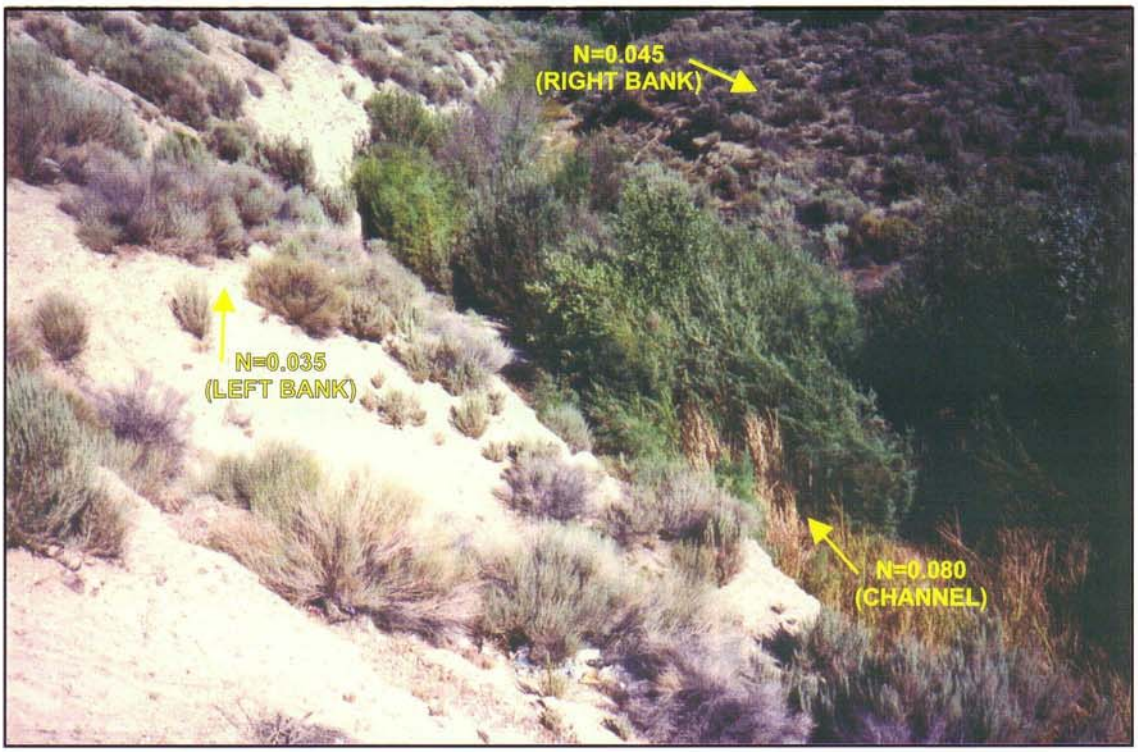


PHOTO 5: LOOKING DOWNSTREAM - RIVER STATION 34+57

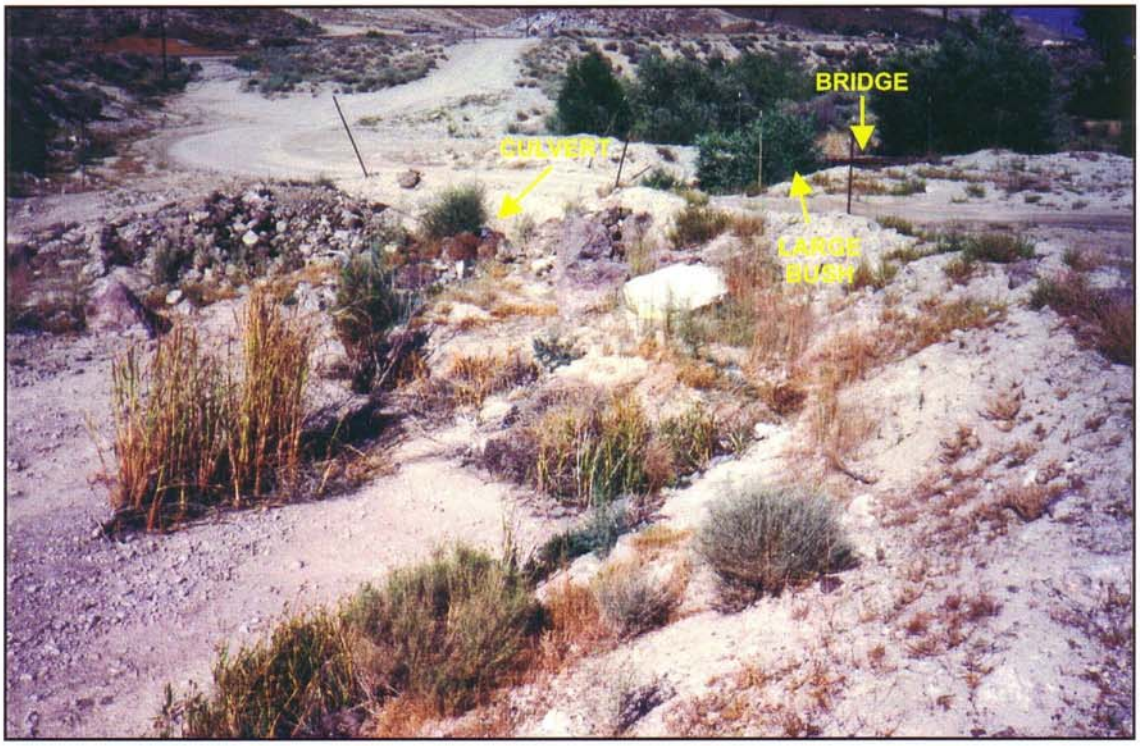
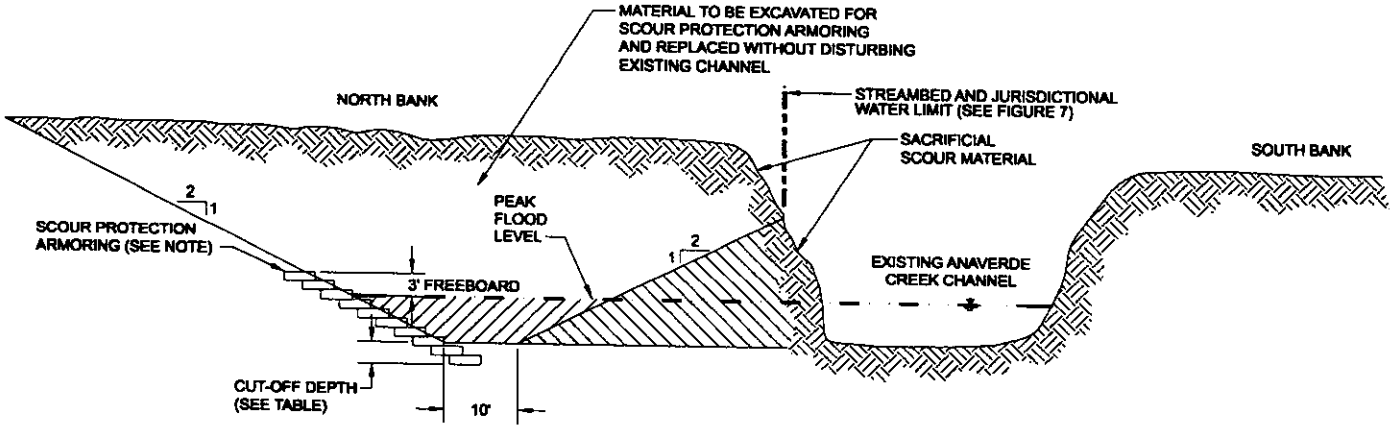
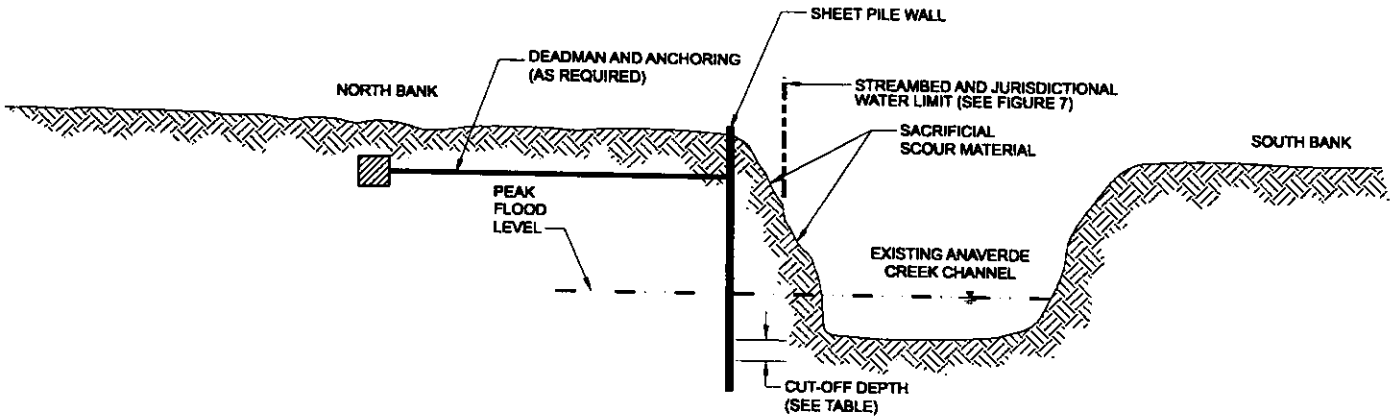


PHOTO 6: LOOKING NORTHEAST - RIVER STATION 37+49
(CULVERT AND BRIDGE OPENING ASSUMED PLUGGED DURING EXTREME FLOOD EVENT)

Golder Associates, Irvine, California	TITLE: ANAVERDE CREEK CHANNEL PHOTOS 5 AND 6			
CLIENT/PROJECT: WASTE MANAGEMENT, ANTELOPE VALLEY PUBLIC LANDFILL	DRAWN: DBS	DATE: OCTOBER 2000	JOB NO.: 003-1971	
	CHECKED: TAC	SCALE: N/A	DWG NO./REV. NO.: A004	
	REVIEWED: TAC	FILE NO.: 1971A004	FIGURE NO.: 5	



GABION OR RIP-RAP SCOUR PROTECTION ARMORING CROSS SECTION



SHEET PILE SCOUR PROTECTION ARMORING CROSS SECTION

MINIMUM CUT-OFF DEPTHS PER LACDPW (SEE NOTE 1)

VELOCITY (fps)	STRAIGHT REACHES (FT)	CURVED REACH (FT)
0 - 6	6	9
6 - 10	8	12
10 - 15	10	15
15 - 18	12.5	18
18 - 20	14	21

NOTE

1. SCOUR PROTECTION ARMORING TO BE GABIONS OR RIP-RAP SIZED TO PROVIDE A SCOUR LIMIT BARRIER. BARRIER SHALL BE DESIGNED IN ACCORDANCE WITH LOS ANGELES COUNTY FLOOD CONTROL DESIGN MANUAL-HYDRAULIC, MARCH 1982 OR LATEST VERSION.
2. SCOUR PROTECTION ARMORING TO BE SHEET PILE WALL. WALL SHALL BE DESIGNED TO PROVIDE STRUCTURAL SUPPORT IN THE EVENT SCOUR EXTENDS TO THE FULL CUT-OFF DEPTH.

Golder Associates N.T.S.

Figure 6
Scour Protection Cross Sections

ANTELOPE VALLEY PUBLIC LANDFILL

June 2004

APPENDIX A

HEC-RAS SUMMARY TABLE – ANAVERDE CREEK

APPENDIX A: HEC-RAS Summary Table - Anaverde Creek "Existing Conditions"

River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
52+86	FEMA 100	3050	905.1	1031.0	2882.00	2891.11	2889.03	2891.85	0.0020	7.1	483.6	125.9	0.52
52+86	Capital Flood	4676	876.2	1035.0	2882.00	2892.52	2890.65	2893.44	0.0021	8.2	686.4	158.8	0.54
52+04	FEMA 100	3050	947.3	1030.7	2881.90	2889.34	2889.34	2891.33	0.0071	11.4	281.1	83.4	0.93
52+04	Capital Flood	4676	891.2	1038.2	2881.90	2891.50	2891.04	2893.09	0.0043	10.6	526.6	147.0	0.75
51+50	FEMA 100	3050	943.9	1026.4	2881.80	2888.84	2888.91	2890.94	0.0068	11.9	283.6	82.5	0.93
51+50	Capital Flood	4676	914.6	1031.5	2881.80	2890.50	2890.50	2892.73	0.0053	12.7	448.8	116.8	0.86
50+55	FEMA 100	3050	930.5	1051.6	2881.70	2885.99	2886.86	2888.92	0.0345	13.8	221.9	121.0	1.79
50+55	Capital Flood	4676	922.3	1053.5	2881.70	2886.51	2887.78	2890.67	0.0352	16.4	287.4	131.2	1.88
49+97	FEMA 100	3050	878.7	1151.7	2881.60	2886.37	2884.59	2886.65	0.0015	4.3	716.4	273.0	0.41
49+97	Capital Flood	4676	868.4	1155.1	2881.60	2886.94	2885.34	2887.42	0.0021	5.6	840.9	286.6	0.50
48+51	FEMA 100	3050	769.8	1628.4	2880.40	2886.41	2882.82	2886.45	0.0001	1.6	1949.9	858.6	0.13
48+51	Capital Flood	4676	757.2	1651.7	2880.40	2887.04	2883.26	2887.11	0.0002	2.2	2208.3	894.6	0.17
47+48	FEMA 100	3050	735.1	1397.9	2878.00	2886.41	2880.39	2886.43	0.0000	1.2	2864.3	662.8	0.07
47+48	Capital Flood	4676	725.3	1416.7	2878.00	2887.05	2880.90	2887.08	0.0001	1.6	3146.5	691.4	0.10
46+92	FEMA 100	3050	727.7	1285.2	2878.00	2886.40	2880.81	2886.43	0.0000	1.3	2600.2	557.5	0.08
46+92	Capital Flood	4676	710.5	1293.3	2878.00	2887.03	2881.40	2887.08	0.0001	1.8	2860.9	582.8	0.11
46+20.3*	FEMA 100	3050	700.7	1202.2	2877.80	2886.37	2881.70	2886.42	0.0001	1.8	1879.7	501.5	0.12
46+20.3*	Capital Flood	4676	684.3	1208.3	2877.80	2886.97	2882.37	2887.05	0.0002	2.4	2104.6	524.0	0.16
45+48.7*	FEMA 100	3050	674.9	1099.2	2877.60	2886.29	2883.02	2886.39	0.0003	2.5	1263.6	424.3	0.20
45+48.7*	Capital Flood	4676	660.3	1109.4	2877.60	2886.83	2883.78	2887.01	0.0005	3.4	1421.1	449.1	0.26
44+77	FEMA 100	3200	662.5	1032.3	2877.40	2884.94	2884.94	2885.82	0.0107	7.5	427.1	369.7	0.99
44+77	Capital Flood	4595	655.0	1036.5	2877.40	2885.99	2885.44	2886.70	0.0047	6.8	684.2	381.5	0.71
44+39	FEMA 100	3200	758.2	1037.6	2877.10	2884.89	2880.18	2885.02	0.0003	2.9	1096.6	279.4	0.20
44+39	Capital Flood	4595	739.0	1046.6	2877.10	2886.26	2880.89	2886.45	0.0003	3.5	1340.9	307.6	0.22
43+60	FEMA 100	3200	812.7	1064.5	2876.40	2884.12	2882.02	2884.82	0.0020	6.8	501.9	187.6	0.51
43+60	Capital Flood	4595	805.2	1077.4	2876.40	2885.41	2883.26	2886.23	0.0019	7.5	682.7	231.5	0.51
42+70	FEMA 100	3200	965.0	1046.0	2875.30	2882.35	2882.35	2884.22	0.0086	11.0	291.7	81.0	1.00
42+70	Capital Flood	4595	957.8	1058.5	2875.30	2883.51	2883.51	2885.67	0.0077	11.8	397.4	100.7	0.98
41+82	FEMA 100	3200	974.0	1052.1	2873.90	2880.88	2881.21	2883.36	0.0071	13.7	290.4	78.1	0.99
41+82	Capital Flood	4595	969.6	1069.2	2873.90	2882.36	2882.58	2884.94	0.0059	14.5	421.0	99.6	0.93
40+96	FEMA 100	3200	971.7	1044.0	2873.10	2878.50	2879.58	2882.17	0.0177	16.3	222.9	72.4	1.45
40+96	Capital Flood	4595	967.6	1048.2	2873.10	2879.48	2880.77	2883.82	0.0159	18.0	298.2	80.6	1.43
40+11	FEMA 100	3200	983.2	1073.4	2872.30	2880.40	2877.87	2881.05	0.0015	6.7	516.2	90.3	0.46
40+11	Capital Flood	4595	980.7	1075.7	2872.30	2881.59	2878.91	2882.52	0.0017	8.0	626.9	94.9	0.51
39+36	FEMA 100	3200	456.3	550.0	2871.10	2880.36	2877.37	2880.95	0.0011	6.7	569.4	93.7	0.41
39+36	Capital Flood	4595	453.8	552.3	2871.10	2881.55	2878.49	2882.40	0.0014	8.1	683.9	98.4	0.46
38+91	FEMA 100	3200	441.2	543.3	2870.58	2879.57	2878.47	2880.80	0.0025	9.9	433.8	102.1	0.61
38+91	Capital Flood	4595	435.5	545.3	2870.58	2880.59	2879.83	2882.22	0.0029	11.6	543.5	109.8	0.68
38+24	FEMA 100	3200	445.9	864.4	2869.81	2879.90	2877.53	2880.38	0.0044	4.8	620.9	368.5	0.30
38+24	Capital Flood	4595	432.6	889.0	2869.81	2881.17	2878.52	2881.68	0.0043	5.2	862.5	456.5	0.30
37+89	FEMA 100	3200	447.7	886.2	2869.41	2879.93	2875.03	2880.11	0.0011	2.6	976.0	438.5	0.15
37+89	Capital Flood	4595	445.4	899.0	2869.41	2881.17	2875.77	2881.44	0.0013	3.2	1145.2	453.6	0.17
37+49	FEMA 100	3200	442.7	925.6	2875.24	2879.03	2878.12	2879.79	0.0124	5.0	538.1	483.0	0.46
37+49	Capital Flood	4595	439.2	951.2	2875.24	2880.38	2878.88	2881.19	0.0090	5.3	739.0	512.0	0.41
37+36.5*	FEMA 100	3200	441.6	893.6	2875.24	2878.59	2878.12	2879.57	0.0178	5.5	472.6	452.0	0.53
37+36.5*	Capital Flood	4595	436.2	936.9	2875.24	2880.20	2878.89	2881.07	0.0094	5.2	716.6	500.7	0.41
37+24	FEMA 100	3200	436.9	857.6	2874.64	2878.71	2877.45	2879.29	0.0071	4.0	595.1	420.7	0.35
37+24	Capital Flood	4595	429.7	923.0	2874.64	2880.29	2878.20	2880.90	0.0044	3.9	848.9	493.4	0.29

APPENDIX A: HEC-RAS Summary Table - Anaverde Creek "Existing Conditions"

River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
36+98	FEMA 100	3200	421.9	773.1	2874.64	2877.90	2877.44	2878.86	0.0116	4.4	442.5	351.2	0.43
36+98	Capital Flood	4595	416.6	836.6	2874.64	2879.99	2878.18	2880.71	0.0041	3.6	746.2	420.0	0.28
36+41	FEMA 100	3200	423.7	741.3	2867.69	2877.80	2875.41	2878.24	0.0044	5.5	620.7	317.6	0.31
36+41	Capital Flood	4595	417.1	787.5	2867.69	2880.05	2876.25	2880.41	0.0023	4.6	958.0	370.4	0.24
35+46	FEMA 100	3200	471.5	585.2	2866.60	2877.50	2873.64	2877.87	0.0028	4.7	655.6	113.7	0.25
35+46	Capital Flood	4595	338.7	600.5	2866.60	2879.84	2874.81	2880.20	0.0021	4.7	955.6	210.3	0.23
35+09	FEMA 100	3200	459.4	606.1	2866.18	2877.53	2872.85	2877.75	0.0014	3.4	871.7	146.7	0.18
35+09	Capital Flood	4595	452.4	619.2	2866.18	2879.87	2873.96	2880.11	0.0010	3.2	1227.6	166.8	0.16
34+57	FEMA 100	3200	470.9	614.5	2865.59	2877.45	2872.66	2877.68	0.0018	3.7	840.4	143.6	0.19
34+57	Capital Flood	4595	463.1	627.5	2865.59	2879.82	2873.64	2880.05	0.0012	3.5	1209.4	164.4	0.17
33+85	FEMA 100	3200	480.3	574.8	2864.50	2876.96	2873.18	2877.45	0.0038	5.4	576.5	94.5	0.29
33+85	Capital Flood	4595	476.8	588.0	2864.50	2879.38	2874.99	2879.88	0.0028	5.3	822.6	111.2	0.26
32+88	FEMA 100	3200	488.3	525.7	2861.96	2874.85	2872.25	2876.57	0.0114	10.4	308.4	37.5	0.52
32+88	Capital Flood	4595	487.1	527.0	2861.96	2875.78	2874.31	2878.65	0.0172	13.4	344.5	40.0	0.65
31+97	FEMA 100	3200	491.7	542.5	2861.21	2872.71	2872.71	2875.34	0.0119	14.4	257.5	50.8	0.83
31+97	Capital Flood	4595	489.0	553.1	2861.21	2874.52	2874.52	2877.26	0.0102	15.0	362.4	64.0	0.79
30+88	FEMA 100	3200	489.7	520.7	2859.94	2868.40	2869.59	2873.36	0.0200	18.8	188.2	31.1	1.16
30+88	Capital Flood	4595	485.0	521.8	2859.94	2871.09	2871.66	2875.78	0.0133	18.6	279.6	36.8	1.00
29+98	FEMA 100	3200	478.8	517.4	2857.50	2862.66	2864.75	2869.55	0.0616	21.2	153.8	38.7	1.82
29+98	Capital Flood	4595	473.2	521.6	2857.50	2869.59	2866.42	2871.31	0.0044	10.8	454.1	48.4	0.57
29+08	FEMA 100	3200	469.1	518.5	2855.50	2867.05	2863.19	2868.00	0.0028	8.1	421.1	49.5	0.45
29+08	Capital Flood	4595	467.7	521.2	2855.50	2869.69	2864.81	2870.82	0.0025	9.0	556.9	53.5	0.44
27+96	FEMA 100	3200	483.4	513.9	2852.87	2863.26	2863.26	2866.92	0.0120	16.1	218.4	30.5	0.90
27+96	Capital Flood	4595	480.0	514.4	2852.87	2865.48	2865.48	2869.77	0.0110	17.6	290.3	34.4	0.89
26+81	FEMA 100	3200	468.8	517.8	2850.88	2861.27	2858.32	2862.38	0.0040	8.5	385.2	49.0	0.52
26+81	Capital Flood	4595	467.9	518.6	2850.88	2863.42	2859.82	2864.84	0.0038	9.7	492.7	50.7	0.52
25+97	FEMA 100	3200	482.2	544.6	2850.48	2858.46	2858.46	2861.54	0.0112	14.4	230.4	62.4	0.95
25+97	Capital Flood	4595	479.8	555.3	2850.48	2860.27	2860.27	2864.02	0.0101	15.9	300.6	75.4	0.94
24+73	FEMA 100	3630	474.6	526.6	2848.00	2854.08	2854.83	2857.74	0.0488	15.4	238.2	52.0	1.24
24+73	Capital Flood	4970	474.2	527.1	2848.00	2854.88	2856.10	2859.87	0.0543	18.0	280.0	52.9	1.34
23+97	FEMA 100	3630	466.5	520.9	2846.00	2853.82	2852.81	2855.84	0.0150	11.5	334.0	54.4	0.74
23+97	Capital Flood	4970	464.9	522.4	2846.00	2855.03	2854.21	2857.69	0.0163	13.3	401.4	57.6	0.79
23+00	FEMA 100	3630	456.7	517.6	2844.50	2851.87	2851.42	2854.06	0.0212	12.0	316.0	60.9	0.85
23+00	Capital Flood	4970	454.6	519.3	2844.50	2853.10	2852.63	2855.87	0.0210	13.5	387.7	64.7	0.87
22+17	FEMA 100	3630	458.2	521.8	2843.30	2850.37	2849.67	2852.41	0.0177	11.7	345.1	63.7	0.80
22+17	Capital Flood	4970	455.5	524.5	2843.30	2851.58	2850.91	2854.23	0.0180	13.2	421.2	69.0	0.83
21+57	FEMA 100	3630	401.8	527.6	2842.50	2849.42	2848.75	2851.47	0.0123	9.1	350.1	125.8	0.65
21+57	Capital Flood	4970	399.8	529.0	2842.50	2850.35	2850.01	2853.21	0.0132	10.4	414.1	129.2	0.69
20+51	FEMA 100	3630	383.8	547.8	2840.92	2848.07	2847.42	2849.89	0.0167	11.0	349.3	103.3	0.77
20+51	Capital Flood	4970	380.7	550.2	2840.92	2849.48	2848.68	2851.53	0.0145	11.7	454.9	153.2	0.74
19+50	FEMA 100	3630	488.9	546.8	2839.30	2845.96	2845.96	2848.47	0.0099	12.9	291.2	57.9	0.96
19+50	Capital Flood	4970	453.7	548.9	2839.30	2847.19	2847.19	2850.21	0.0094	14.2	364.6	95.2	0.97
18+53	FEMA 100	3630	453.6	521.0	2837.49	2842.41	2843.61	2846.48	0.0277	16.3	228.2	67.5	1.53
18+53	Capital Flood	4970	451.0	523.0	2837.49	2843.19	2844.73	2848.20	0.0277	18.1	282.5	72.0	1.57
18+18	FEMA 100	3630	444.0	532.5	2836.90	2842.07	2842.96	2845.25	0.0271	14.3	253.9	88.5	1.47
18+18	Capital Flood	4970	441.9	532.8	2836.90	2842.53	2843.89	2846.97	0.0321	16.9	294.1	91.0	1.63
17+85	FEMA 100	3630	458.3	552.6	2836.35	2842.71	2842.71	2844.59	0.0106	11.5	342.7	94.3	0.98
17+85	Capital Flood	4970	457.8	554.3	2836.35	2842.97	2843.61	2846.06	0.0164	14.8	365.4	96.5	1.22

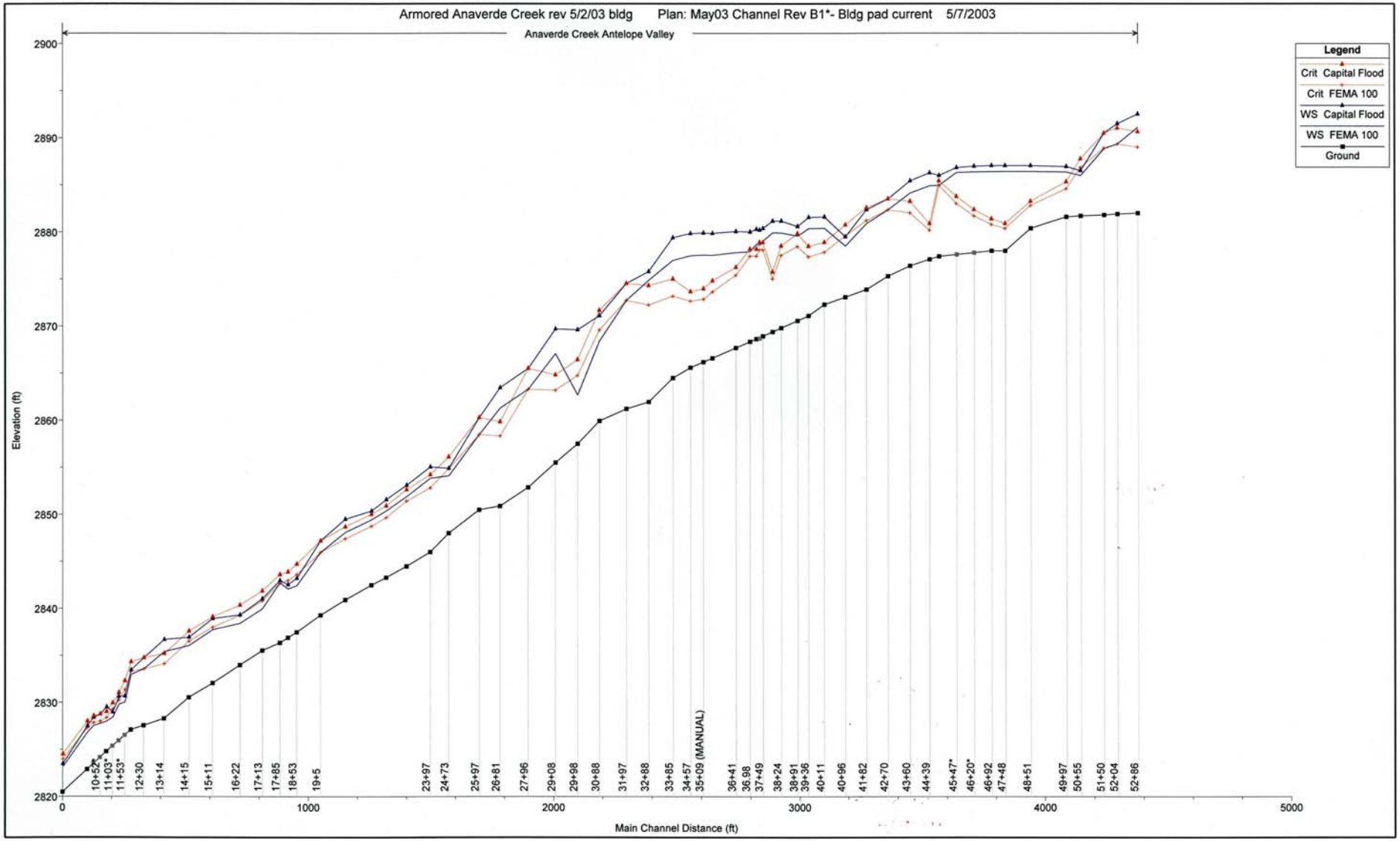
APPENDIX A: HEC-RAS Summary Table - Anaverde Creek "Existing Conditions"

River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
17+13	FEMA 100	3630	472.4	540.3	2835.53	2839.96	2840.83	2843.43	0.0172	15.0	243.7	67.8	1.38
17+13	Capital Flood	4970	472.2	540.8	2835.53	2841.04	2841.88	2844.90	0.0138	15.8	317.0	68.6	1.28
16+22	FEMA 100	3630	464.4	530.8	2834.00	2838.42	2839.28	2841.89	0.0168	15.0	243.4	66.4	1.37
16+22	Capital Flood	4970	463.9	531.4	2834.00	2839.30	2840.36	2843.53	0.0156	16.5	302.8	67.4	1.36
15+11	FEMA 100	3630	444.6	511.8	2832.07	2837.74	2838.02	2840.29	0.0132	12.9	285.3	67.2	1.09
15+11	Capital Flood	4970	443.0	512.7	2832.07	2838.92	2839.12	2841.84	0.0114	13.8	366.6	69.7	1.04
14+15	FEMA 100	3630	451.8	520.1	2830.55	2836.05	2836.53	2838.87	0.0159	13.5	272.1	68.3	1.17
14+15	Capital Flood	4970	451.2	520.3	2830.55	2836.94	2837.58	2840.47	0.0158	15.2	332.7	69.1	1.20
13+14	FEMA 100	3630	455.6	524.7	2828.31	2835.39	2834.11	2836.76	0.0051	9.4	389.0	69.1	0.69
13+14	Capital Flood	4970	443.8	525.2	2828.31	2836.69	2835.20	2838.38	0.0049	10.5	482.5	81.4	0.70
12+30	FEMA 100	3630	448.5	511.1	2827.56	2833.56	2833.56	2835.98	0.0111	12.5	294.6	62.6	1.00
12+30	Capital Flood	4970	444.7	512.1	2827.56	2834.75	2834.75	2837.63	0.0101	13.7	370.9	67.5	0.99
11+78	FEMA 100	3630	439.7	522.0	2827.10	2832.96	2833.33	2835.28	0.0146	12.5	300.6	82.3	1.12
11+78	Capital Flood	4970	434.2	523.1	2827.10	2833.43	2834.33	2836.80	0.0200	15.1	339.9	88.9	1.32
11+53.0*	FEMA 100	3630	447.2	558.6	2826.53	2830.02	2831.35	2834.39	0.0379	17.0	217.6	111.4	1.78
11+53.0*	Capital Flood	4970	444.5	561.4	2826.53	2830.67	2832.31	2835.90	0.0347	18.7	272.5	116.9	1.76
11+28.0*	FEMA 100	3630	436.5	599.8	2825.95	2829.80	2830.23	2831.95	0.0158	12.1	310.8	163.3	1.18
11+28.0*	Capital Flood	4970	430.8	606.5	2825.95	2830.64	2831.04	2833.05	0.0133	12.9	401.9	175.7	1.12
11+03.0*	FEMA 100	3630	431.1	634.4	2825.38	2828.43	2829.29	2831.29	0.0316	13.8	270.3	203.4	1.58
11+03.0*	Capital Flood	4970	428.1	637.6	2825.38	2828.96	2829.94	2832.42	0.0293	15.2	336.8	209.5	1.57
10+78	FEMA 100	3630	420.3	674.2	2824.80	2828.00	2828.41	2829.86	0.0183	11.0	334.8	253.9	1.25
10+78	Capital Flood	4970	412.5	683.6	2824.80	2829.52	2829.03	2830.78	0.0065	9.1	561.4	271.1	0.81
10+52.0*	FEMA 100	3630	433.0	675.9	2824.17	2827.76	2828.00	2829.54	0.0141	10.8	345.2	242.9	1.12
10+52.0*	Capital Flood	4970	420.5	684.7	2824.17	2828.77	2828.77	2830.53	0.0095	10.8	481.2	264.2	0.97
10+26.0*	FEMA 100	3630	426.8	676.7	2823.53	2827.55	2827.88	2829.31	0.0119	11.0	357.5	249.9	1.06
10+26.0*	Capital Flood	4970	418.3	688.4	2823.53	2828.40	2828.57	2830.27	0.0097	11.5	475.7	270.1	0.99
10+00	FEMA 100	3630	432.9	679.1	2822.90	2826.83	2827.32	2828.91	0.0161	12.3	327.7	246.3	1.22
10+00	Capital Flood	4970	429.7	680.2	2822.90	2827.51	2828.00	2829.91	0.0144	13.3	416.1	250.6	1.19
09+00	FEMA 100	3630	447.2	677.2	2820.50	2823.16	2824.01	2825.88	0.0433	13.5	281.5	230.0	1.81
09+00	Capital Flood	4970	439.1	677.7	2820.50	2823.50	2824.52	2826.93	0.0433	15.2	345.0	238.6	1.86

* indicates interpolated cross section

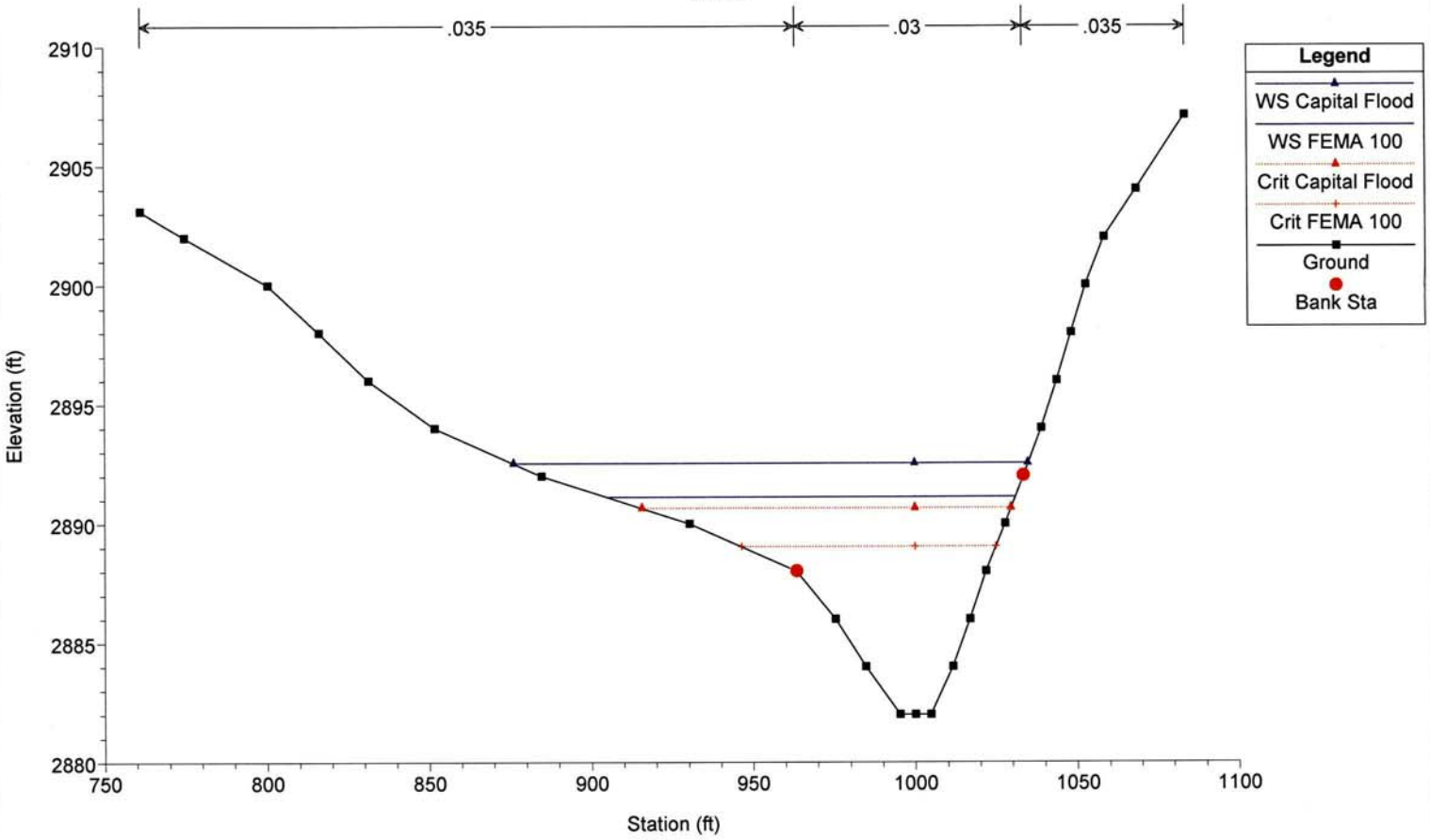
APPENDIX B

ANAVERDE CREEK
ANTELOPE VALLEY AREA FLOOD PROFILE & CROSS-SECTIONS


Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003
Anaverde Creek Antelope Valley
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Elevation (ft)
2820
2830
2840
2850
2860
2870
2880
2890
2900
Main Channel Distance (ft)
0
1000
2000
3000
4000
5000
10+52*
11+03*
11+53*
12+30
13+14
14+15
15+11
16+22
17+13
17+85
18+53
19+5
23+97
24+73
25+97
26+81
27+96
29+08
29+98
30+88
31+97
32+88
33+85
34+57
35+09 (MANUAL)
36+41
36.98
37+49
38+24
38+91
39+36
40+11
40+96
41+82
42+70
43+60
44+39
45+47*
46+20*
46+92
47+48
48+51
49+97
50+55
51+50
52+04
52+86

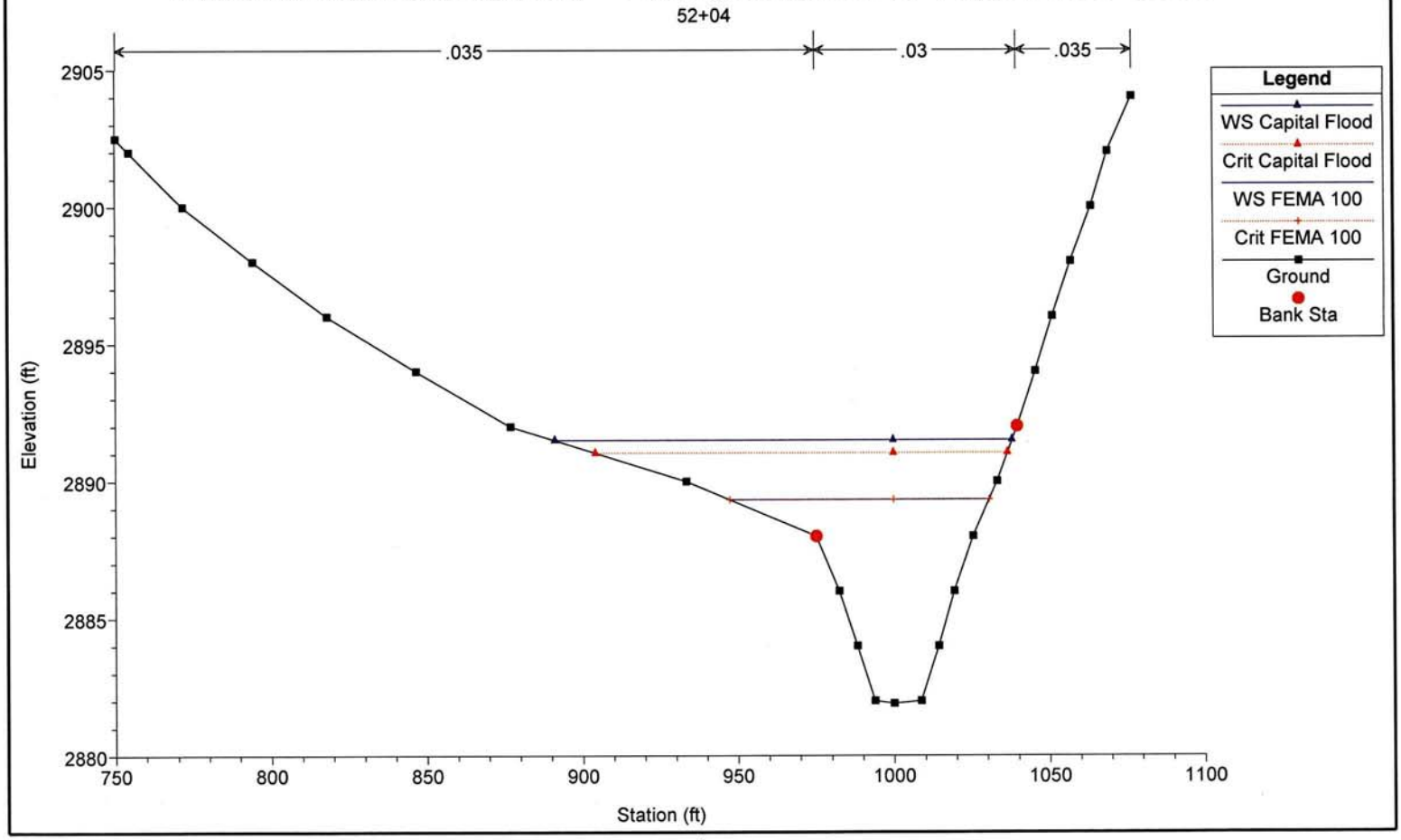
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

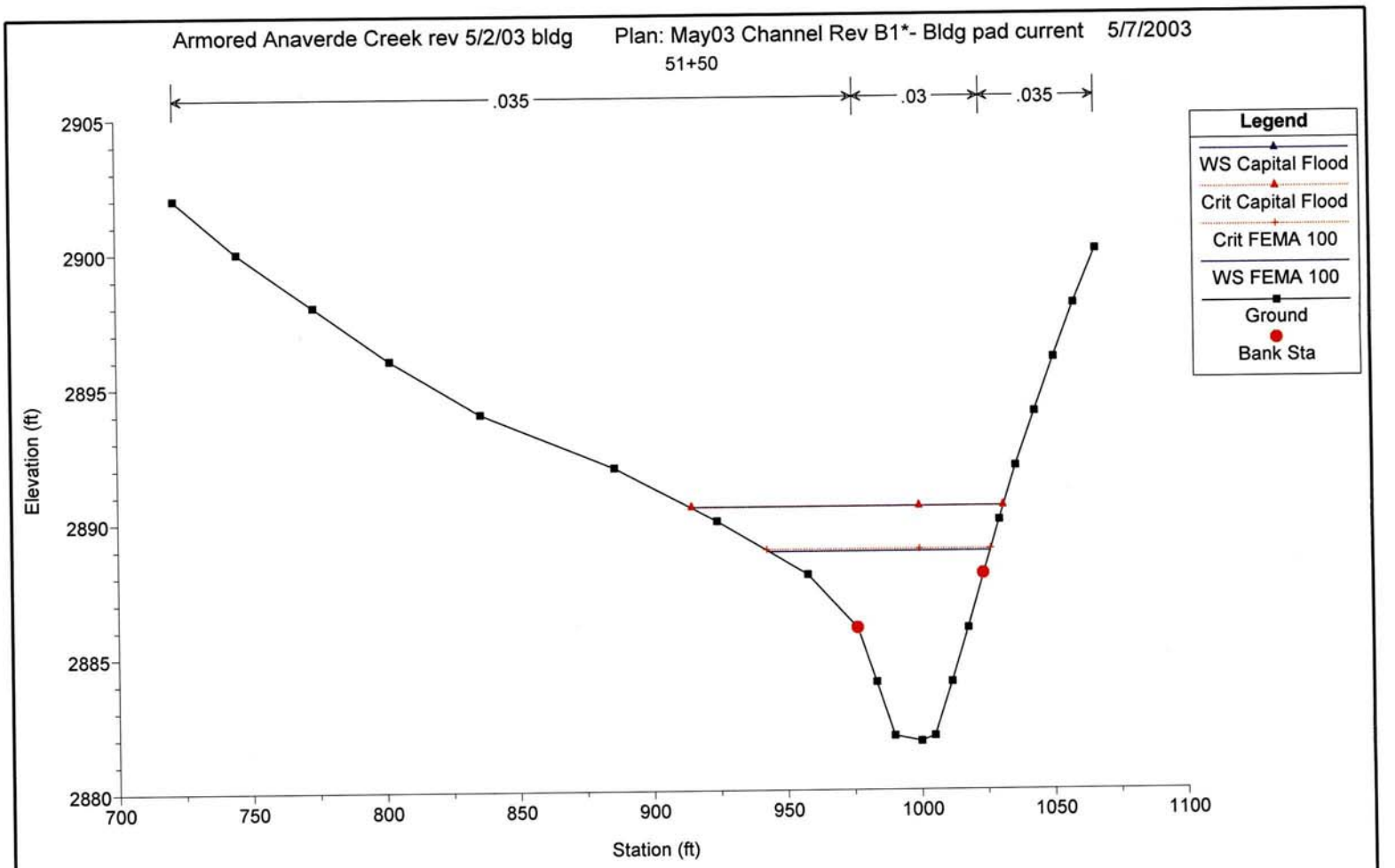
52+86

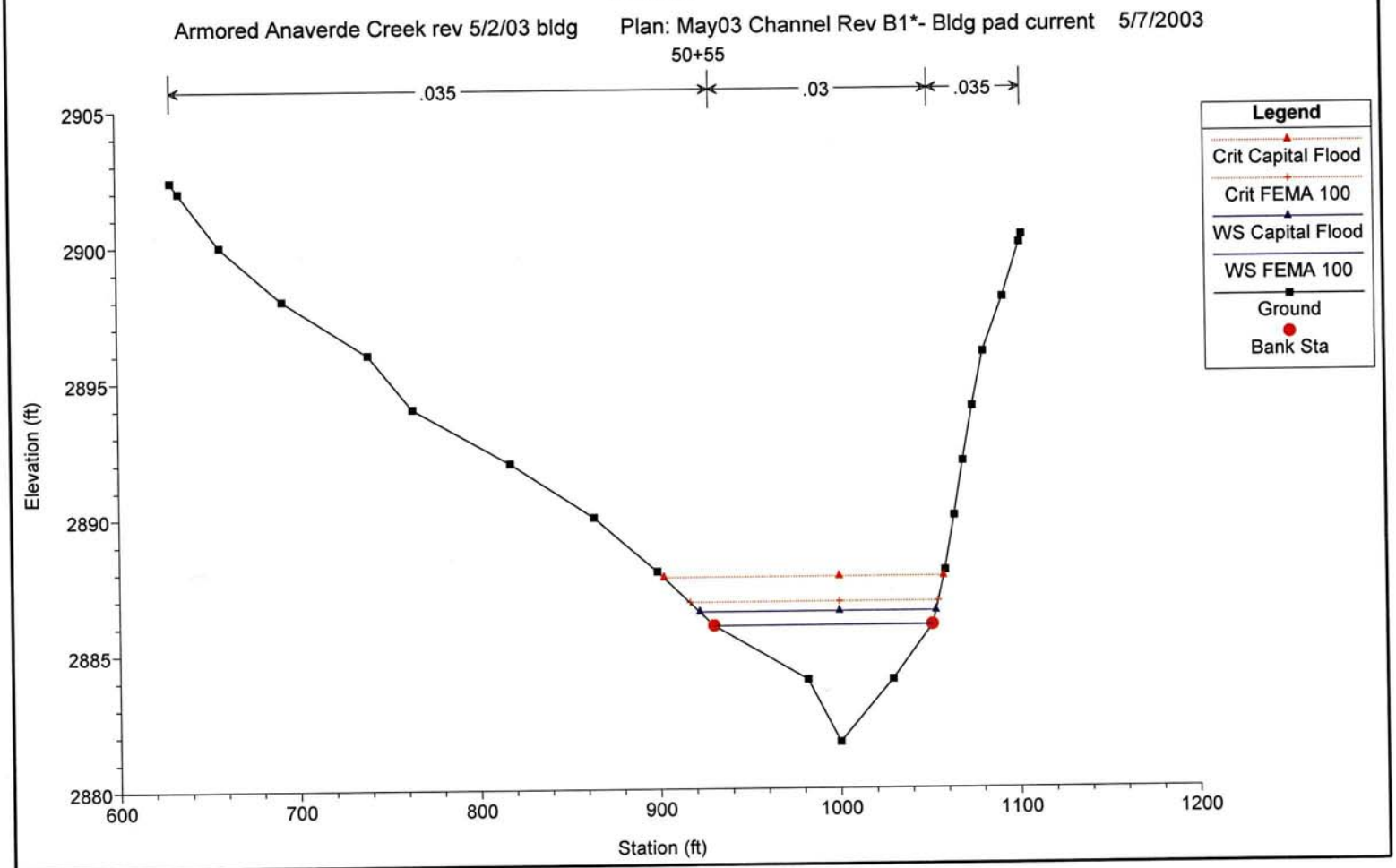


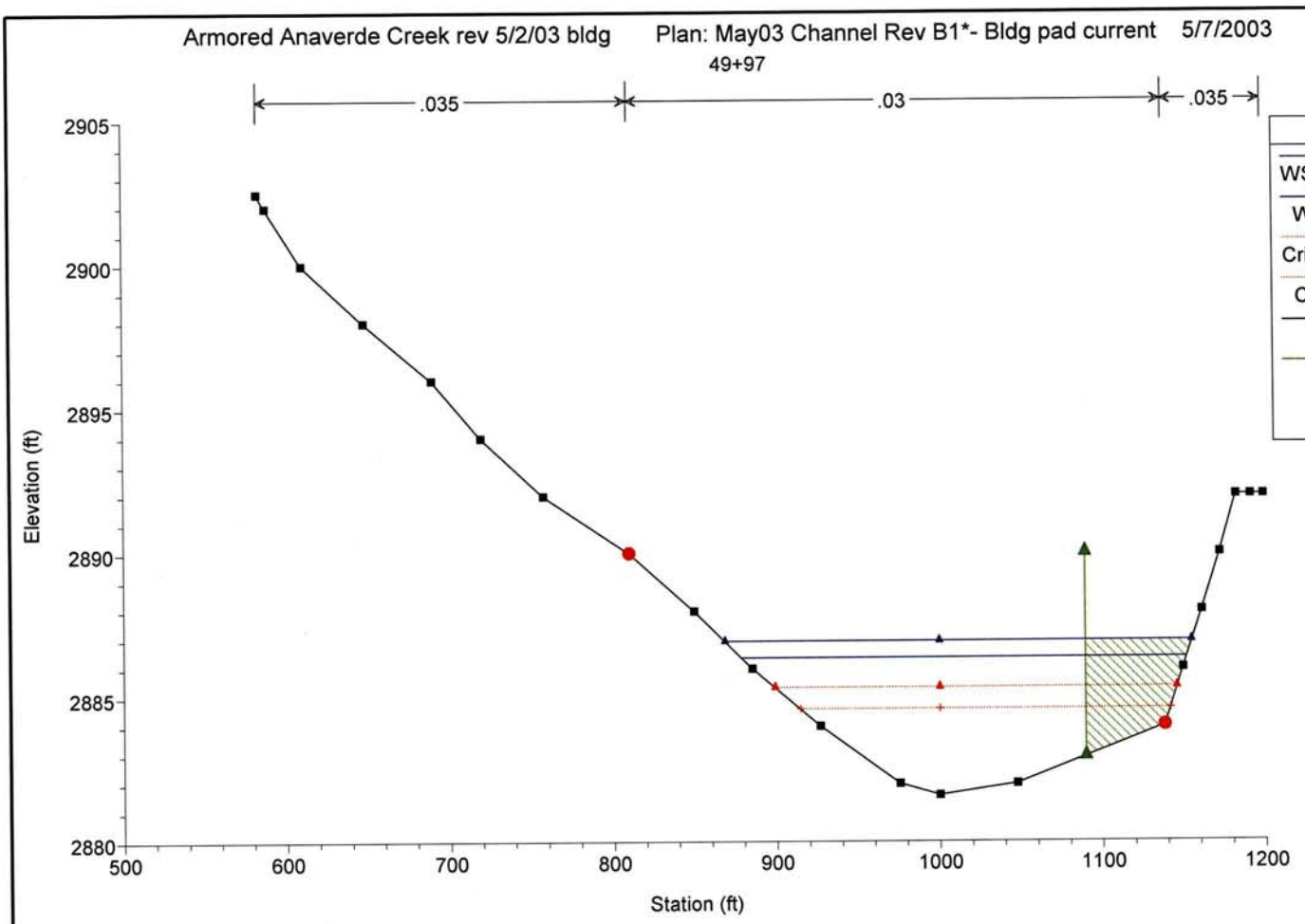
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

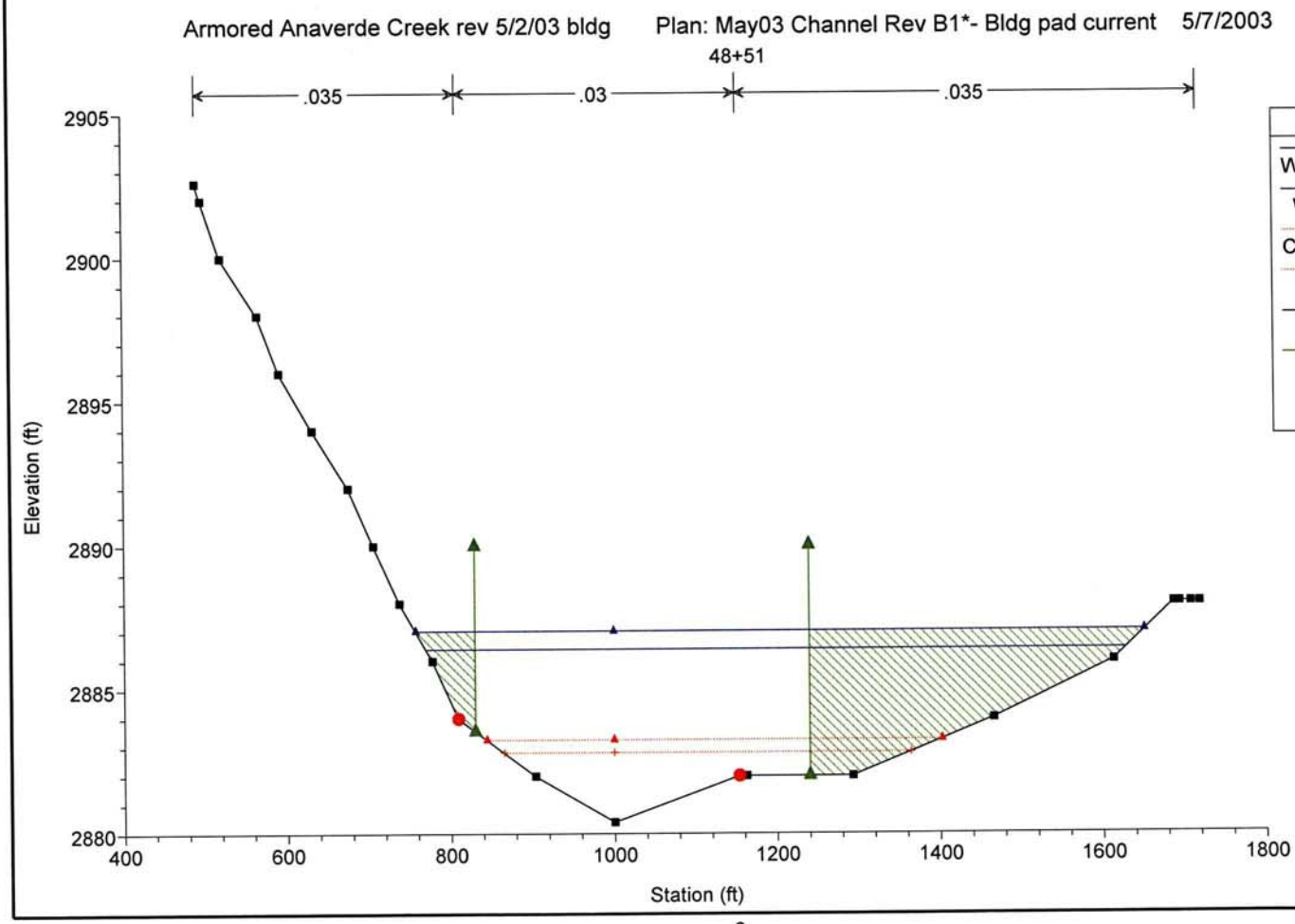
52+04

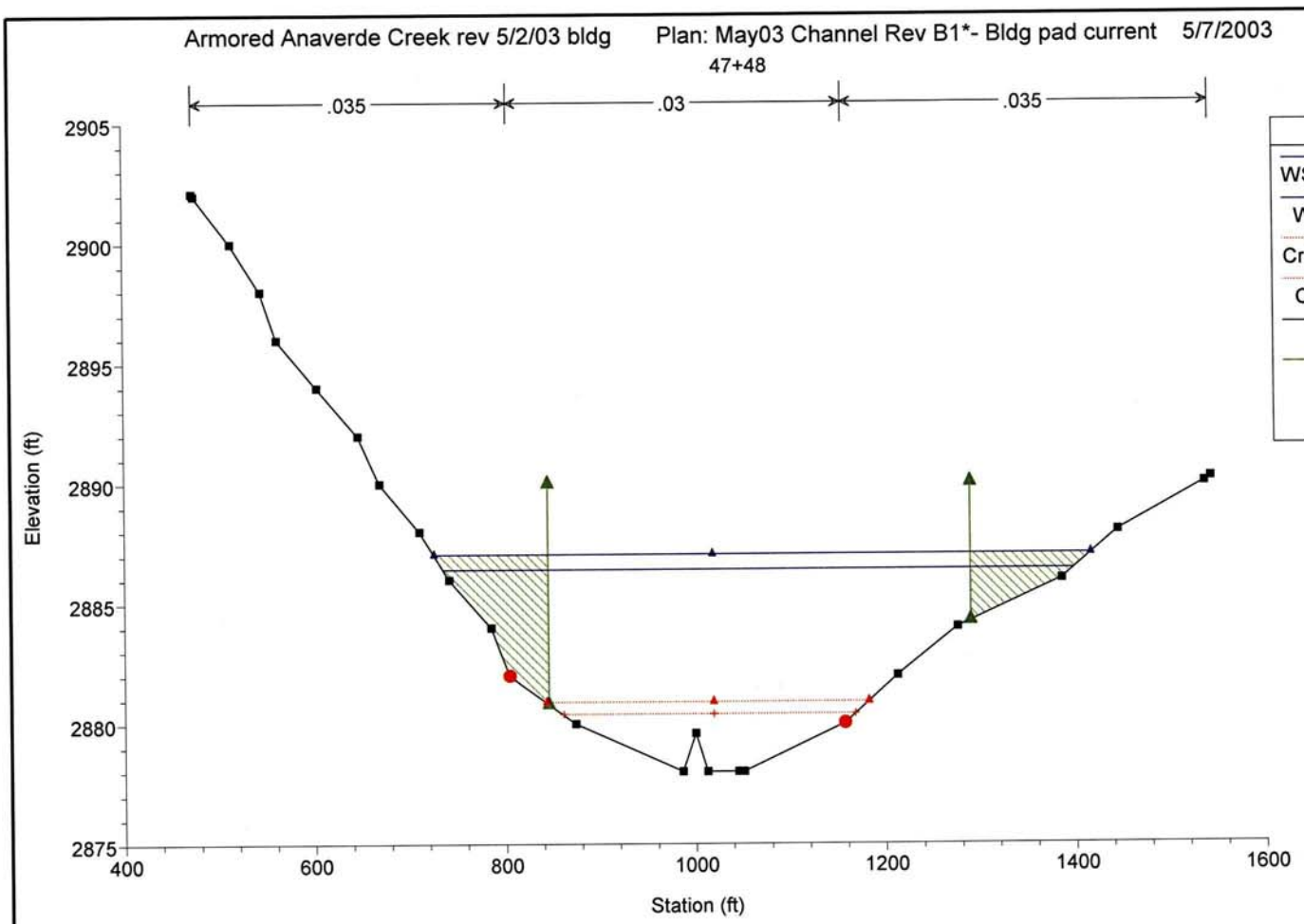


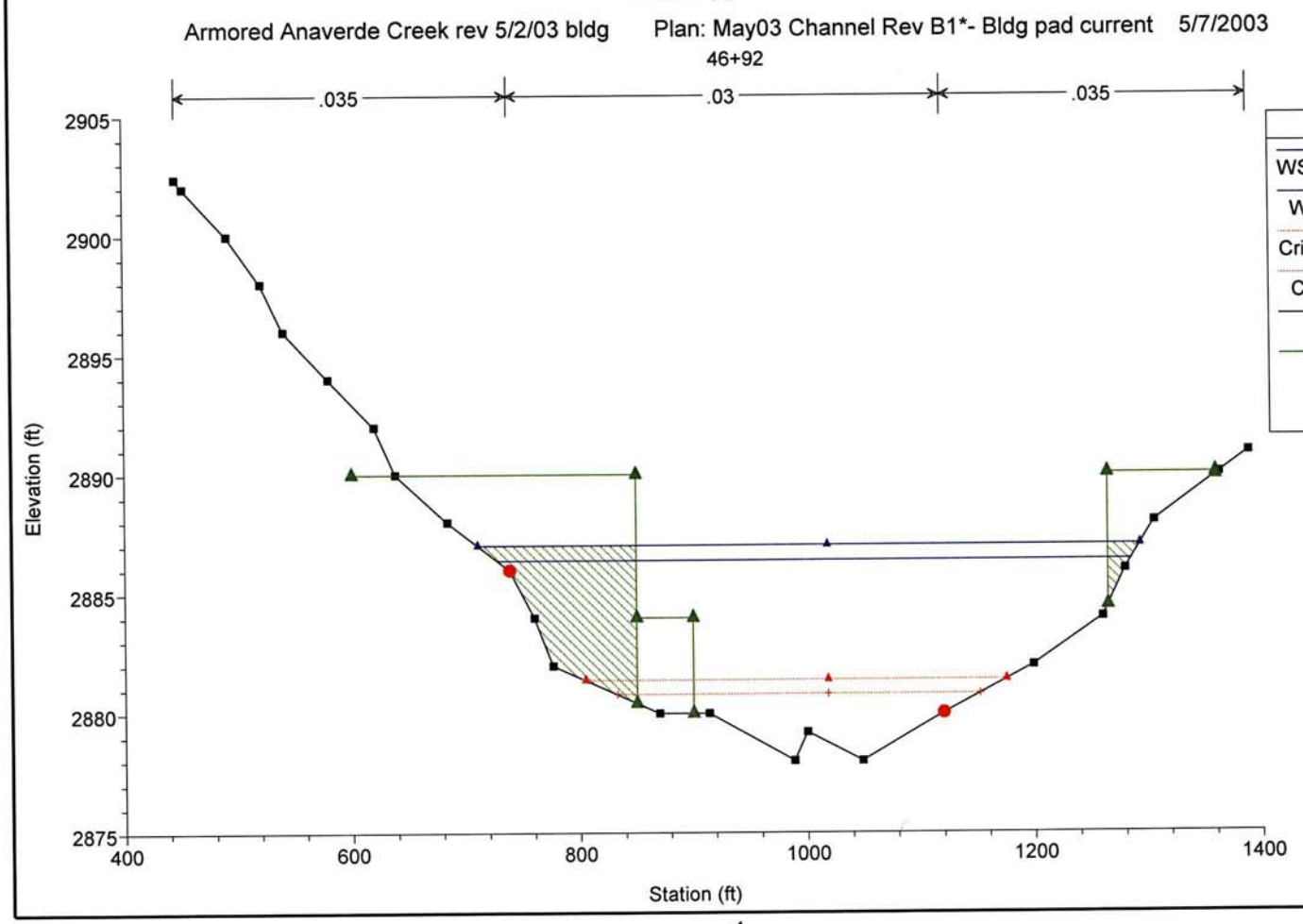

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
51+50
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
700
750
800
850
900
950
1000
1050
1100

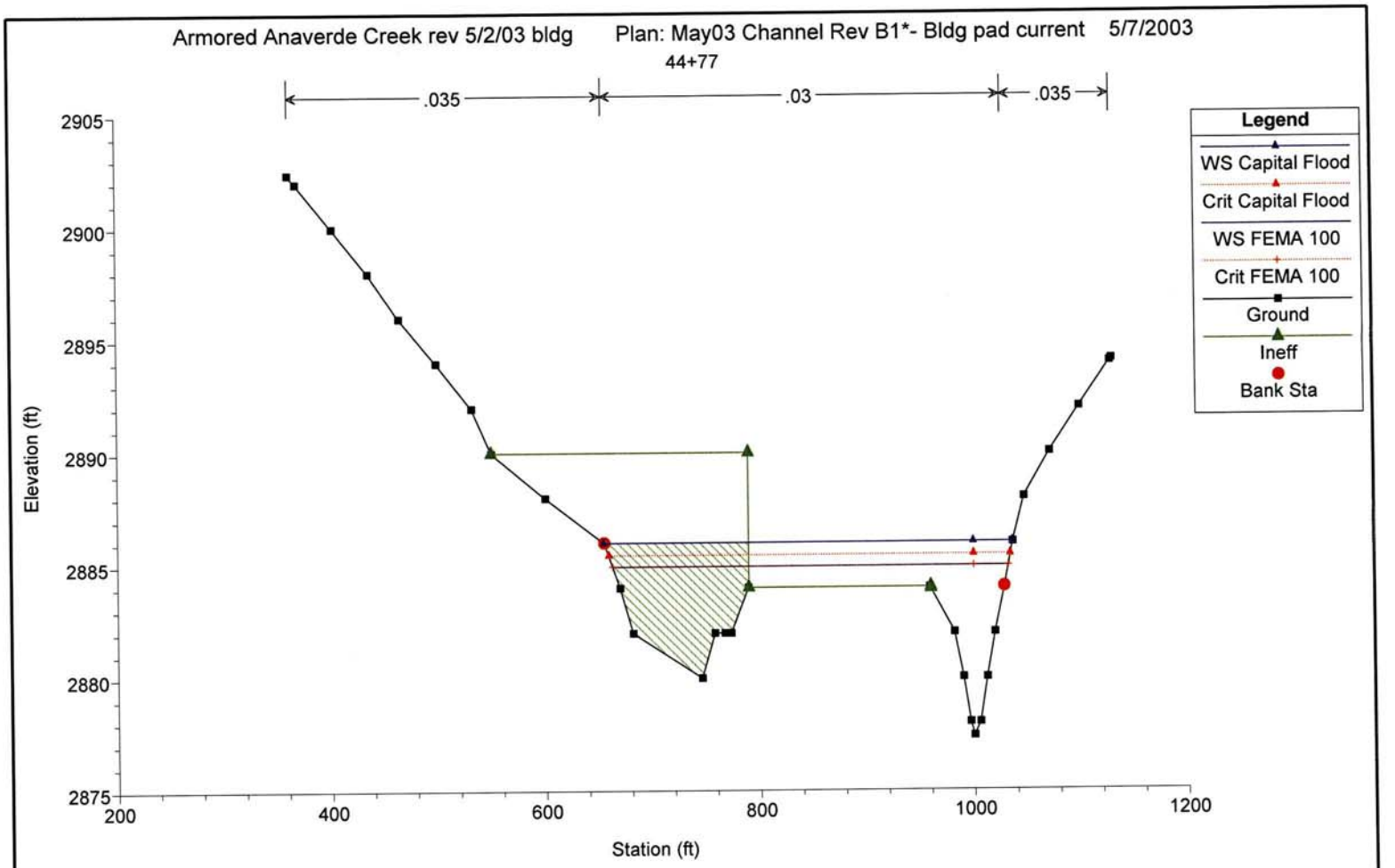

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
50+55
.035
.03
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
600
700
800
900
1000
1100
1200

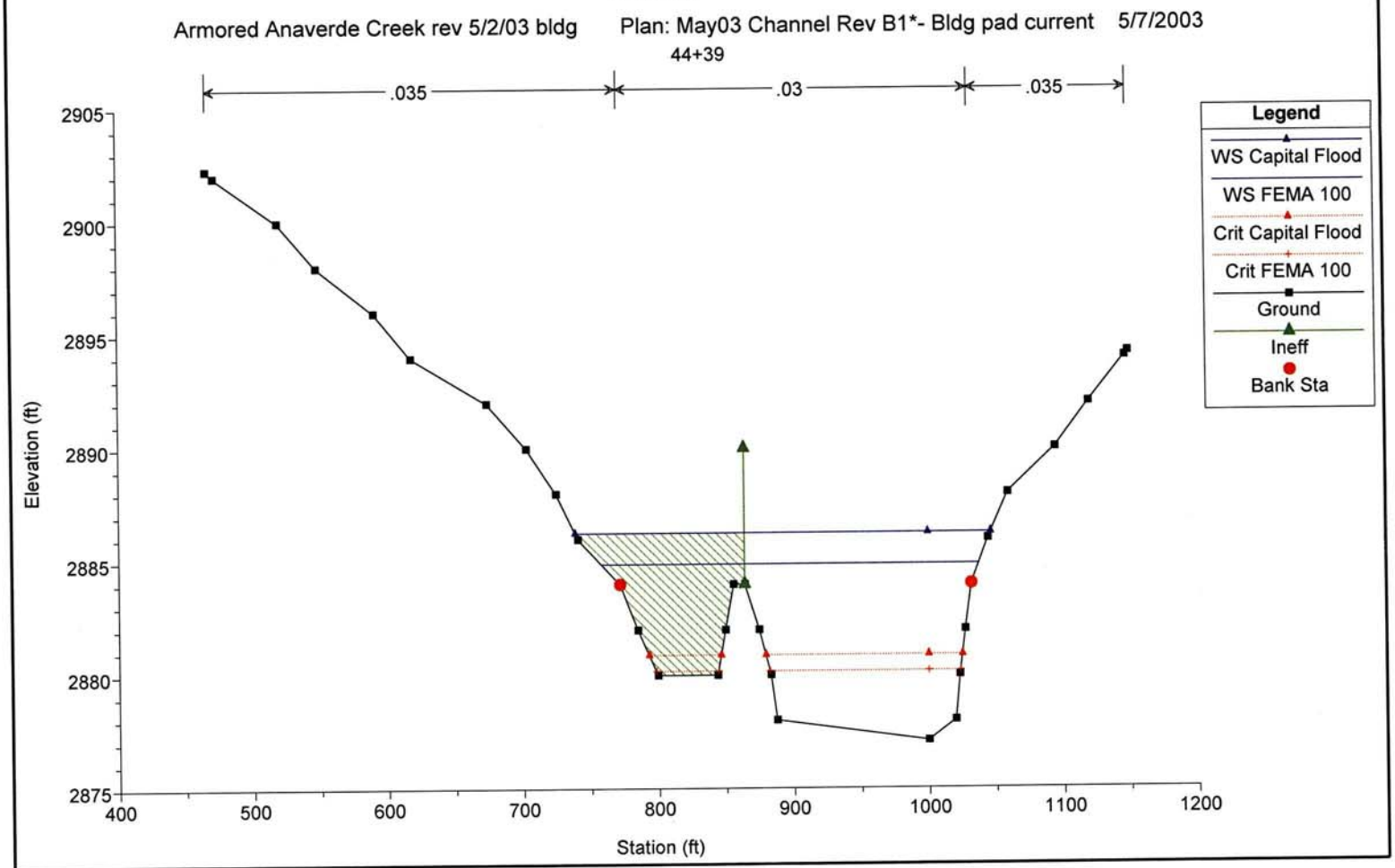

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
49+97
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

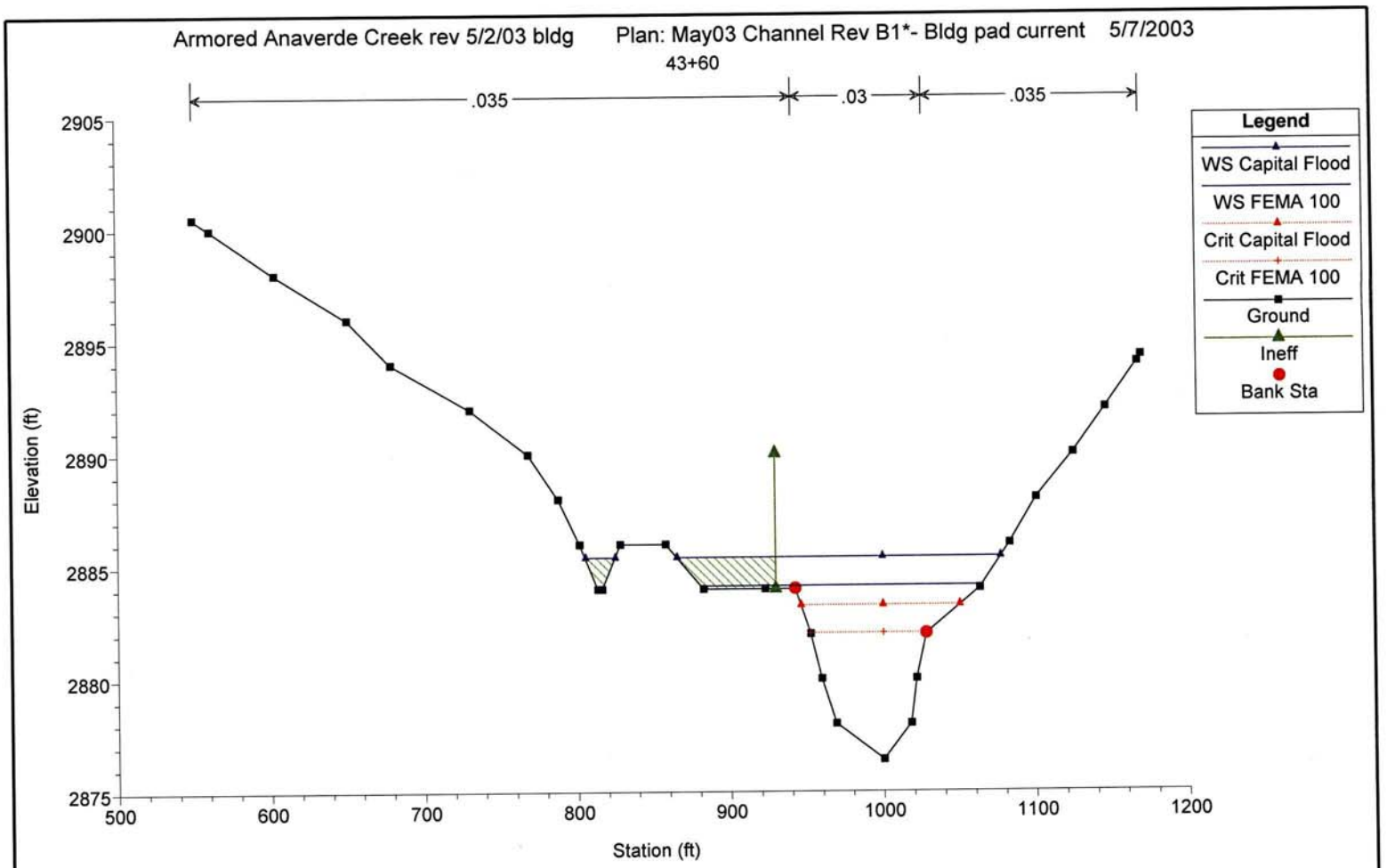

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
48+51
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

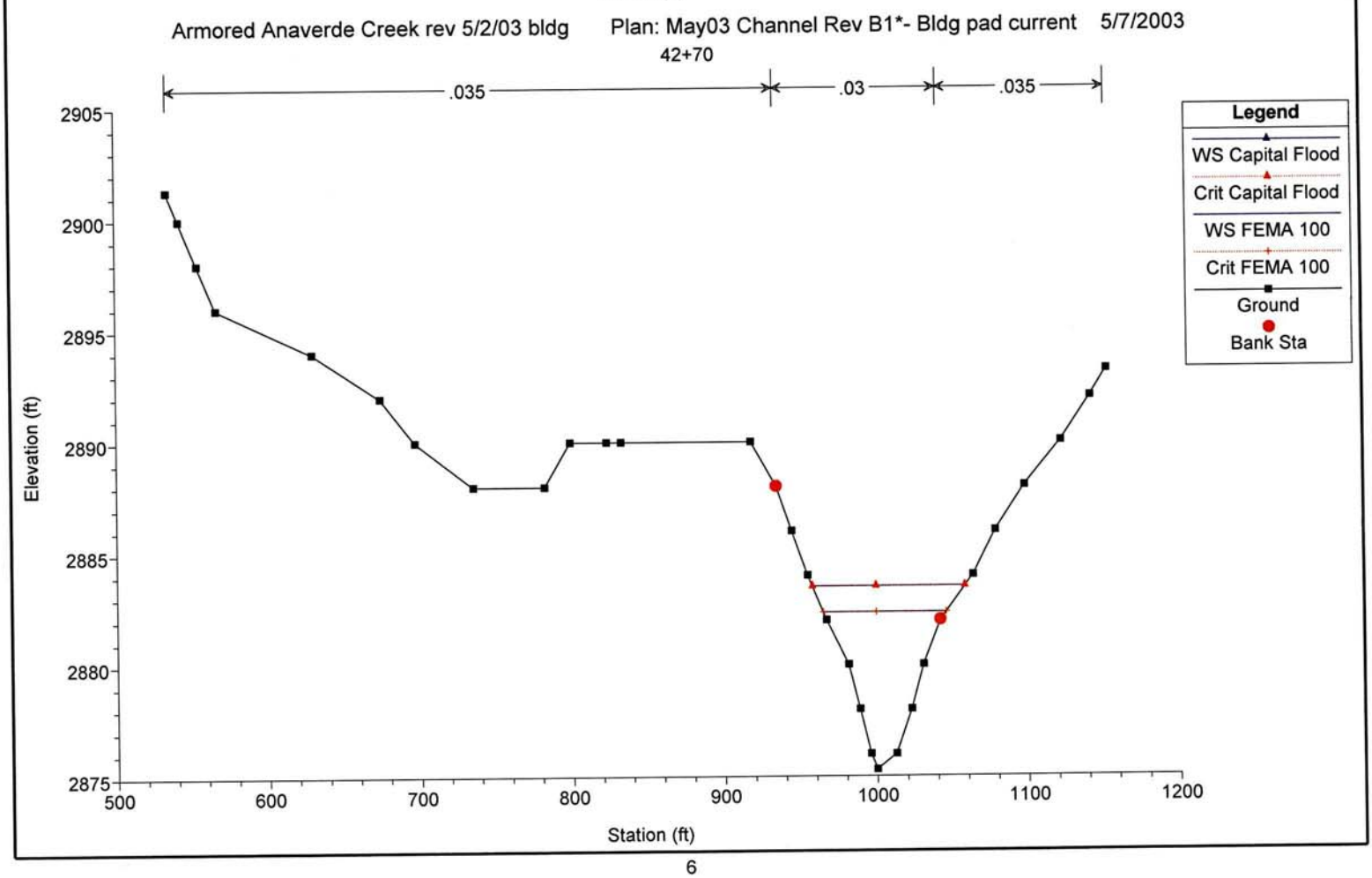

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
47+48
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
2905
2900
2895
2890
2885
2880
2875
400
600
800
1000
1200
1400
1600
Station (ft)

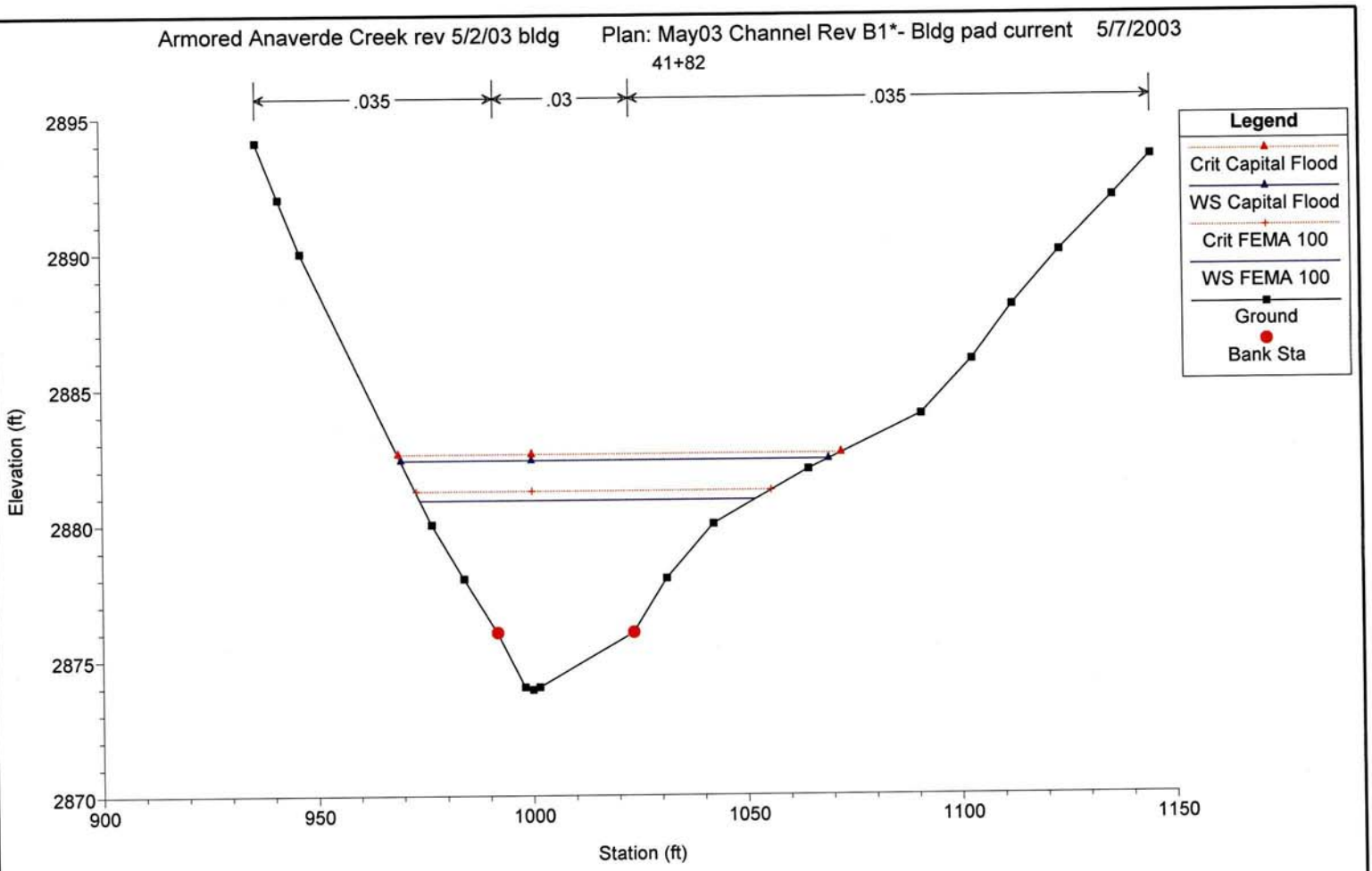

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
46+92
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
2905
2900
2895
2890
2885
2880
2875
400
600
800
1000
1200
1400
Station (ft)

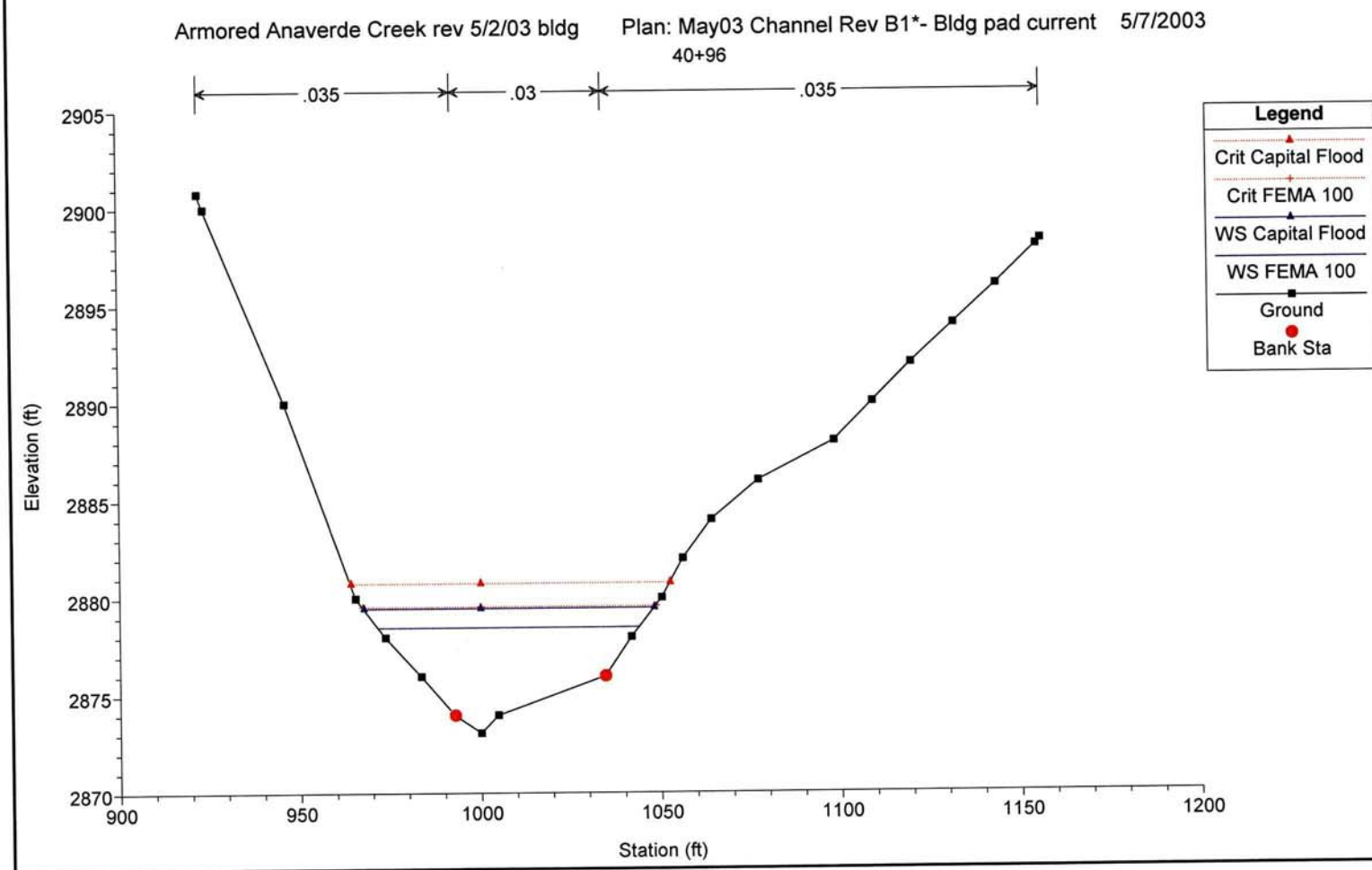

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
44+77
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

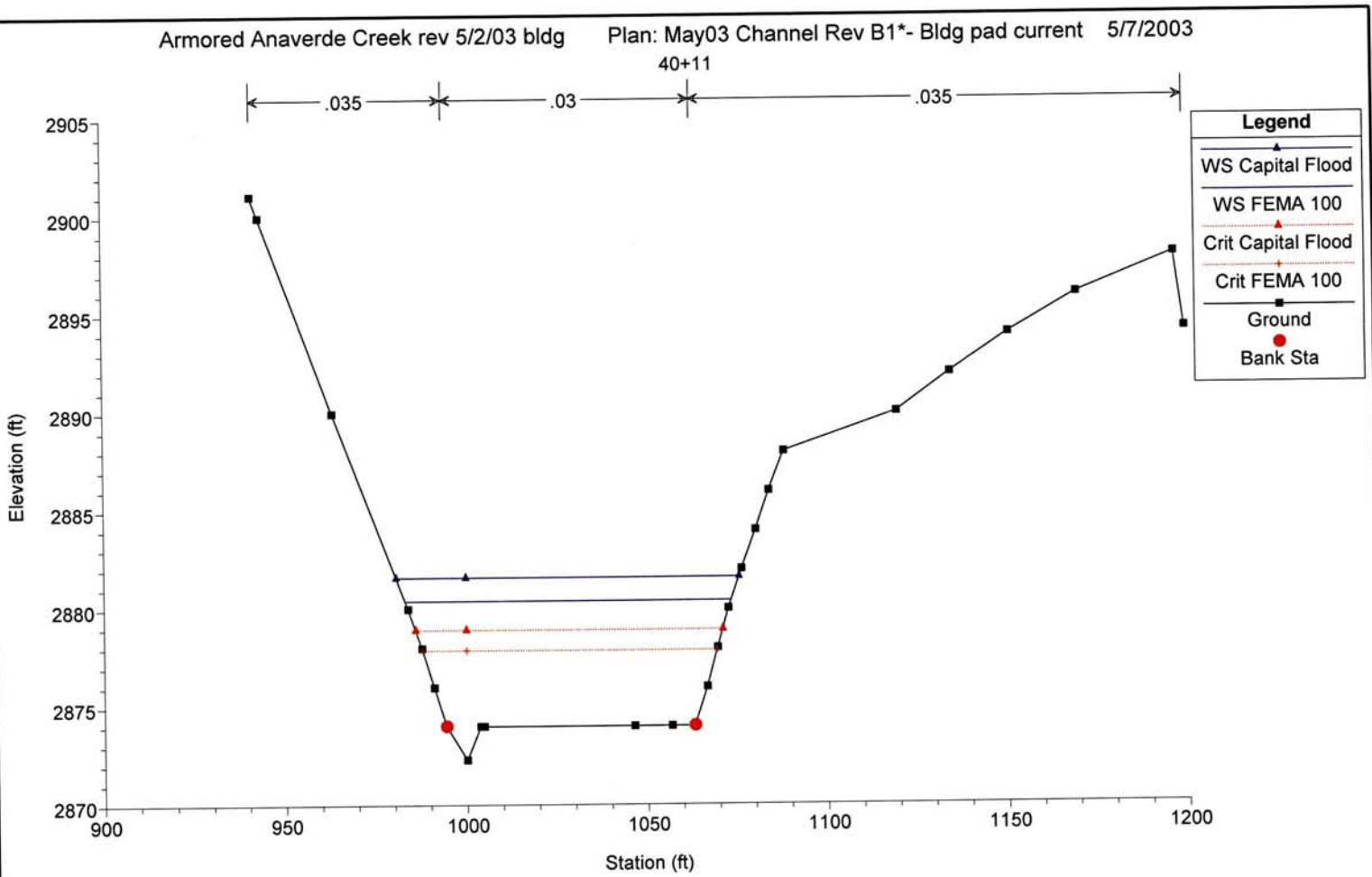

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
44+39
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

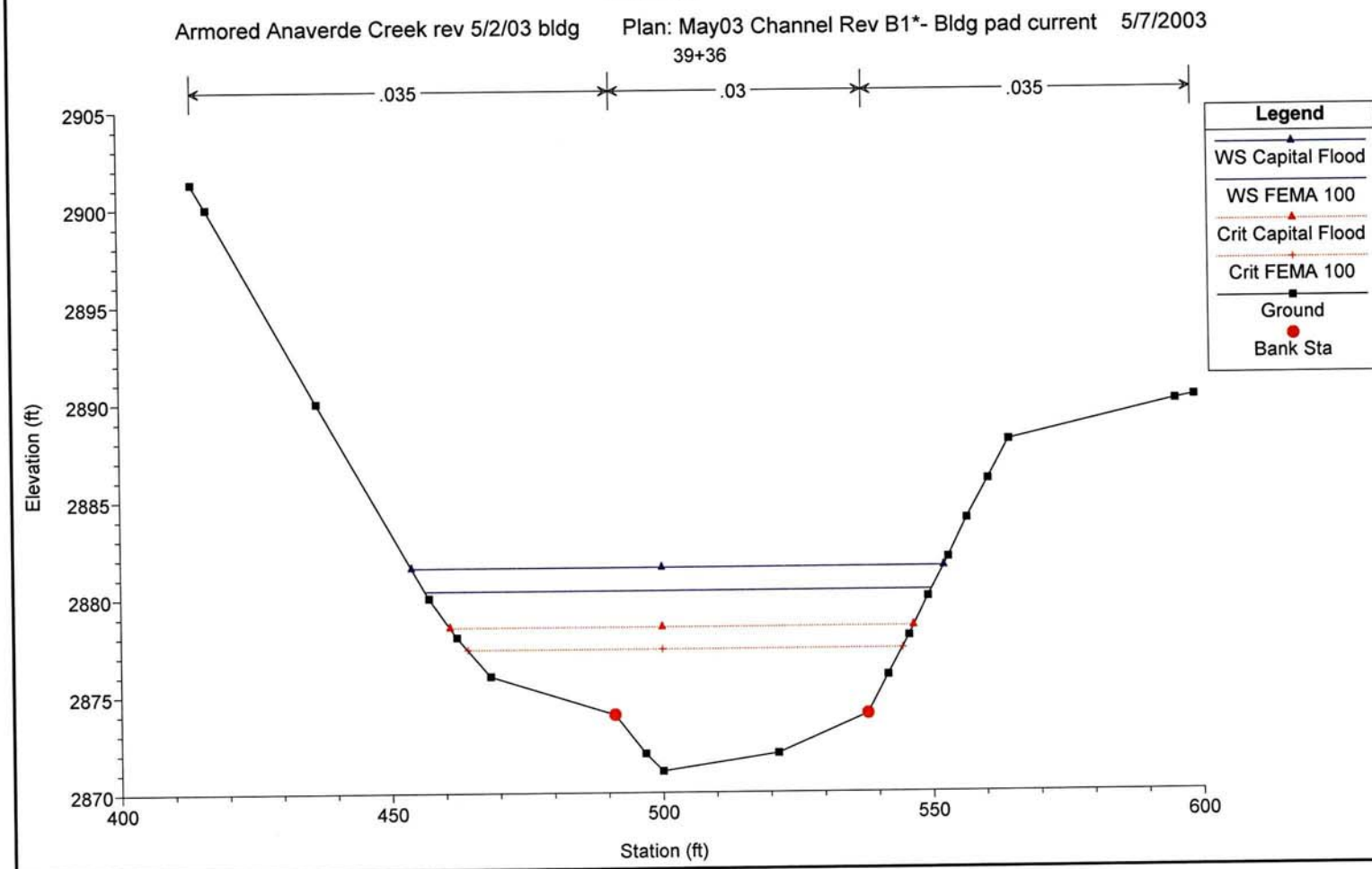

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
43+60
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
500
600
700
800
900
1000
1100
1200

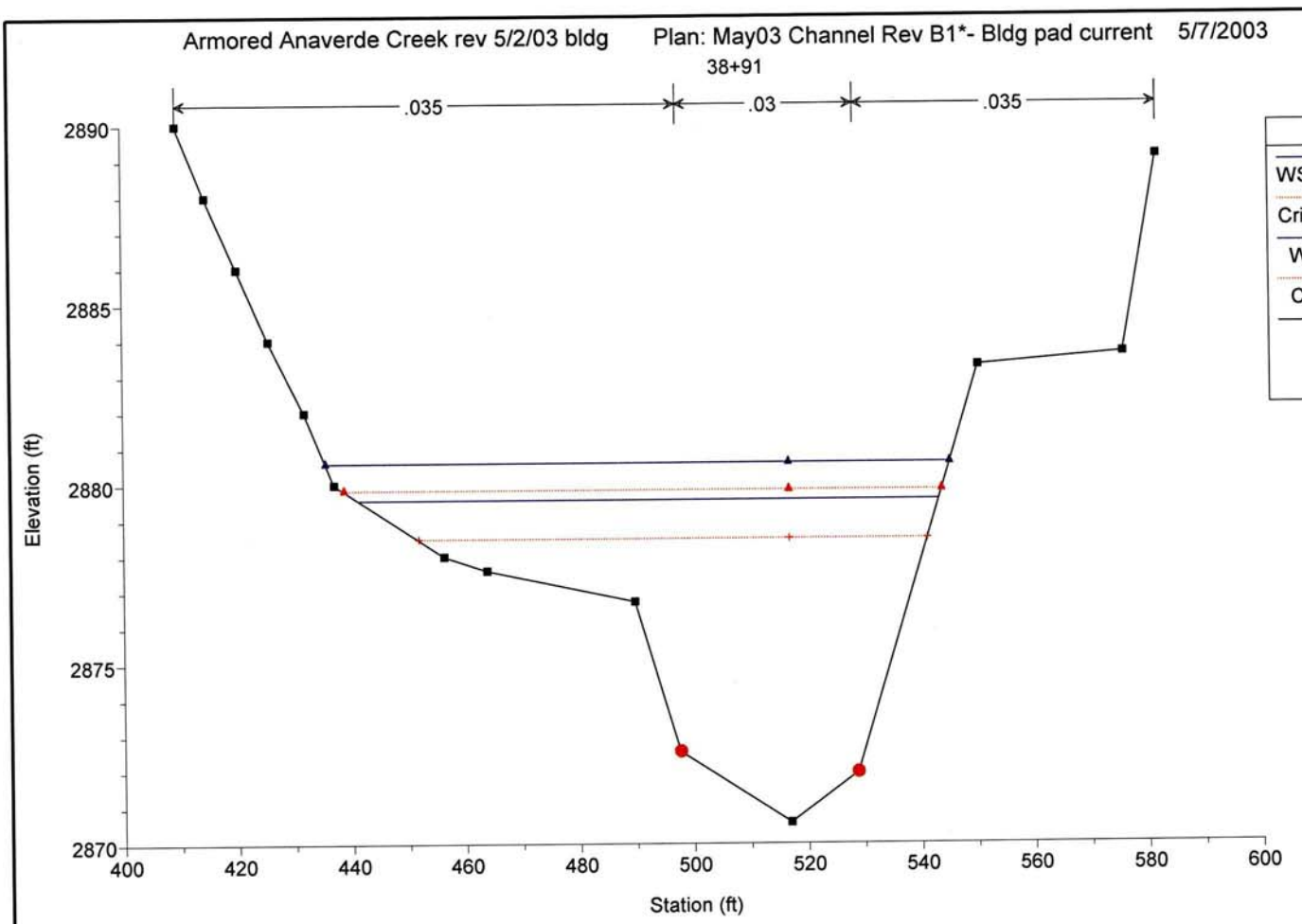

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
42+70
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
500
600
700
800
900
1000
1100
1200

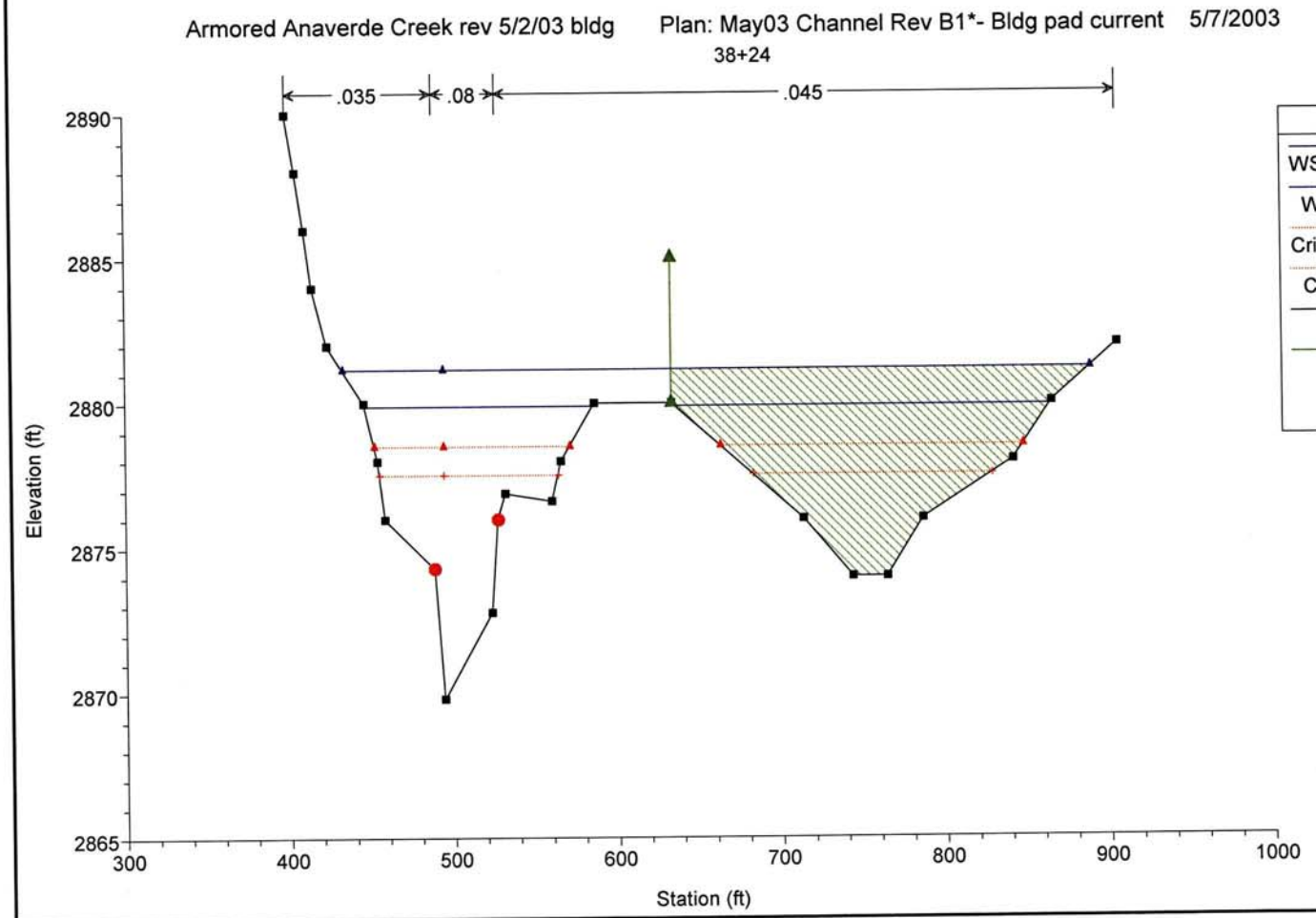

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
41+82
.035
.03
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
900
950
1000
1050
1100
1150

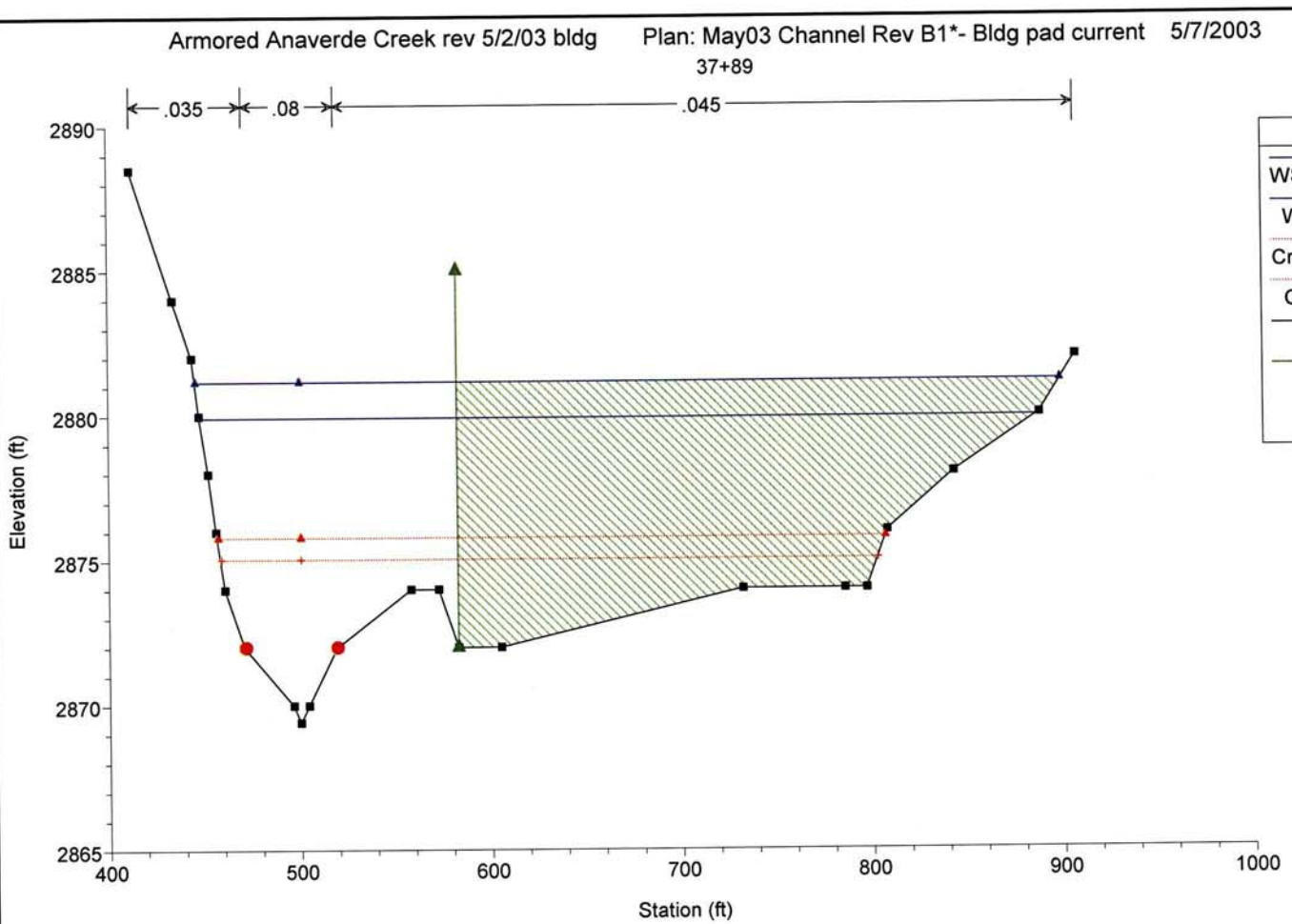

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
40+96
.035
.03
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
2870
900
950
1000
1050
1100
1150
1200

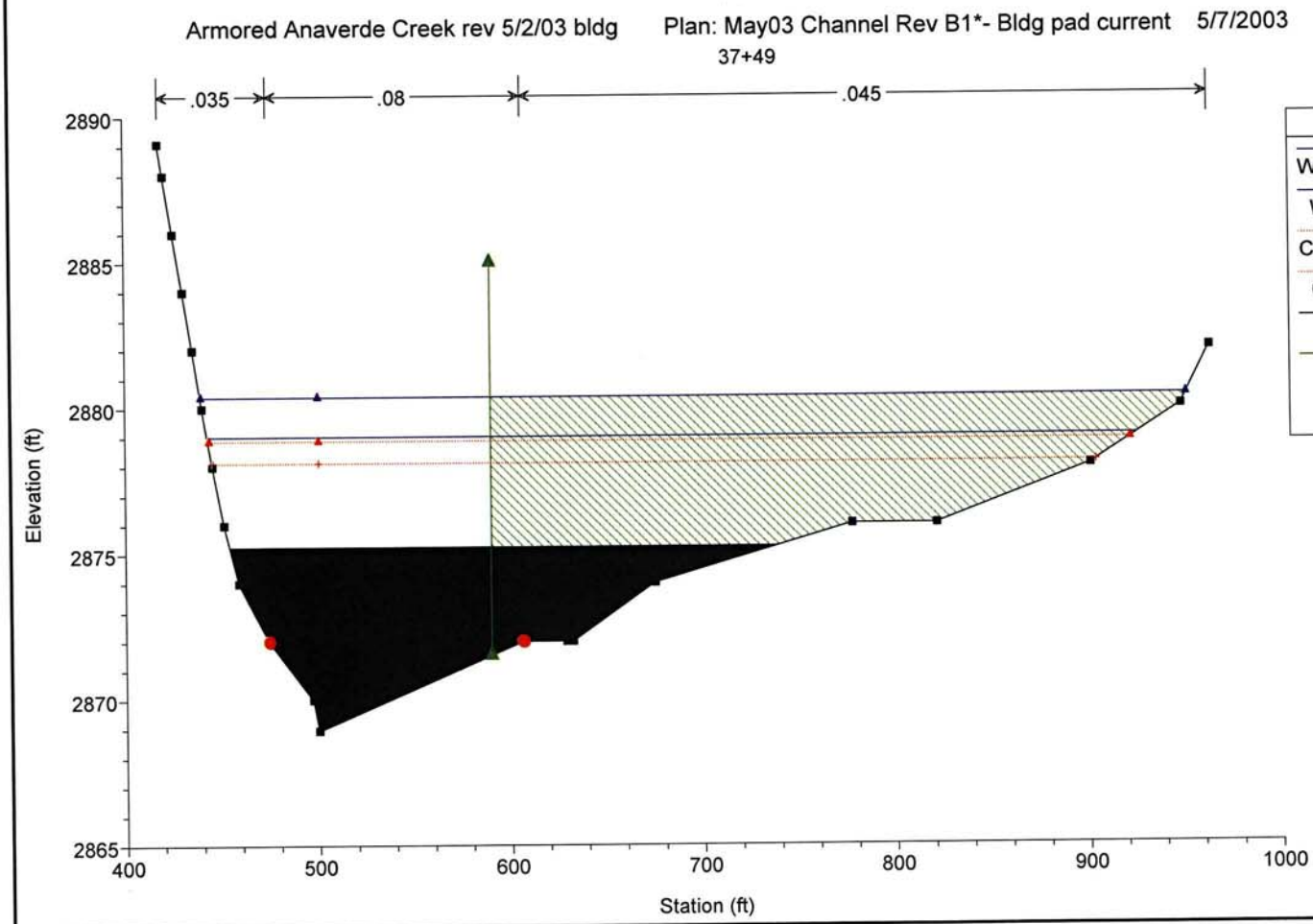

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
40+11
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
2870
900
950
1000
1050
1100
1150
1200

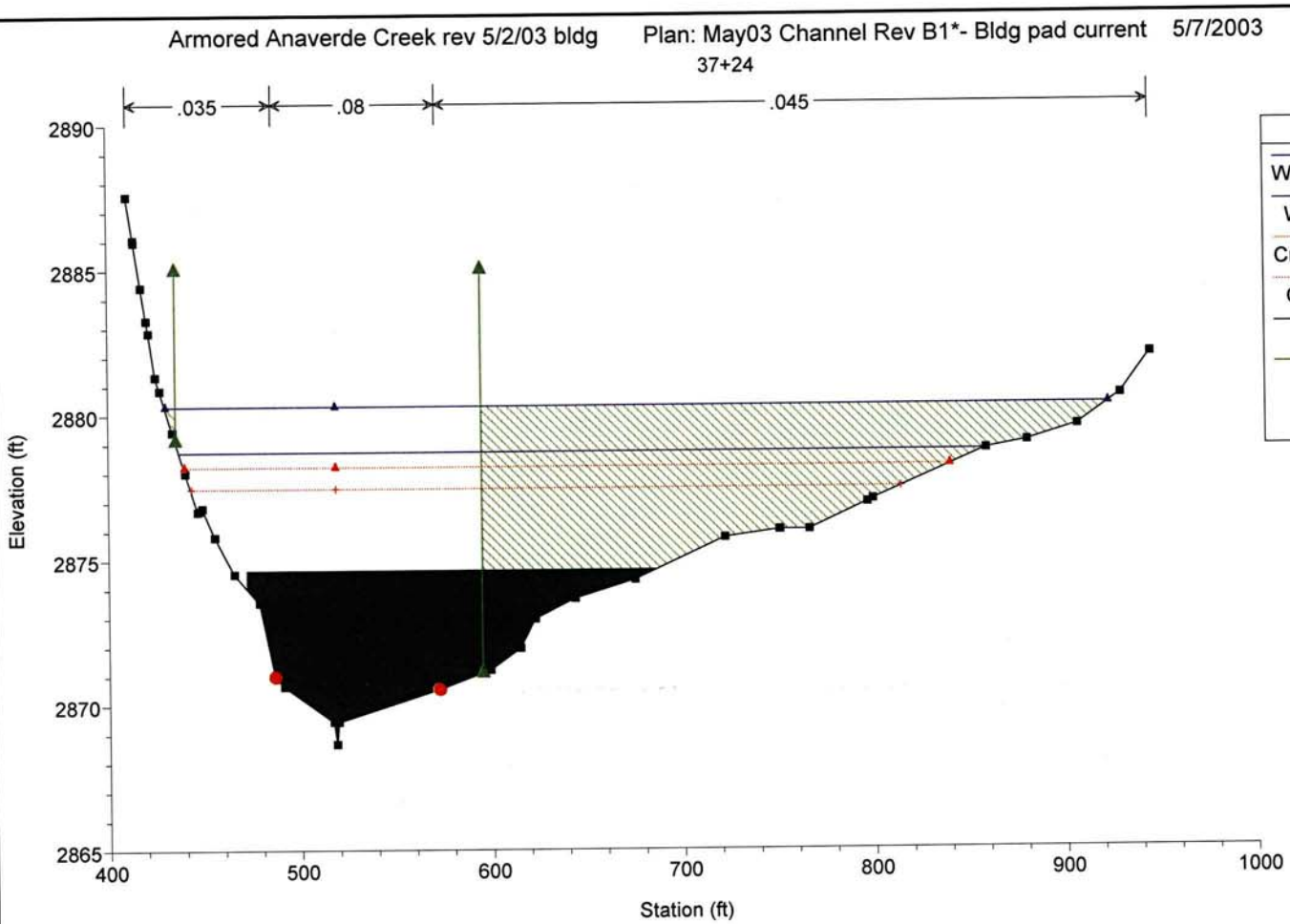

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
39+36
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
2870
400
450
500
550
600

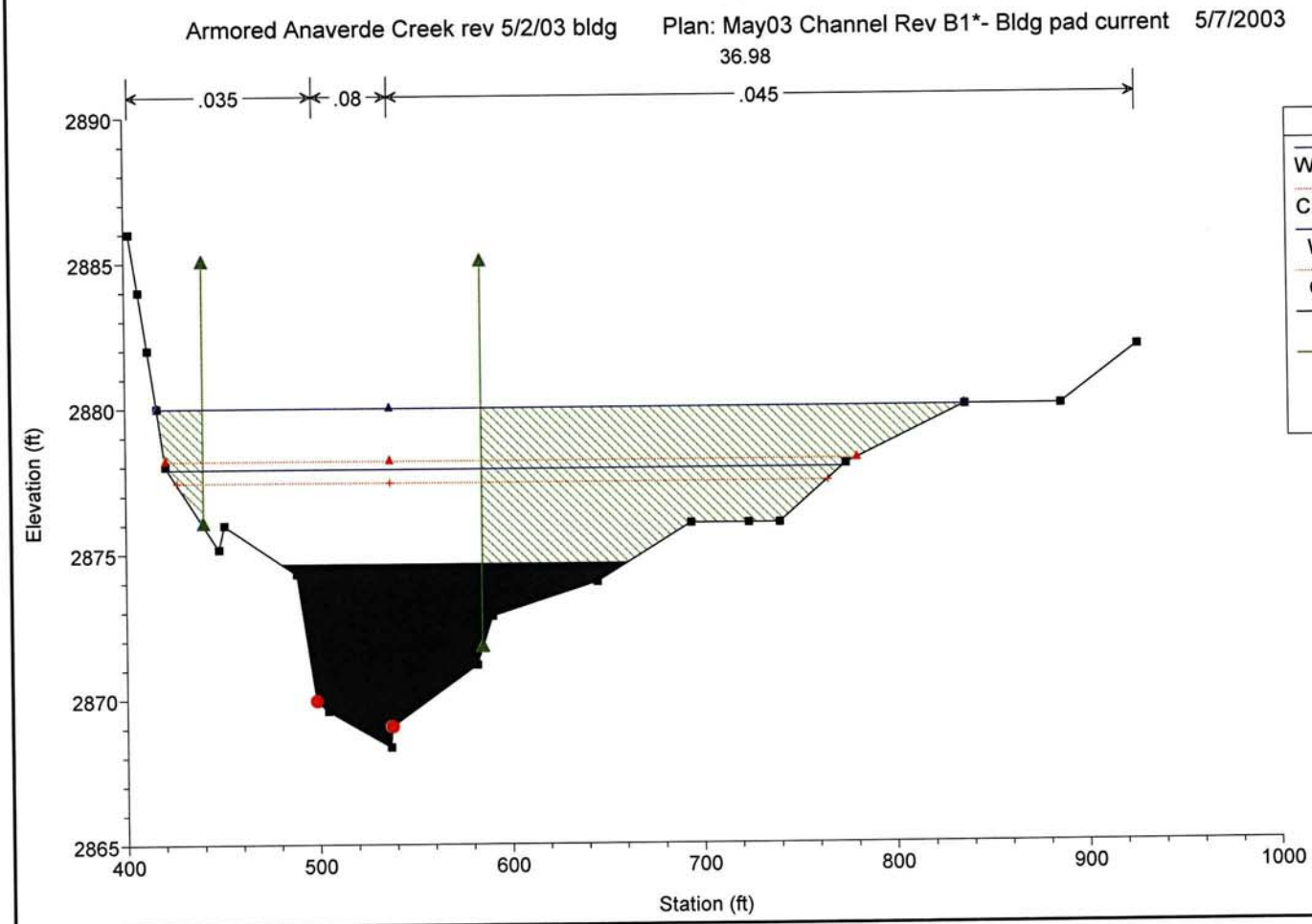

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
38+91
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

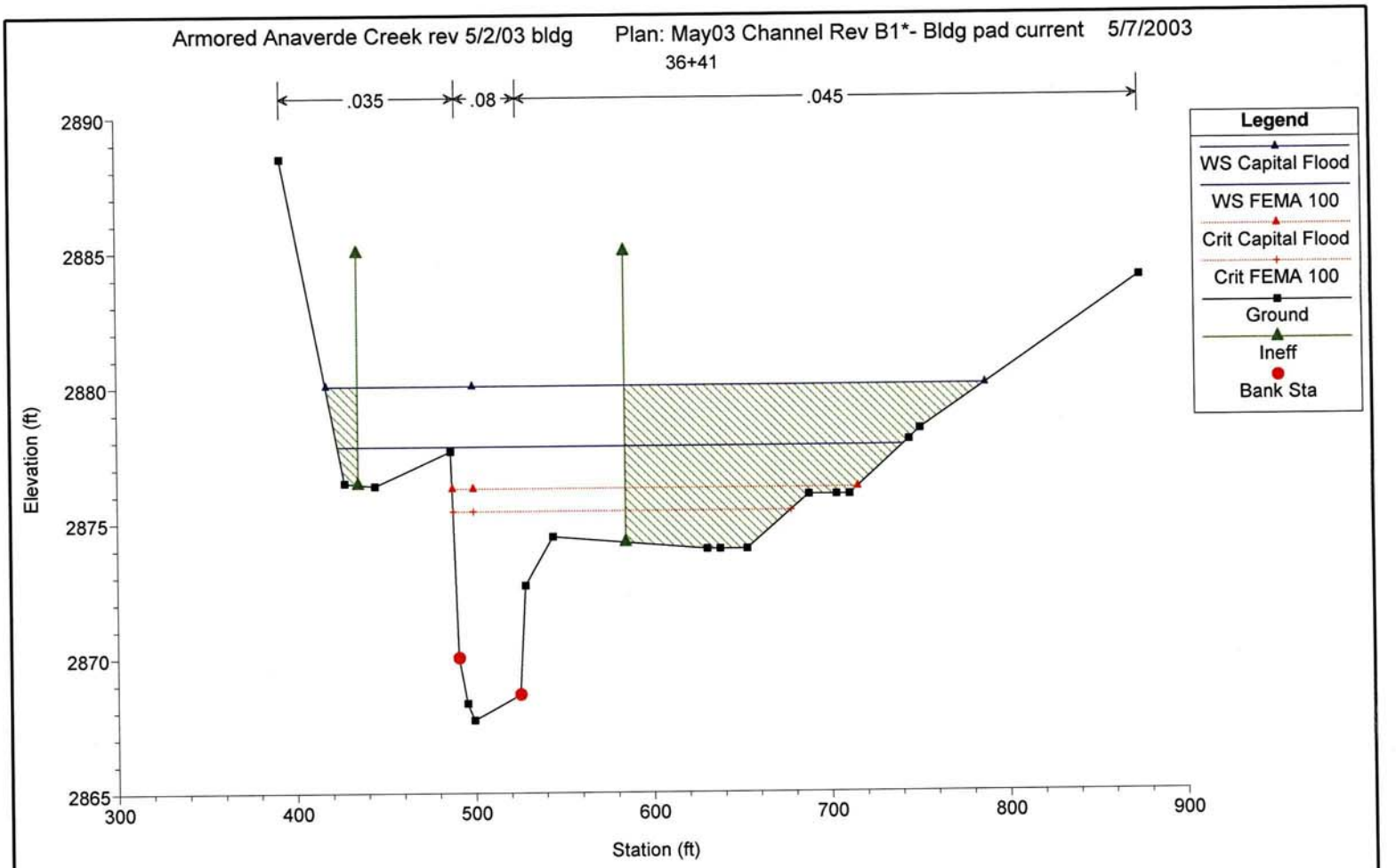

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
38+24
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

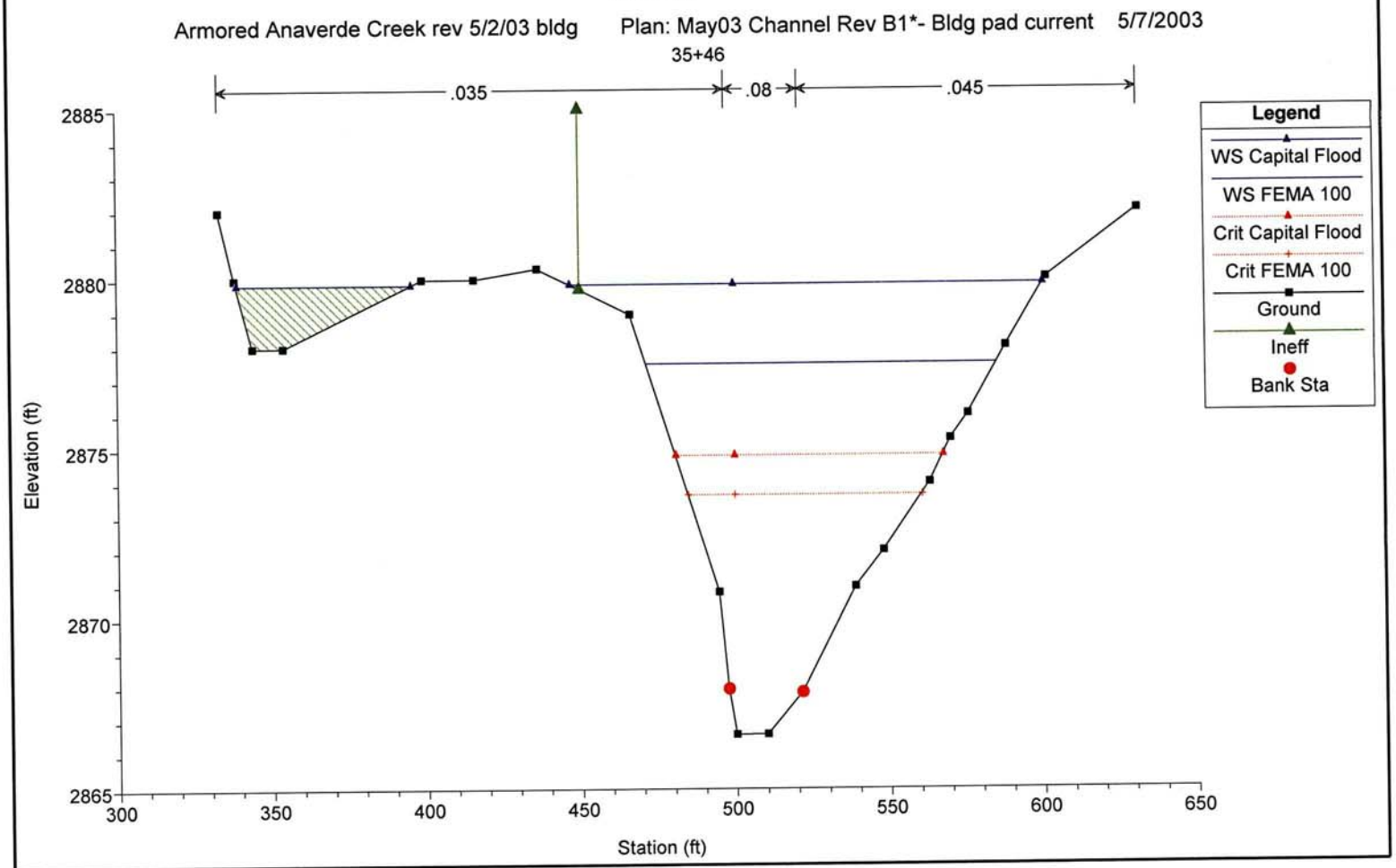

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
37+89
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

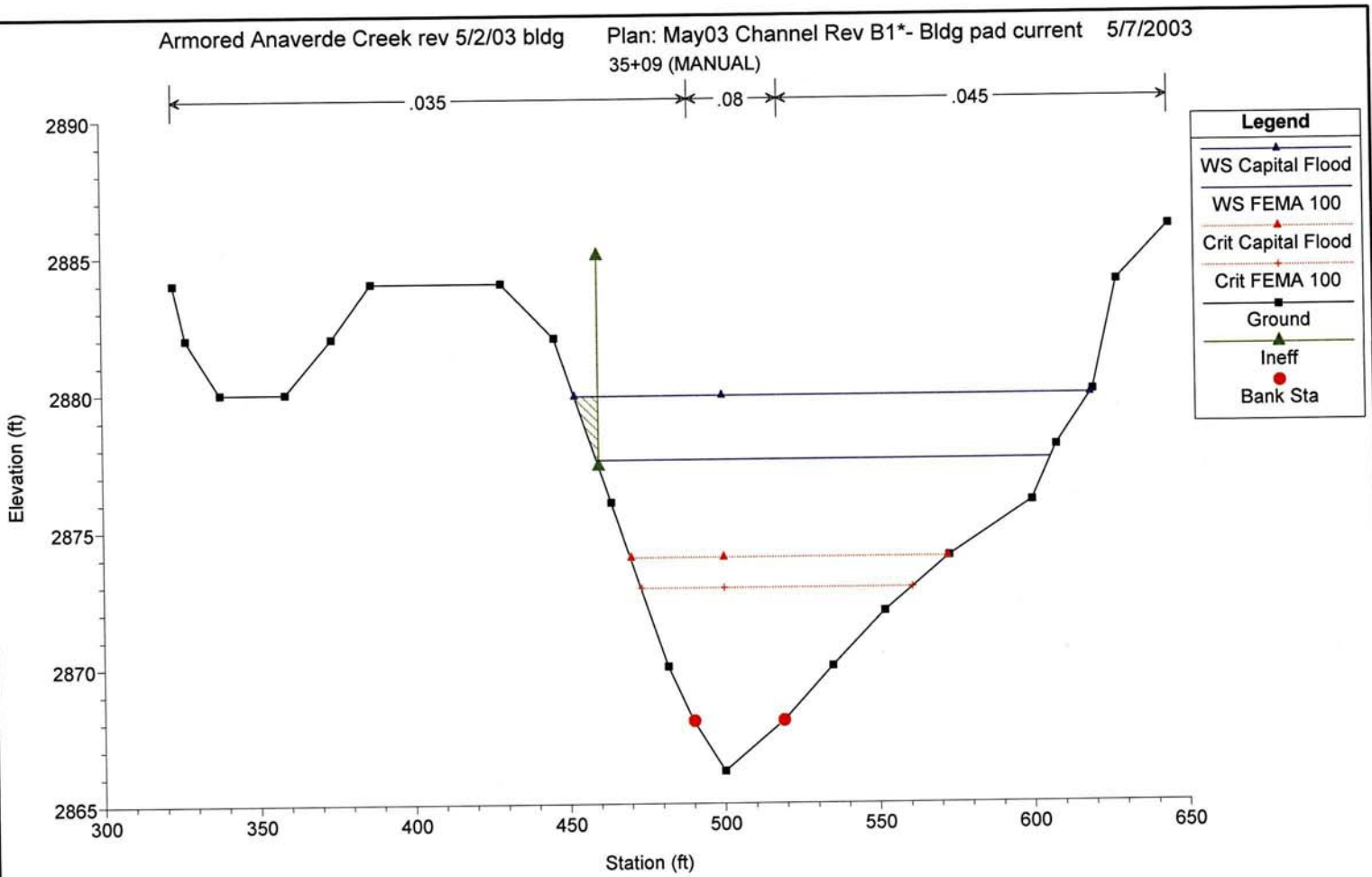

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
37+49
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

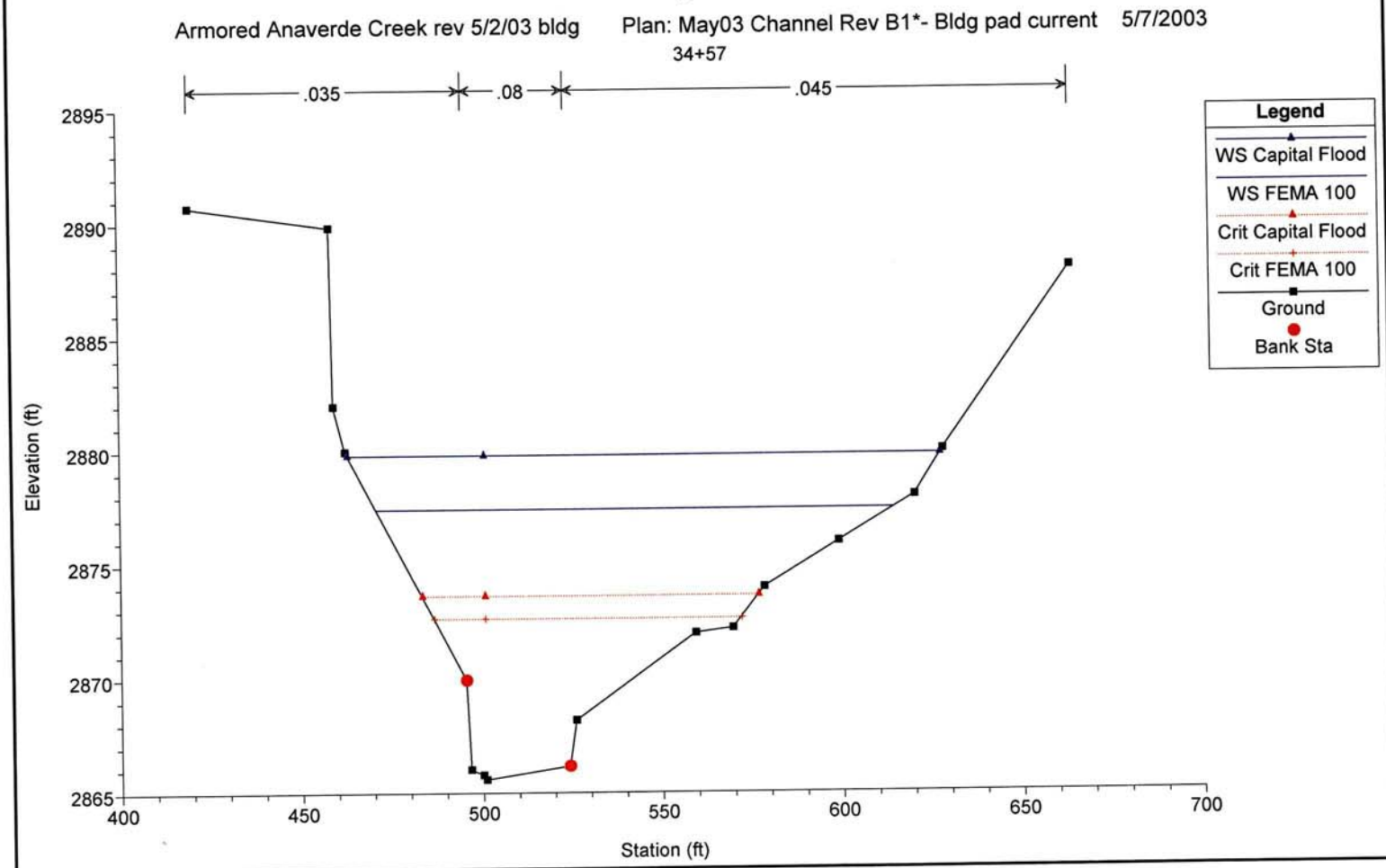

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
37+24
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

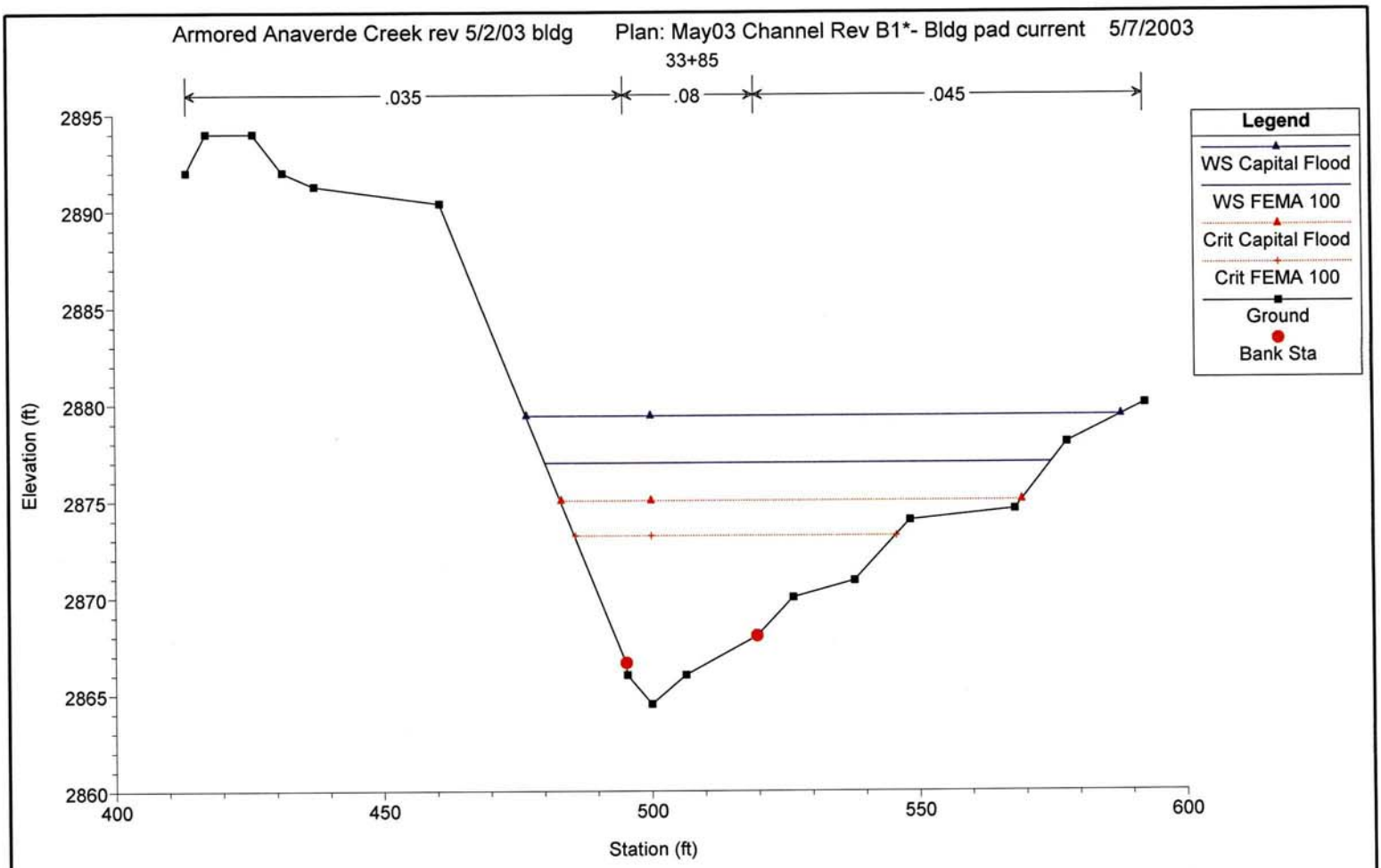

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
36.98
.035
.08
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

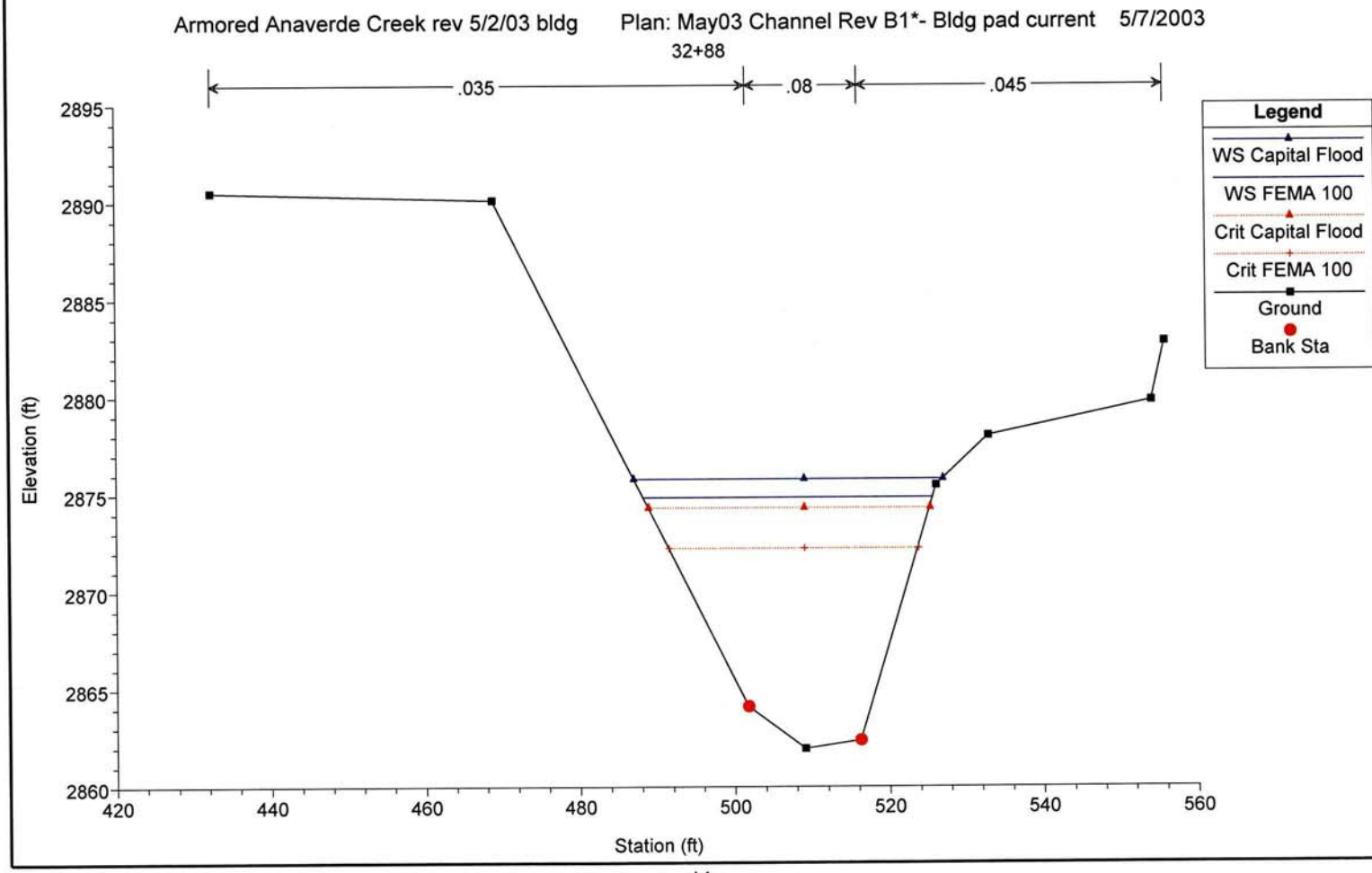

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
36+41
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
300
400
500
600
700
800
900

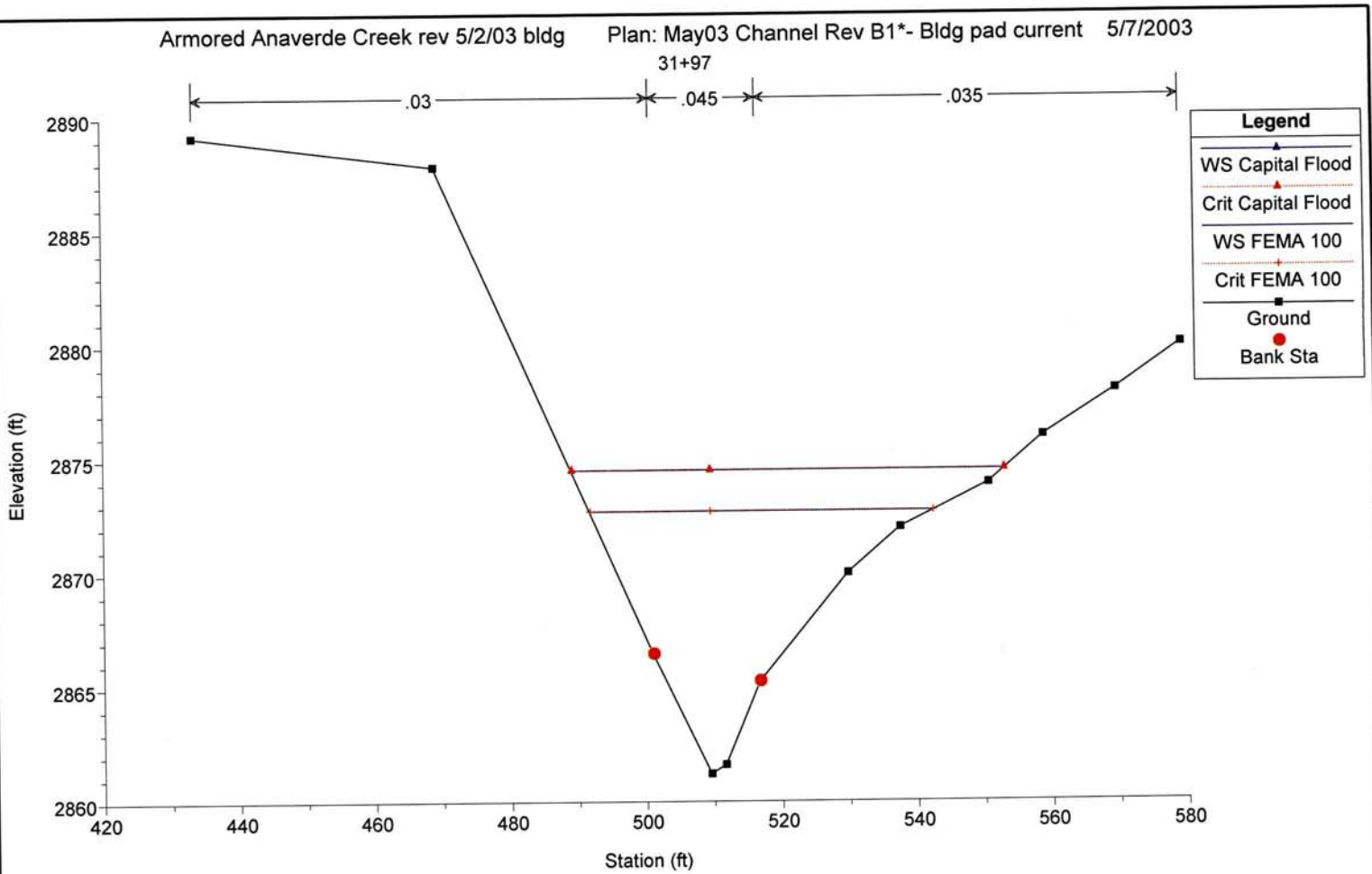

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
35+46
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2885
2880
2875
2870
2865
300
350
400
450
500
550
600
650

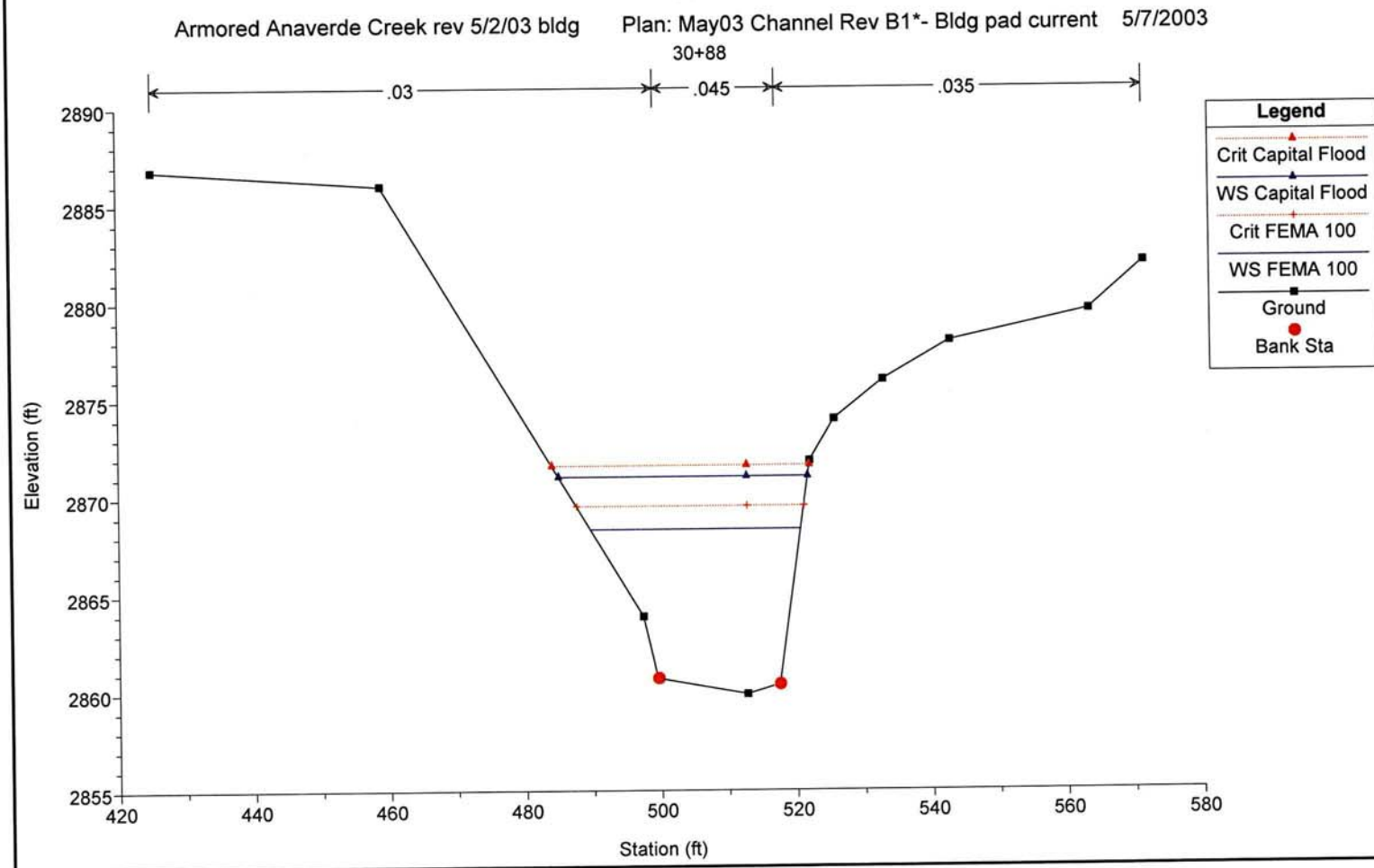

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
35+09 (MANUAL)
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

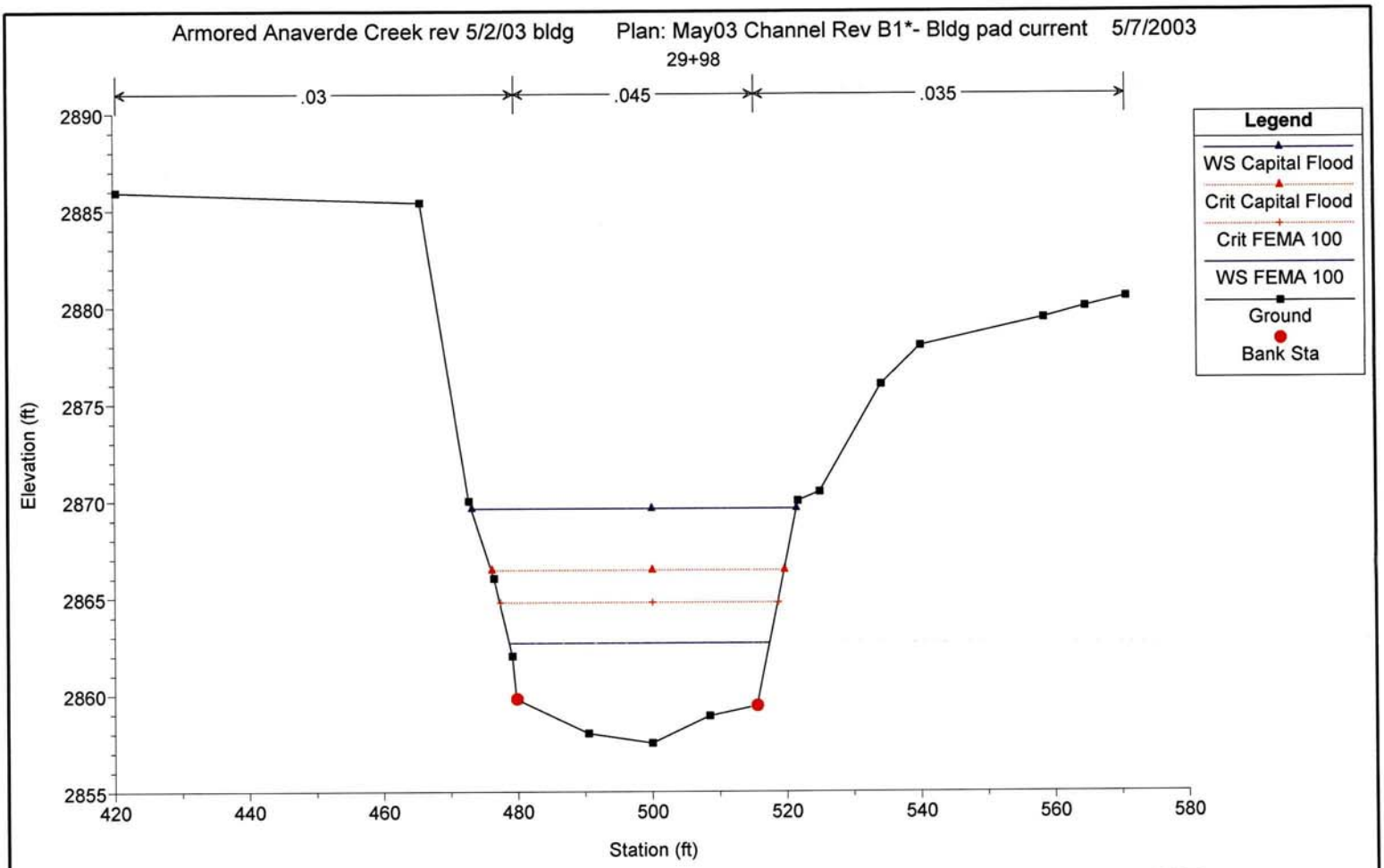

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
34+57
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

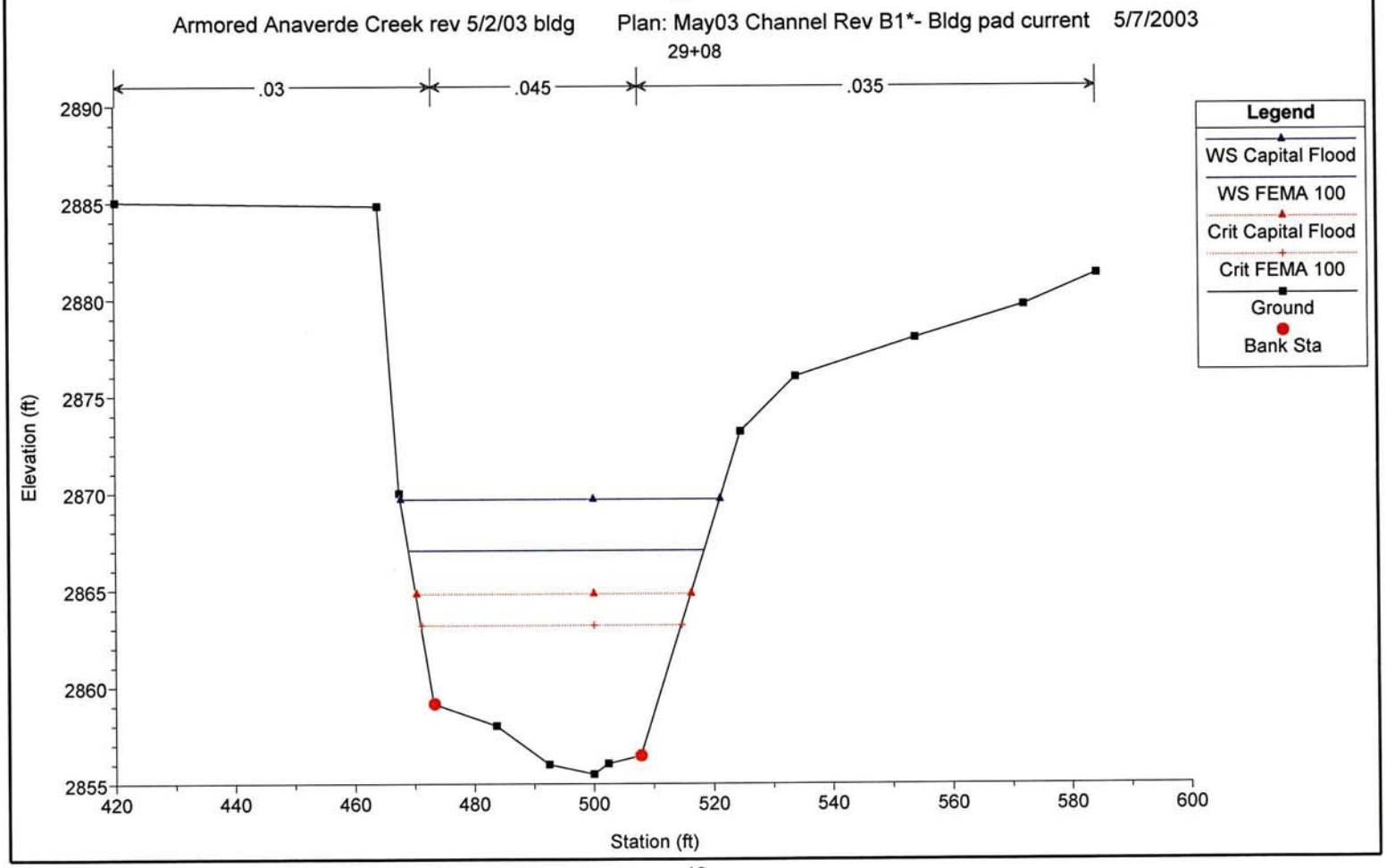

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
33+85
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
2865
2860
400
450
500
550
600

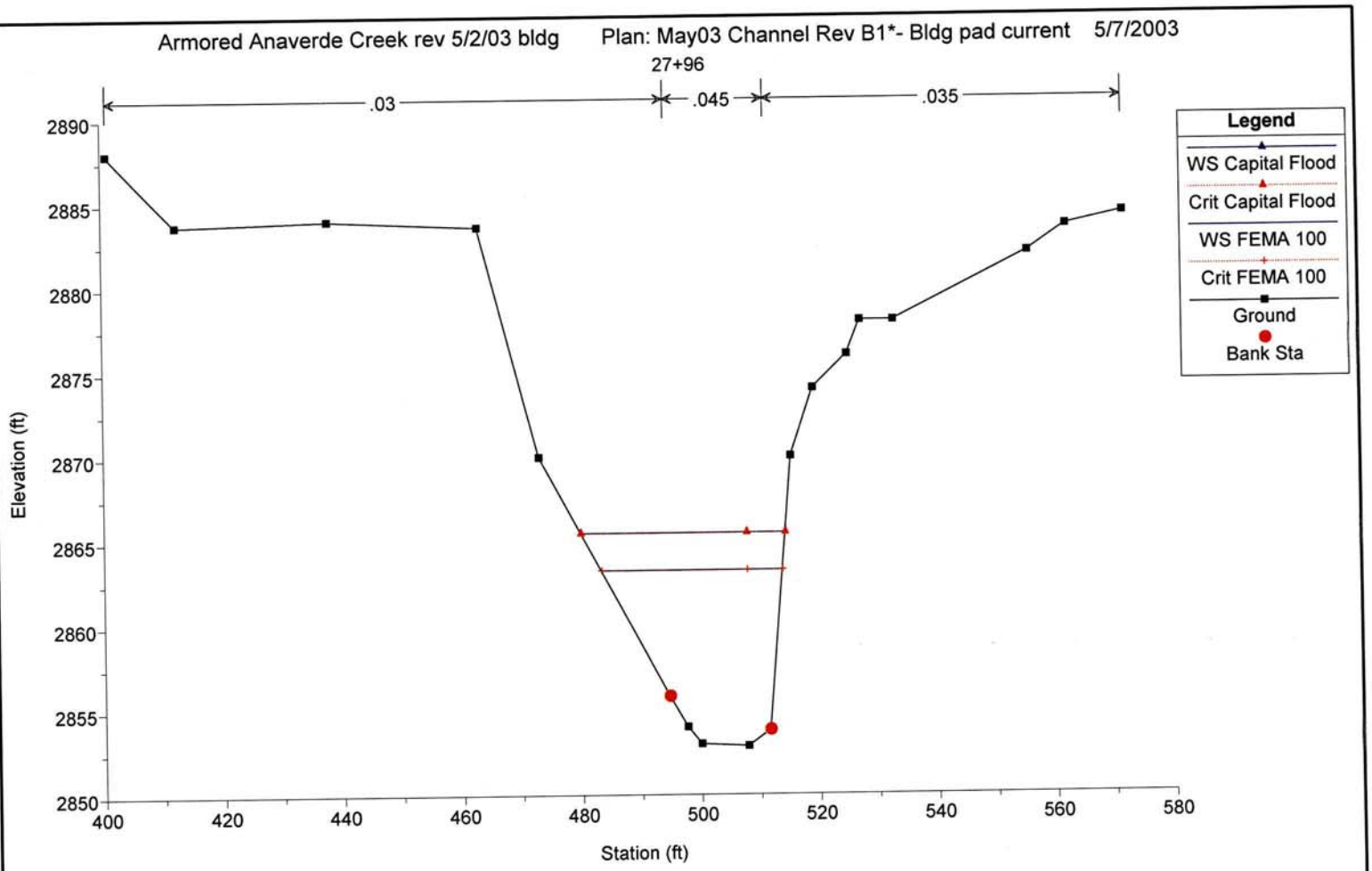

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
32+88
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
2865
2860
420
440
460
480
500
520
540
560

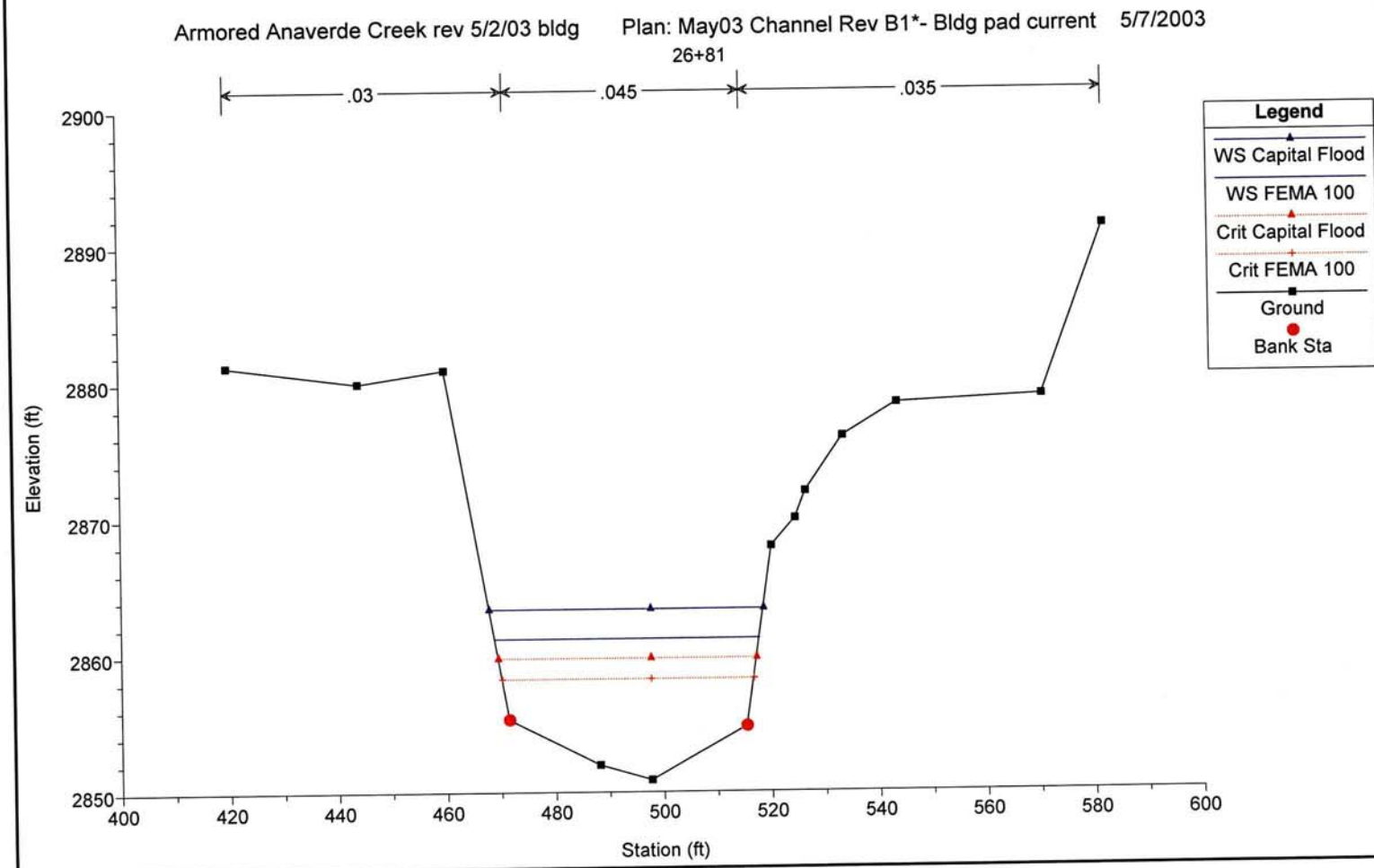

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
31+97
.03
.045
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
2860
420
440
460
480
500
520
540
560
580

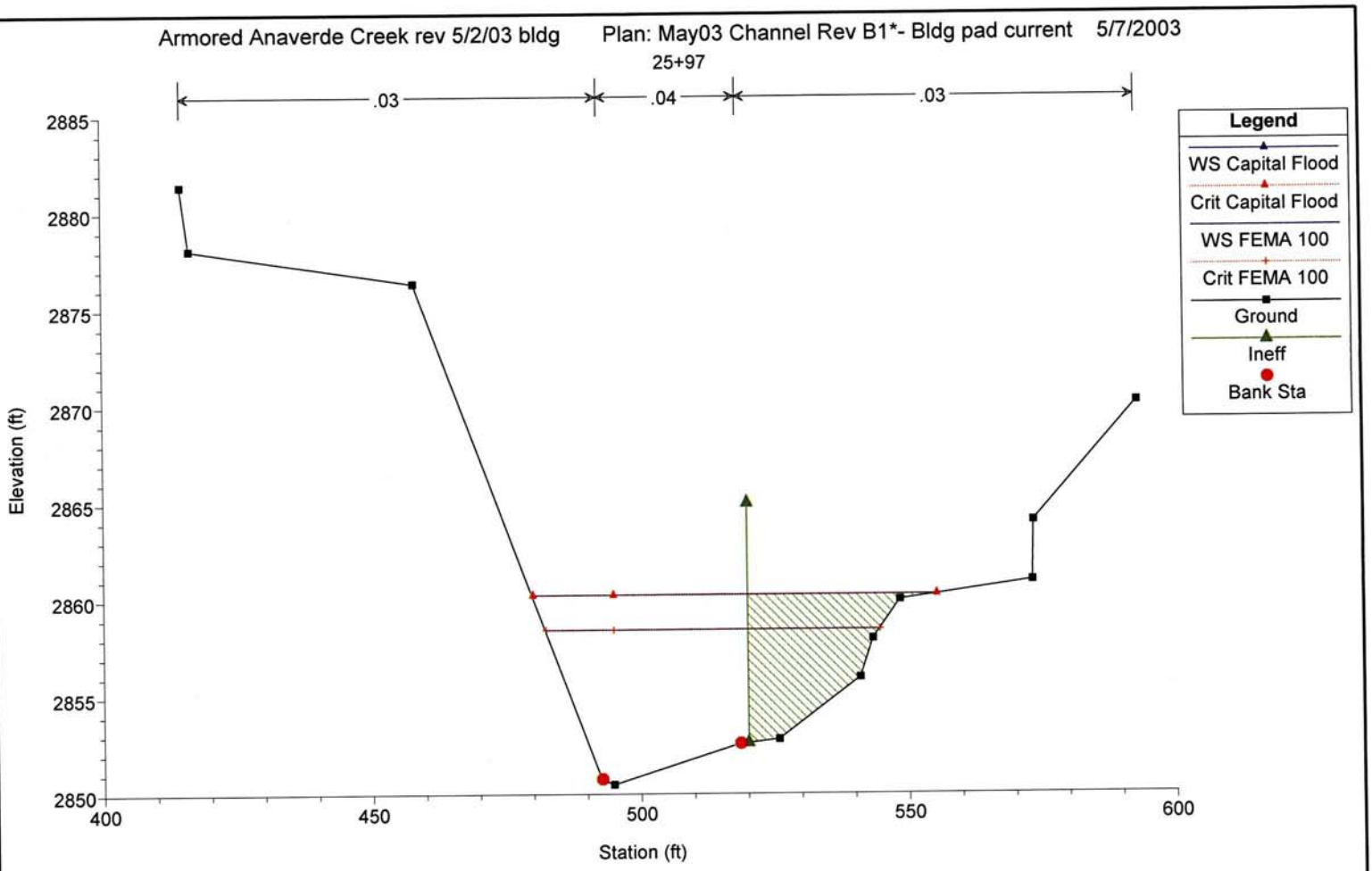

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
30+88
.03
.045
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
2860
2855
420
440
460
480
500
520
540
560
580

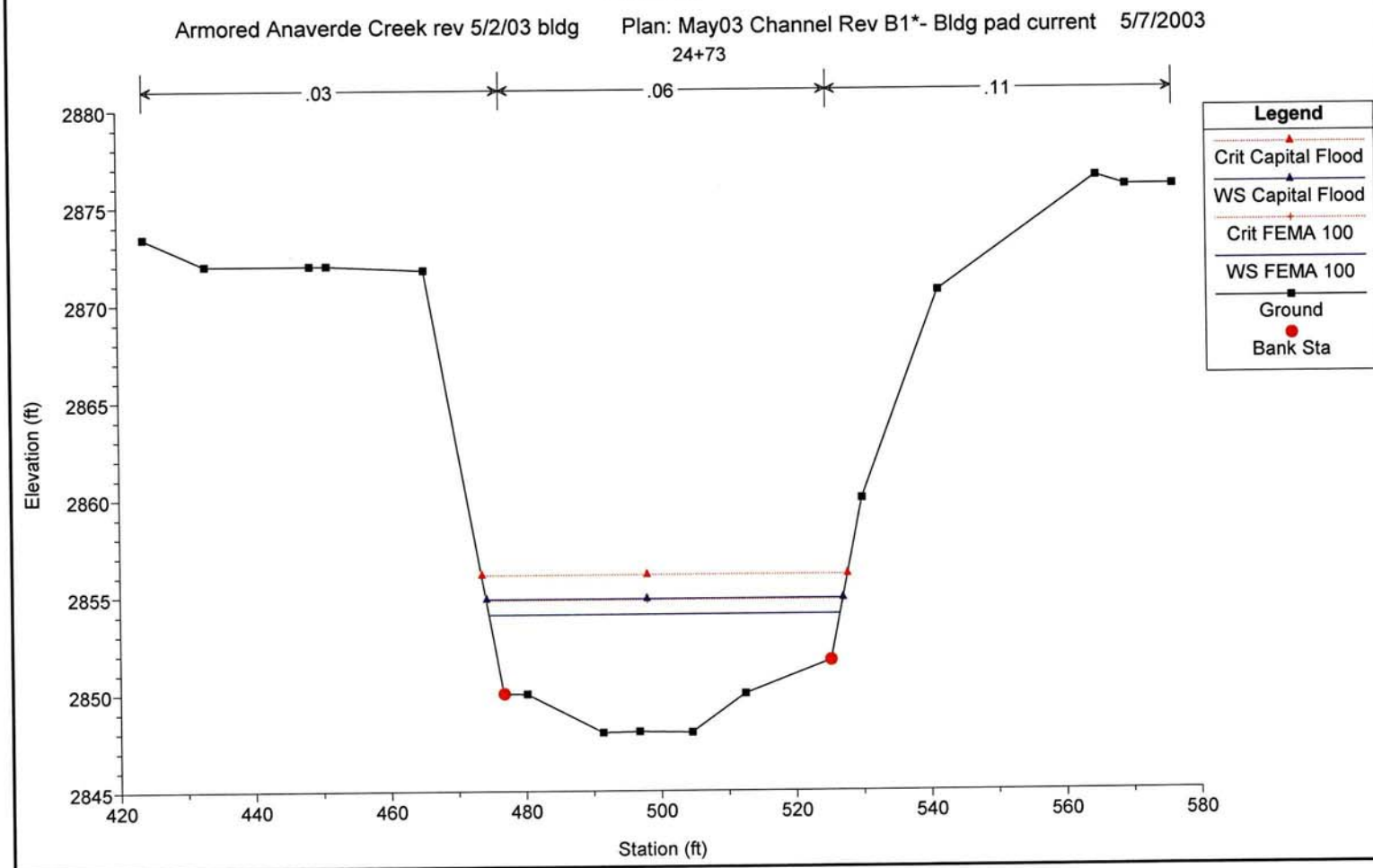

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
29+98
.03
.045
.035
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
29+08
.03
.045
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
27+96
.03
.045
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

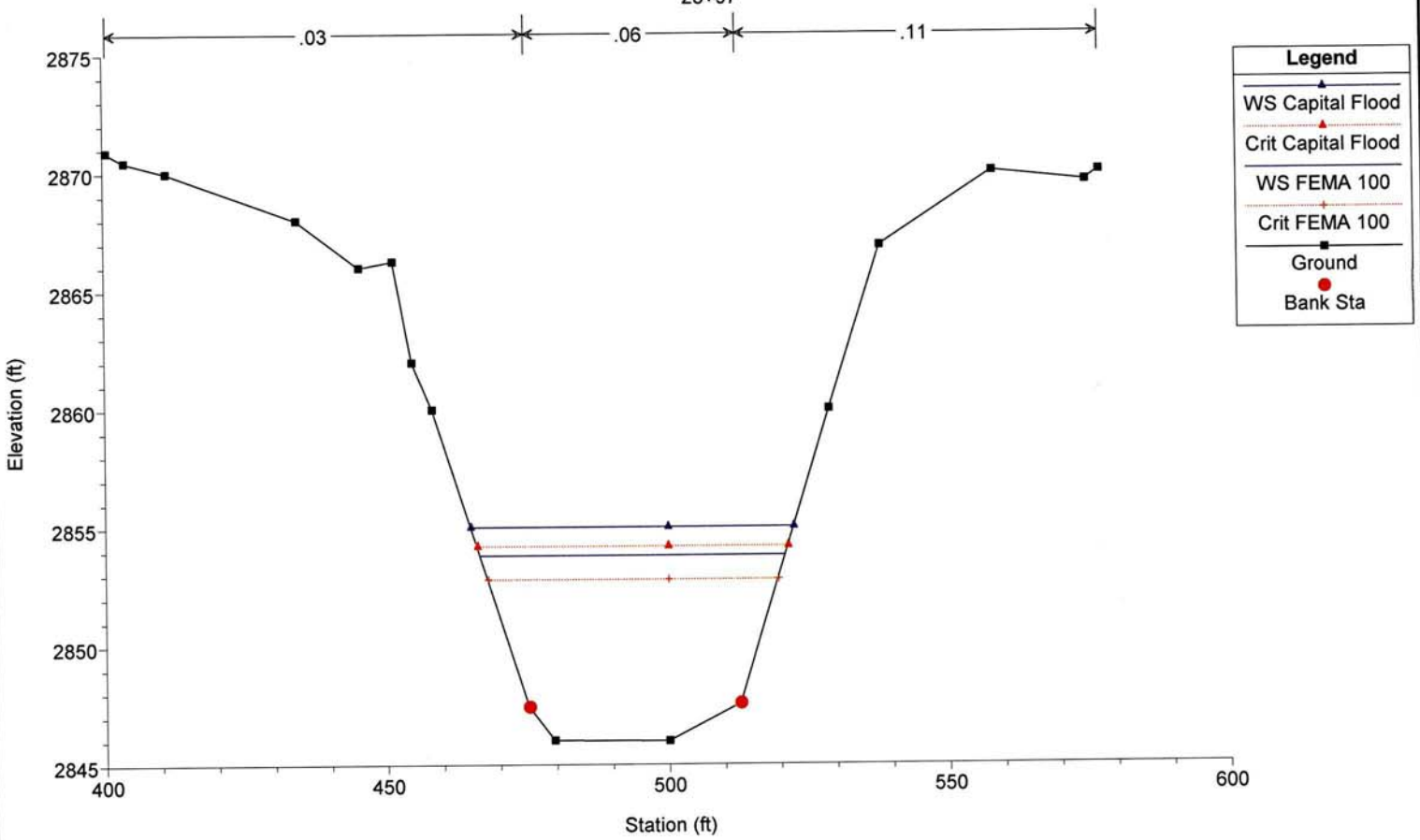

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
26+81
.03
.045
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
25+97
.03
.04
.03
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2885
2880
2875
2870
2865
2860
2855
2850
400
450
500
550
600


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
24+73
.03
.06
.11
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2880
2875
2870
2865
2860
2855
2850
2845
420
440
460
480
500
520
540
560
580

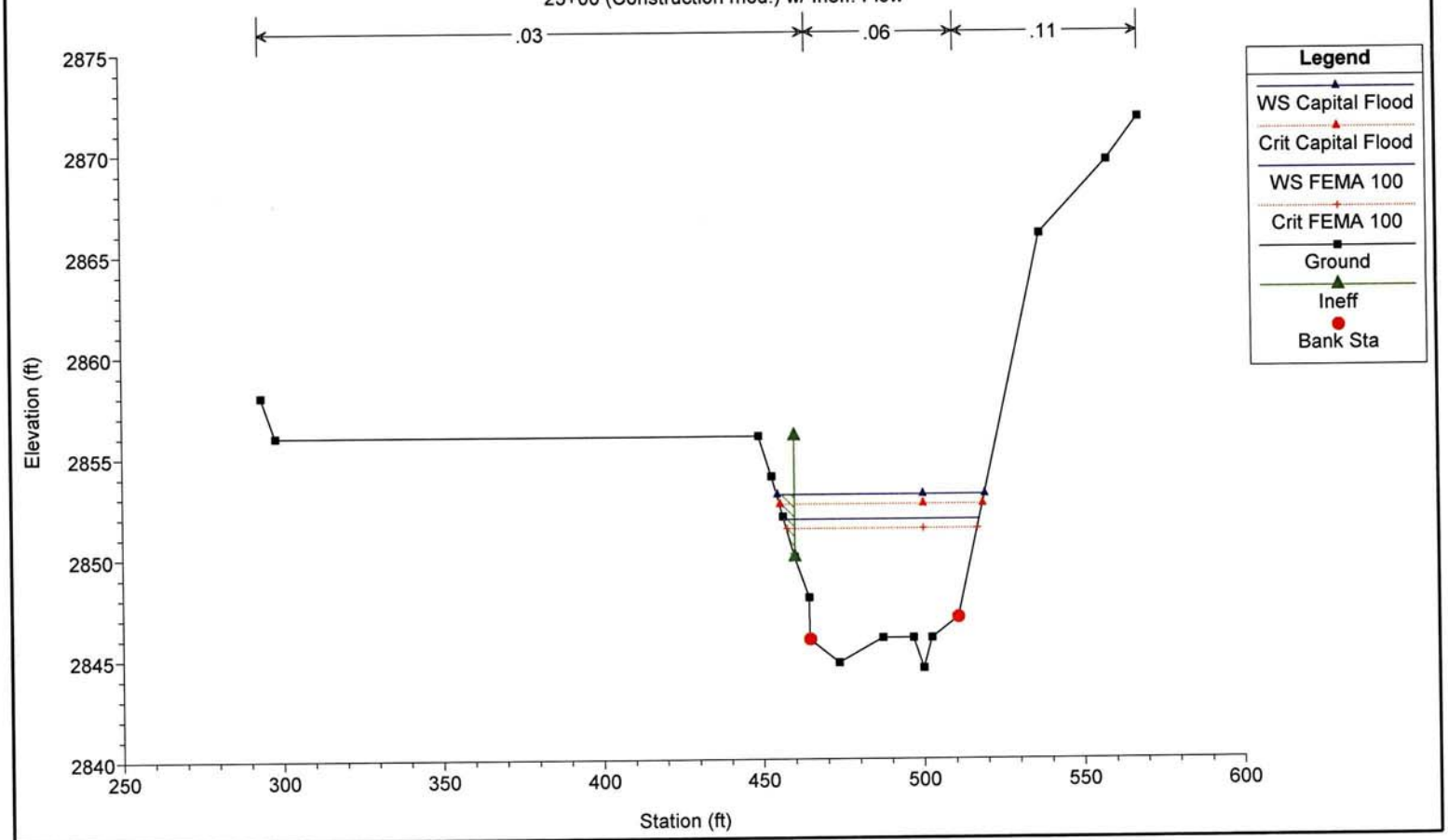
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

23+97



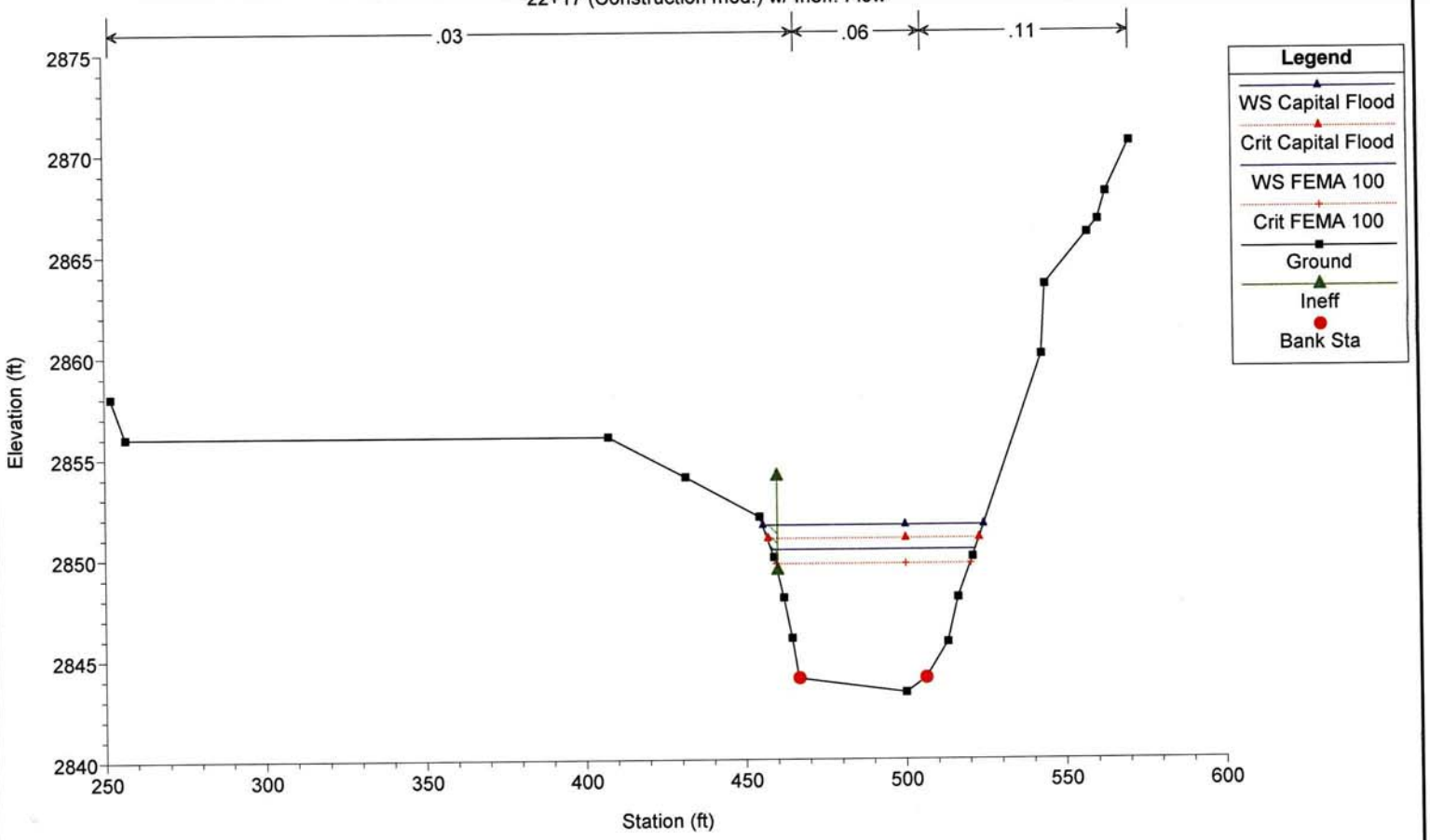
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

23+00 (Construction mod.) w/ Ineff. Flow



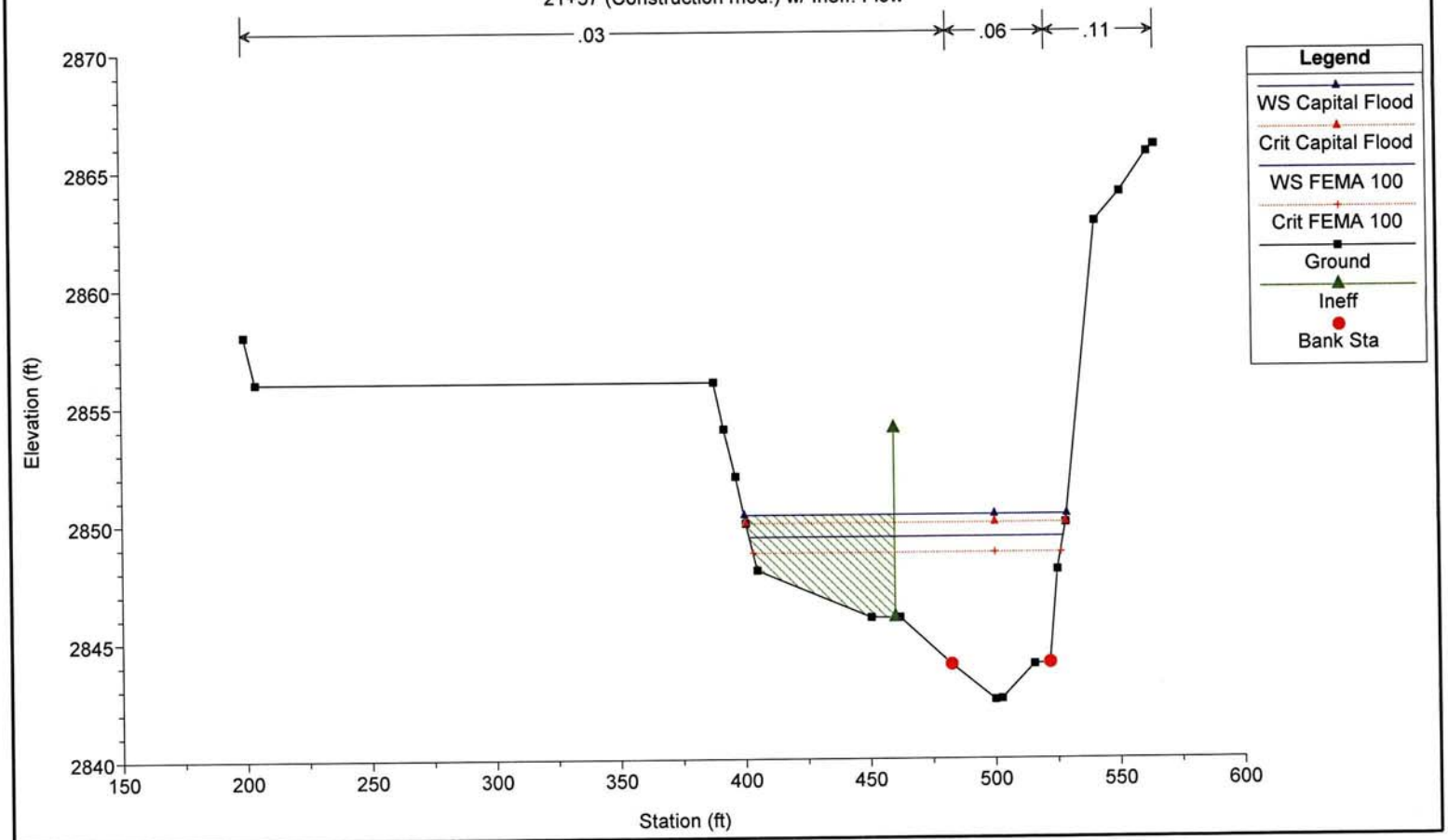
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

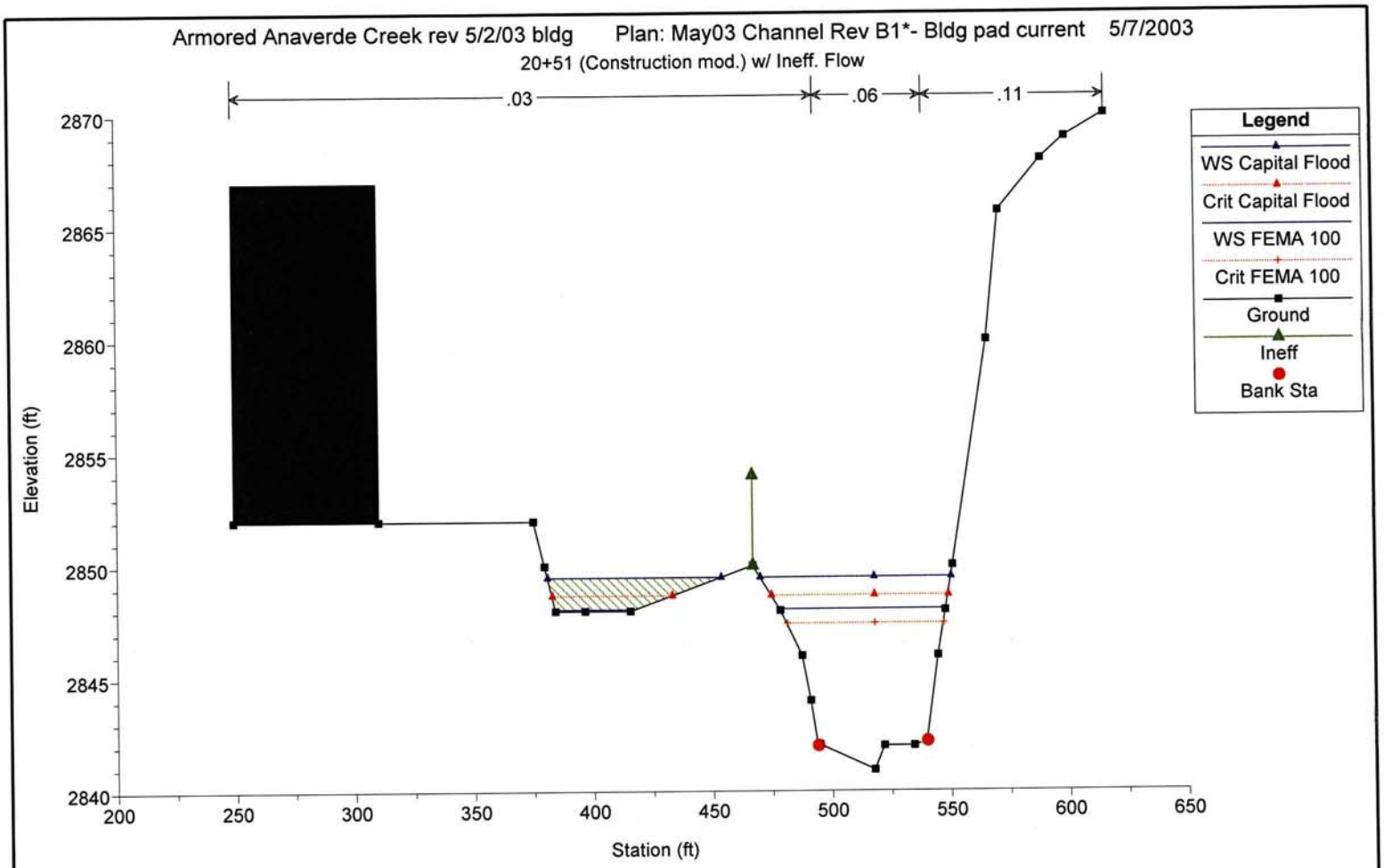
22+17 (Construction mod.) w/ Ineff. Flow

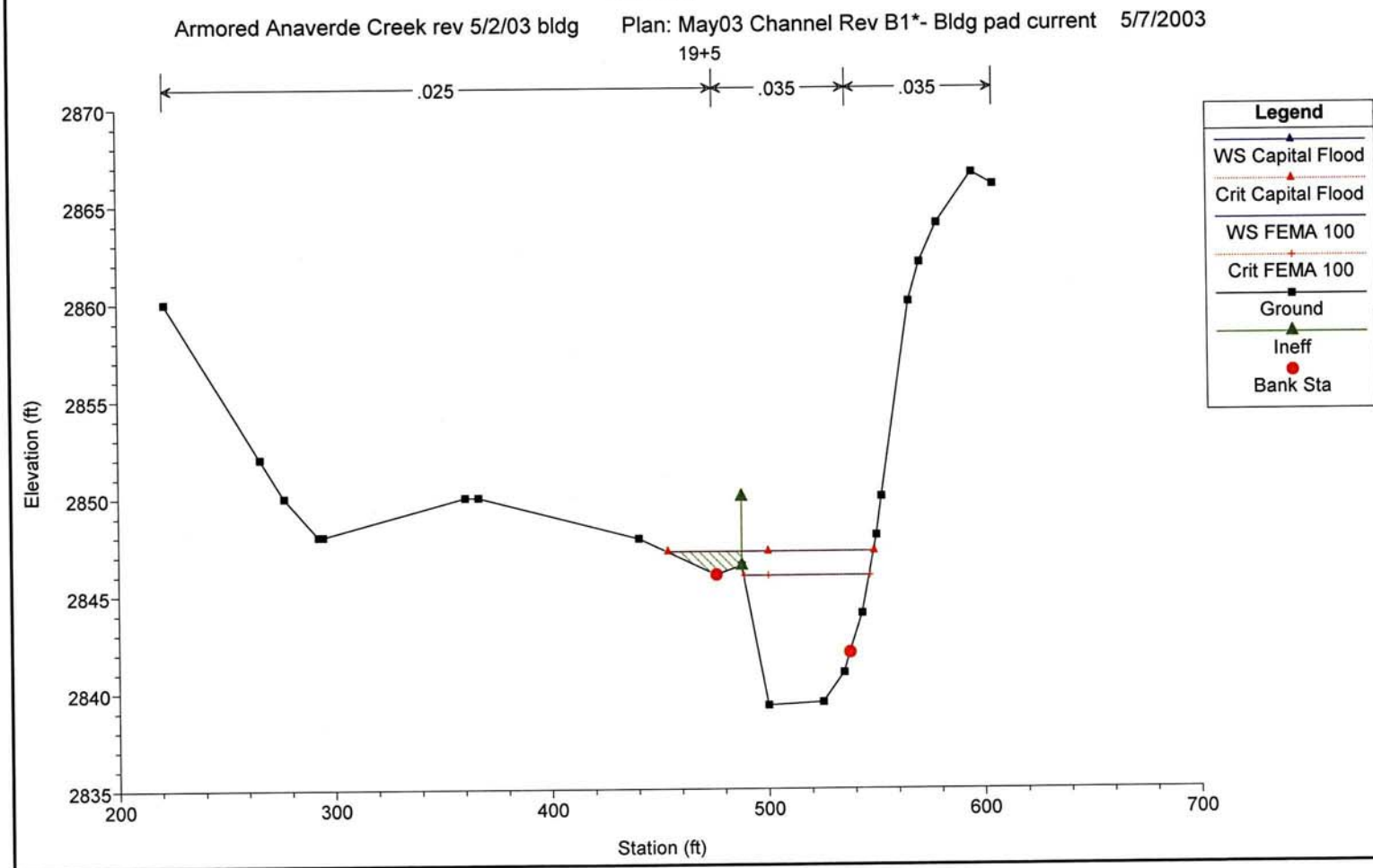


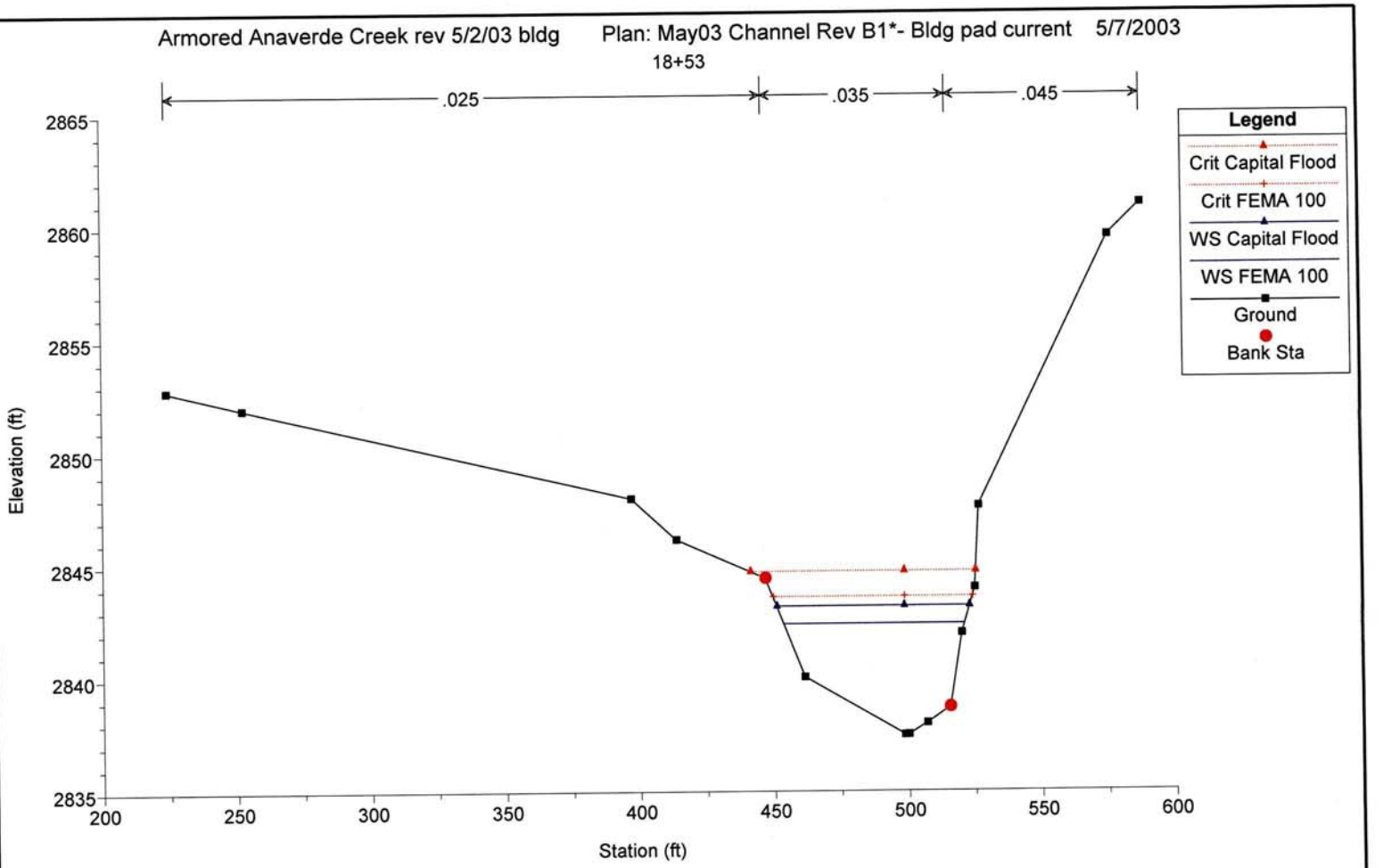
Armored Anaverde Creek rev 5/2/03 bldg Plan: May03 Channel Rev B1*- Bldg pad current 5/7/2003

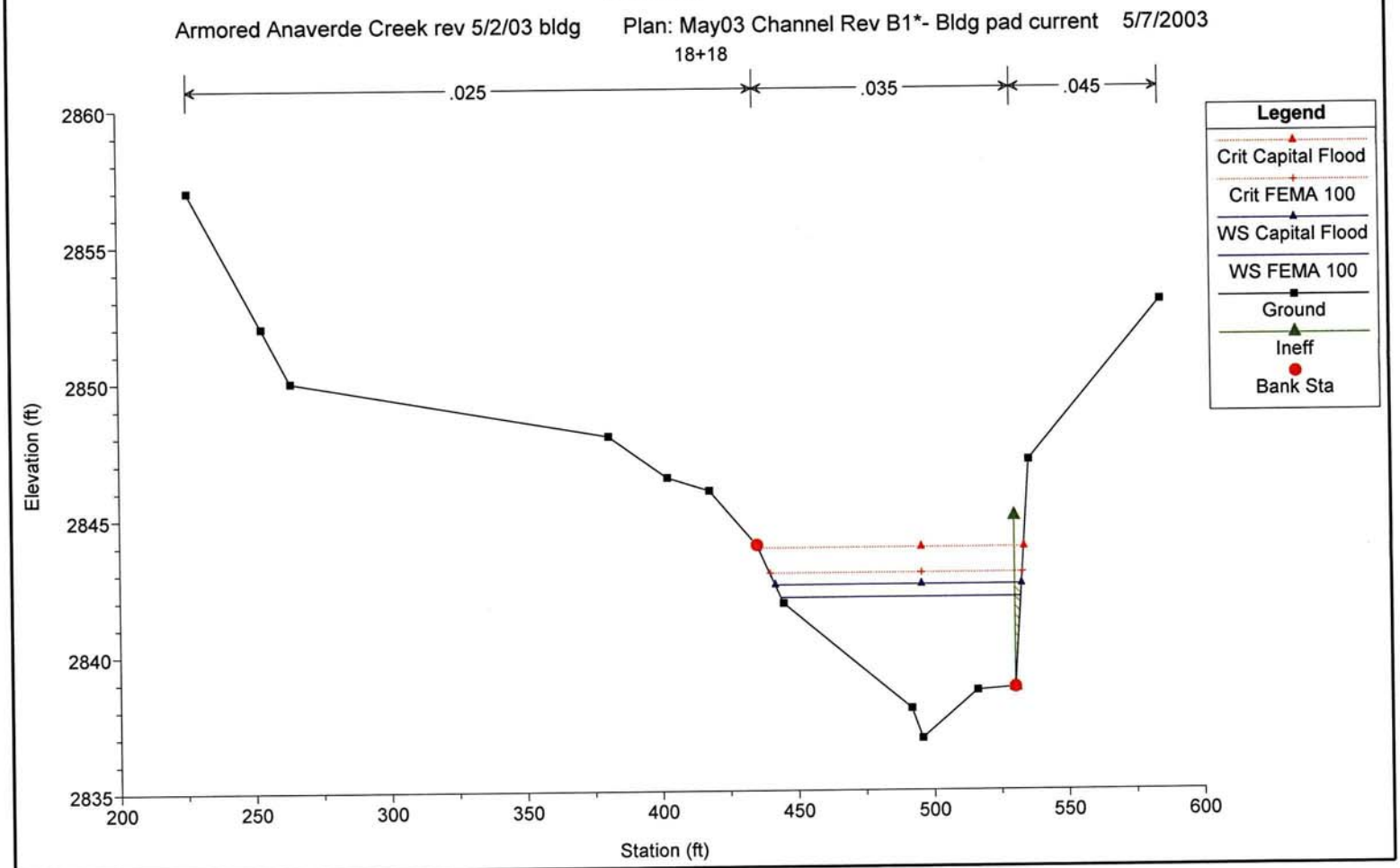
21+57 (Construction mod.) w/ Ineff. Flow

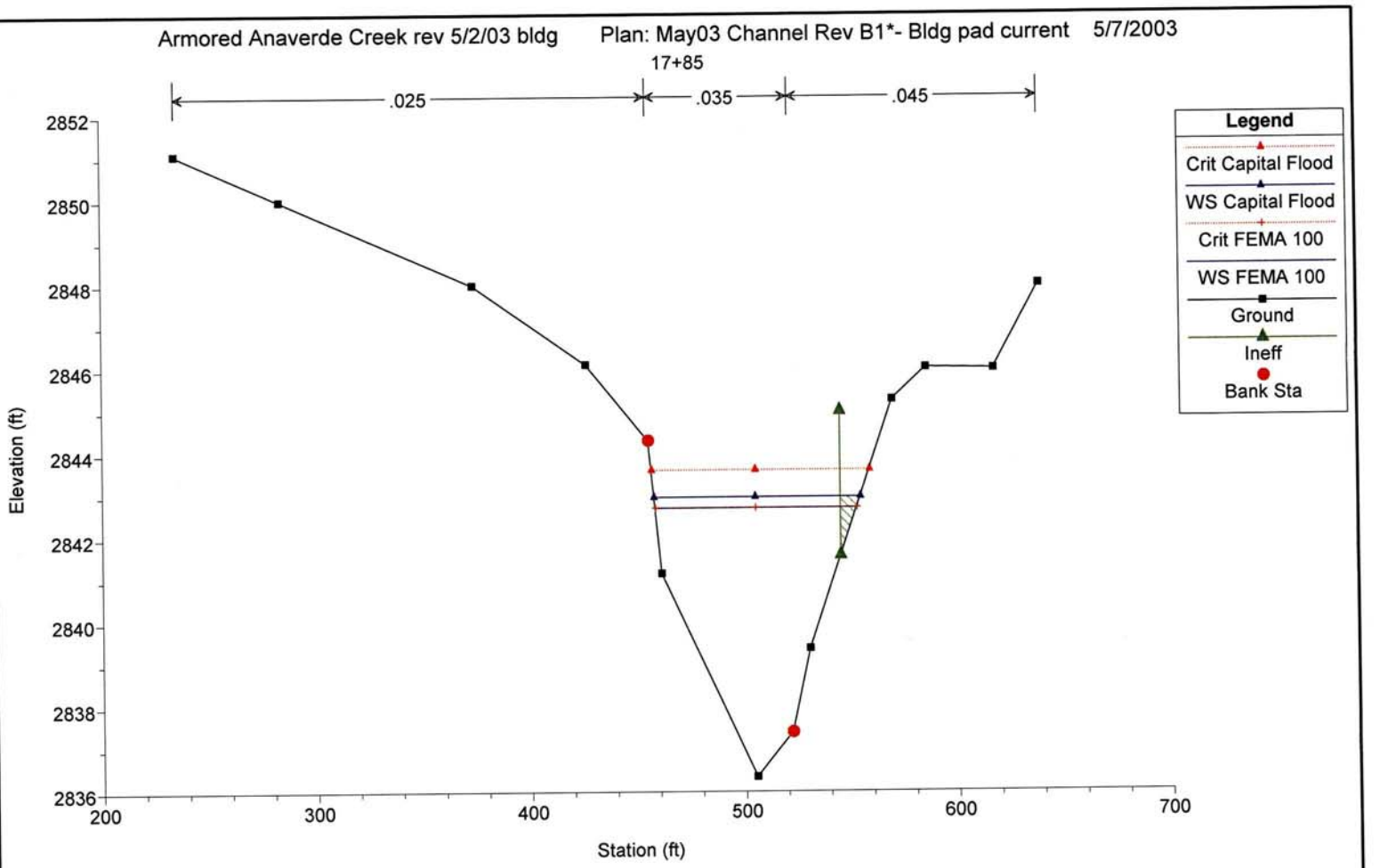


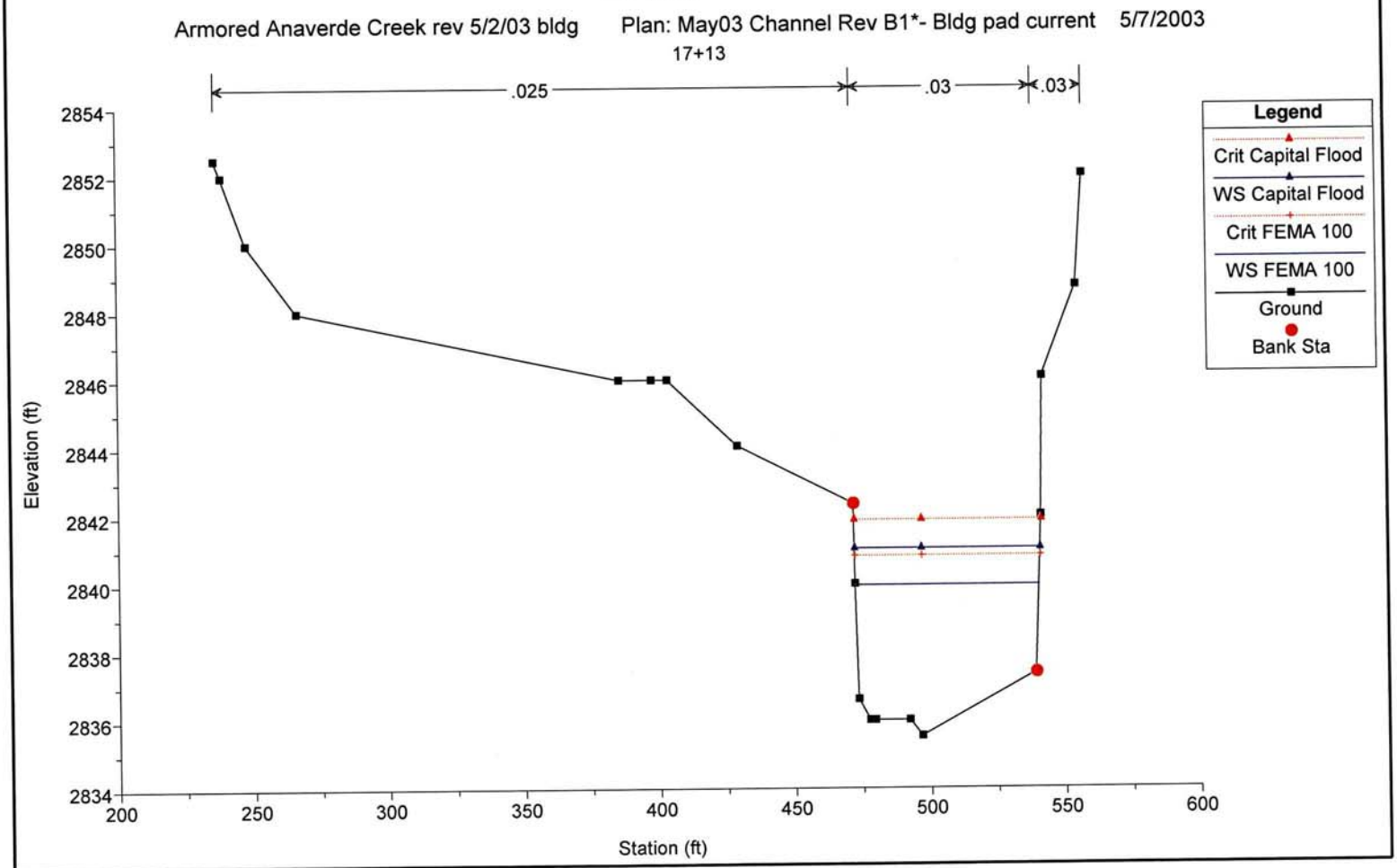

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
20+51 (Construction mod.) w/ Ineff. Flow
.03
.06
.11
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2870
2865
2860
2855
2850
2845
2840
200
250
300
350
400
450
500
550
600
650

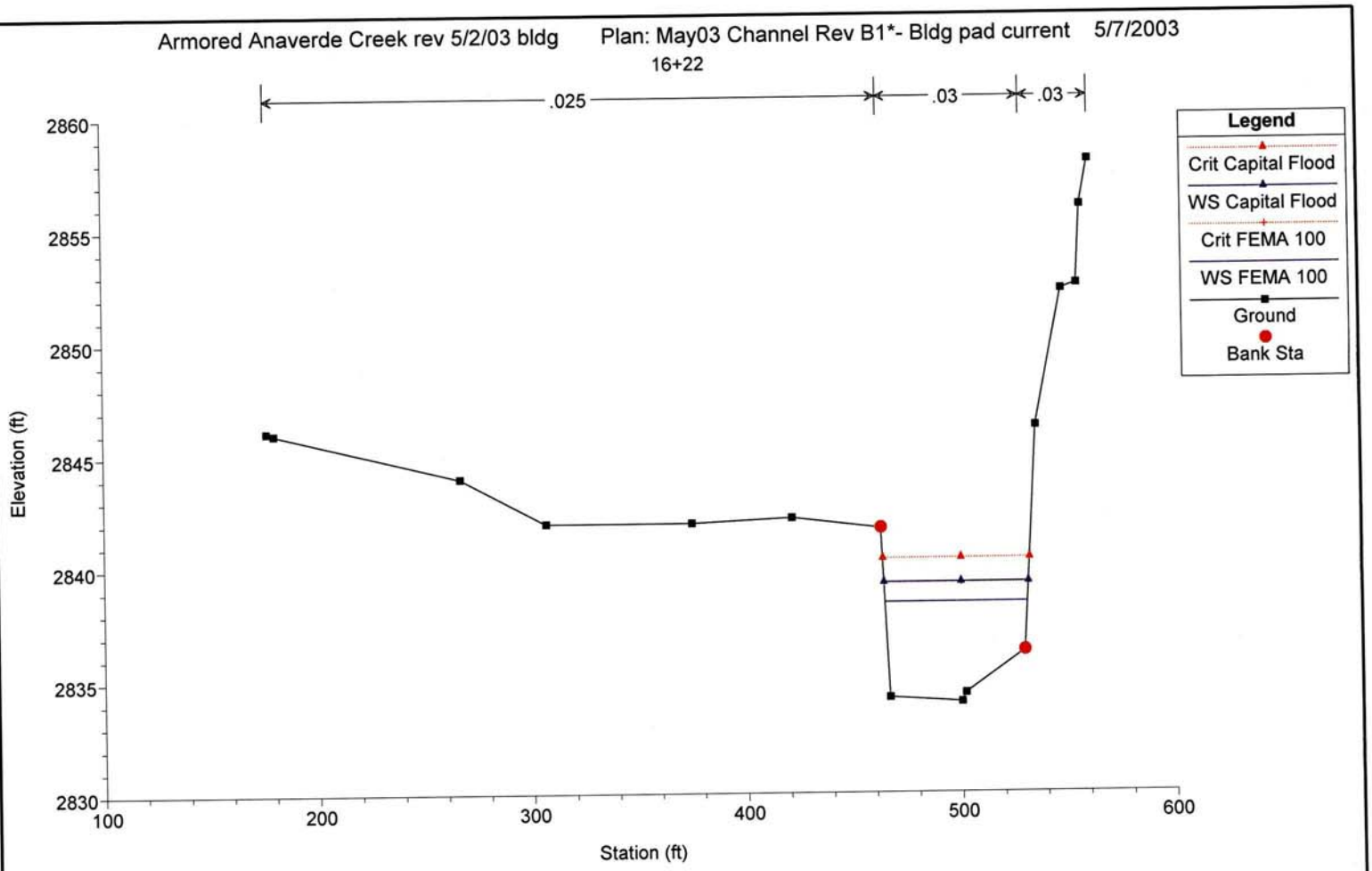

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
19+5
.025
.035
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2870
2865
2860
2855
2850
2845
2840
2835
200
300
400
500
600
700

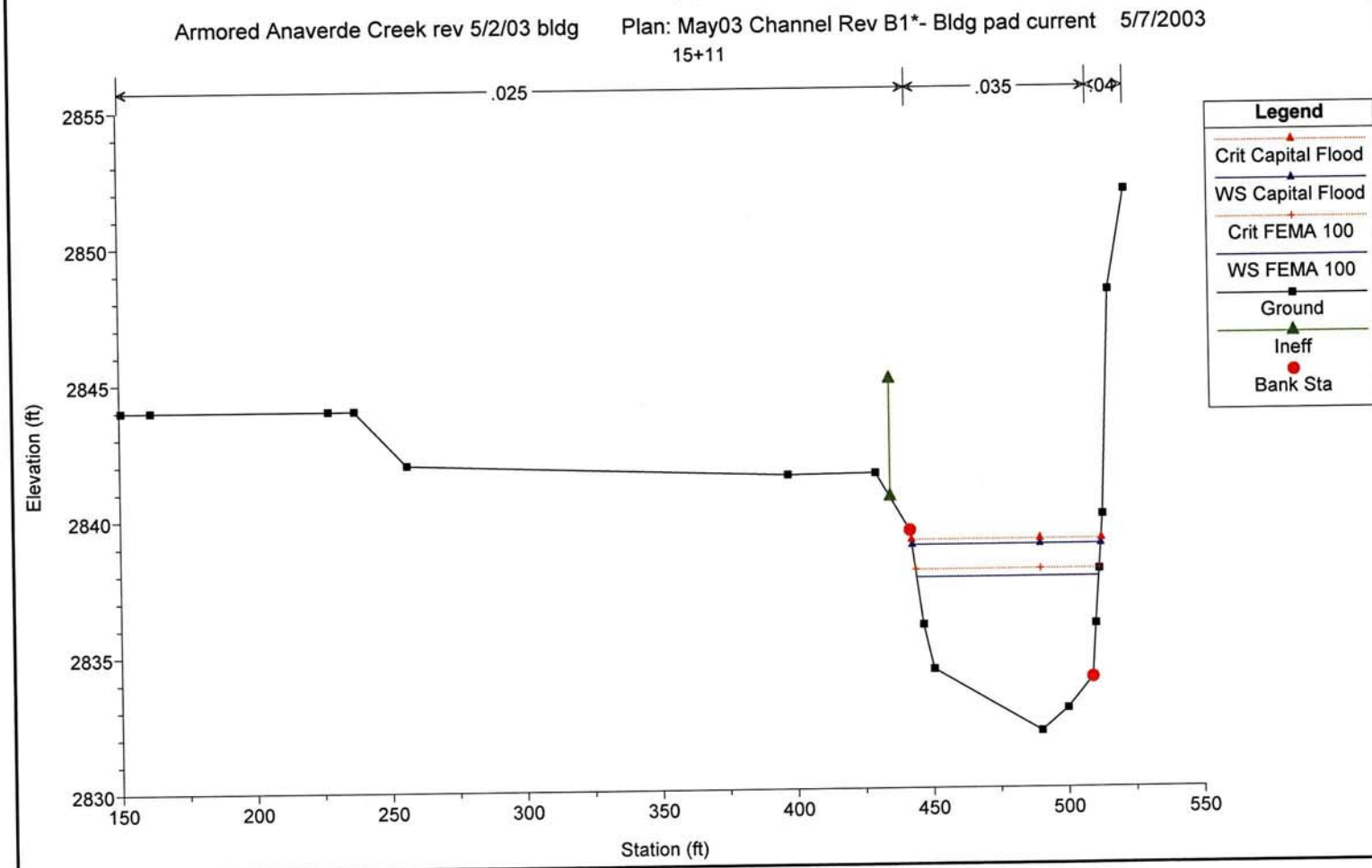

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
18+53
.025
.035
.045
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2865
2860
2855
2850
2845
2840
2835
200
250
300
350
400
450
500
550
600

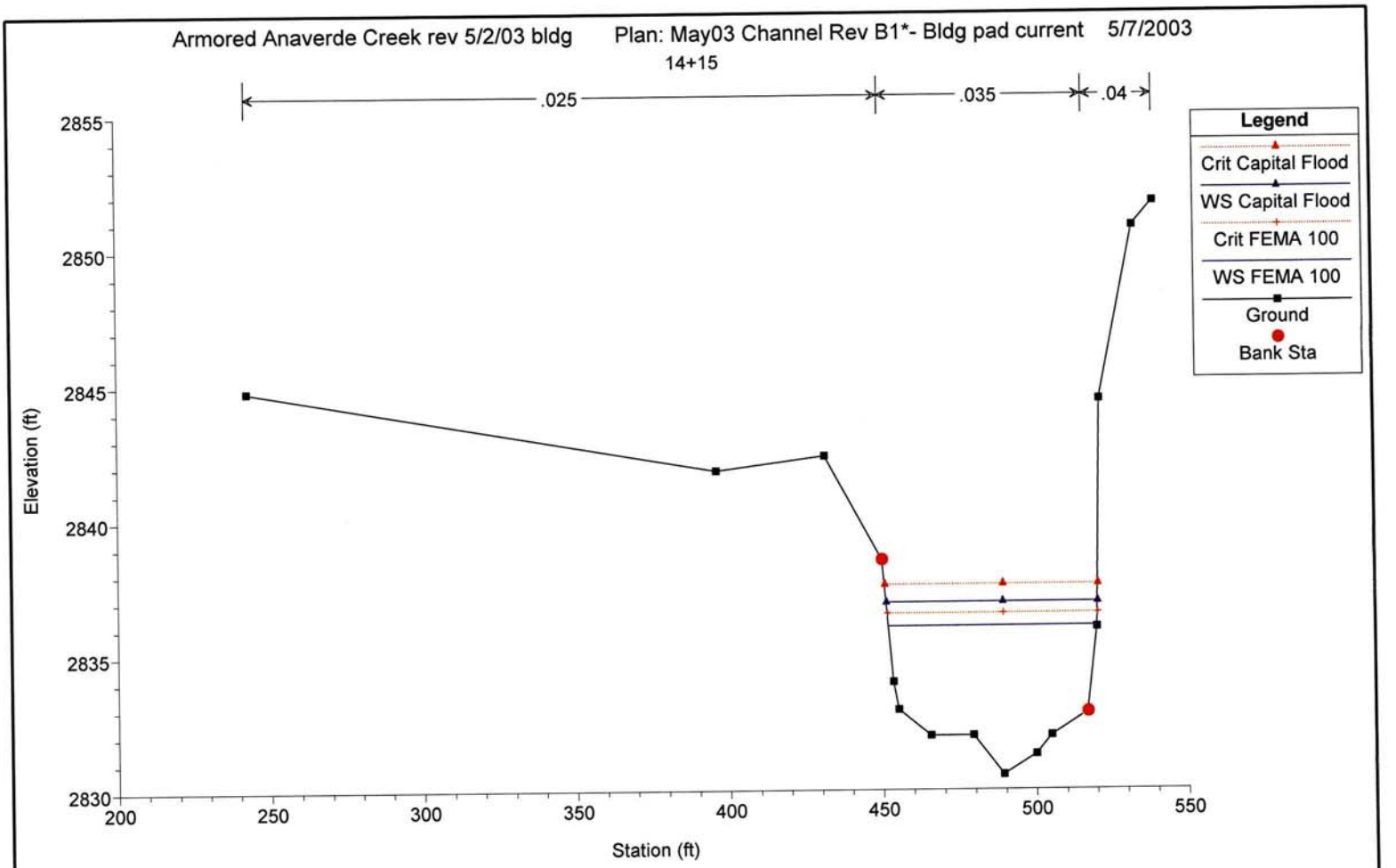

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
18+18
.025
.035
.045
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2860
2855
2850
2845
2840
2835
200
250
300
350
400
450
500
550
600

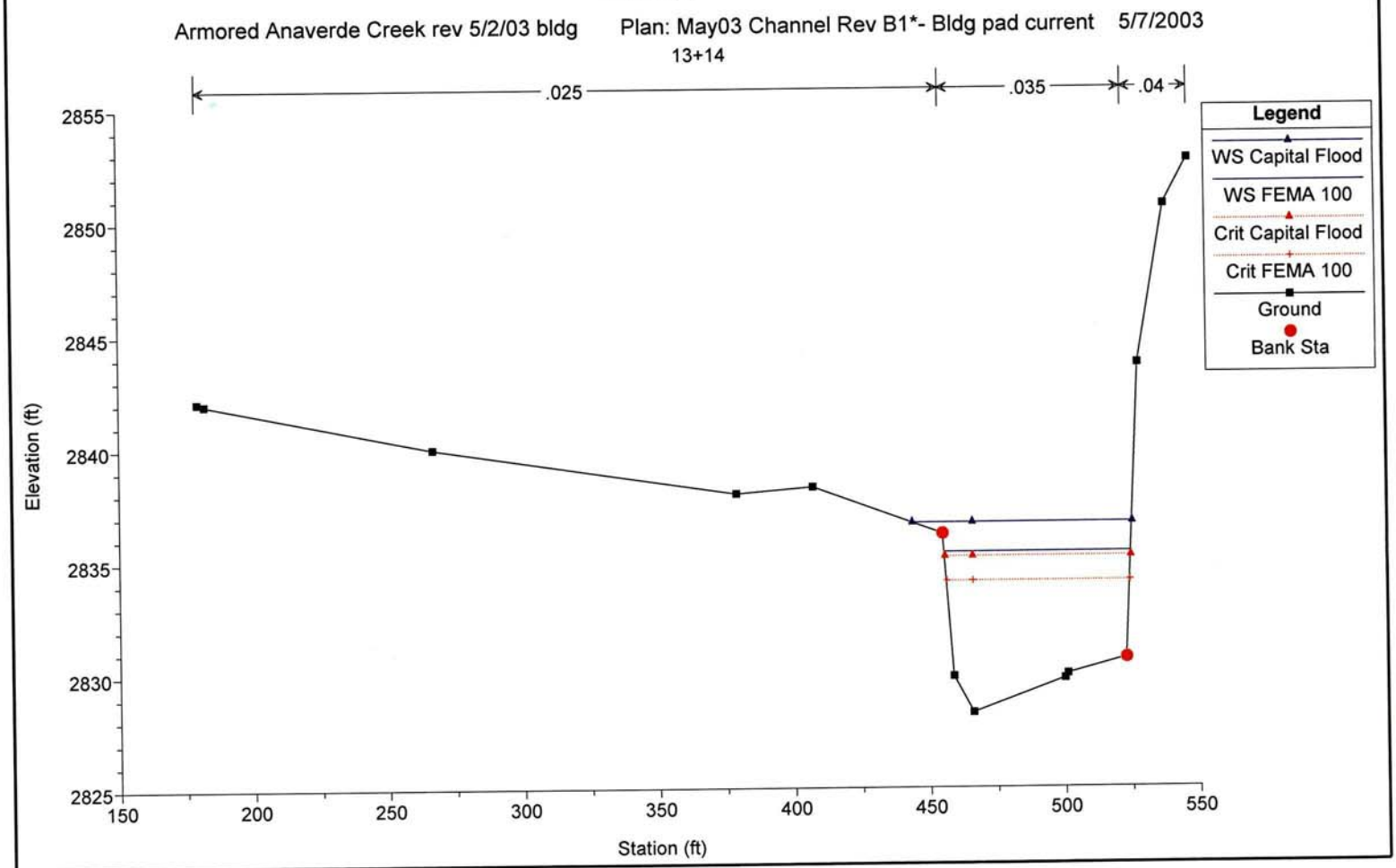

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
17+85
.025
.035
.045
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2852
2850
2848
2846
2844
2842
2840
2838
2836
200
300
400
500
600
700

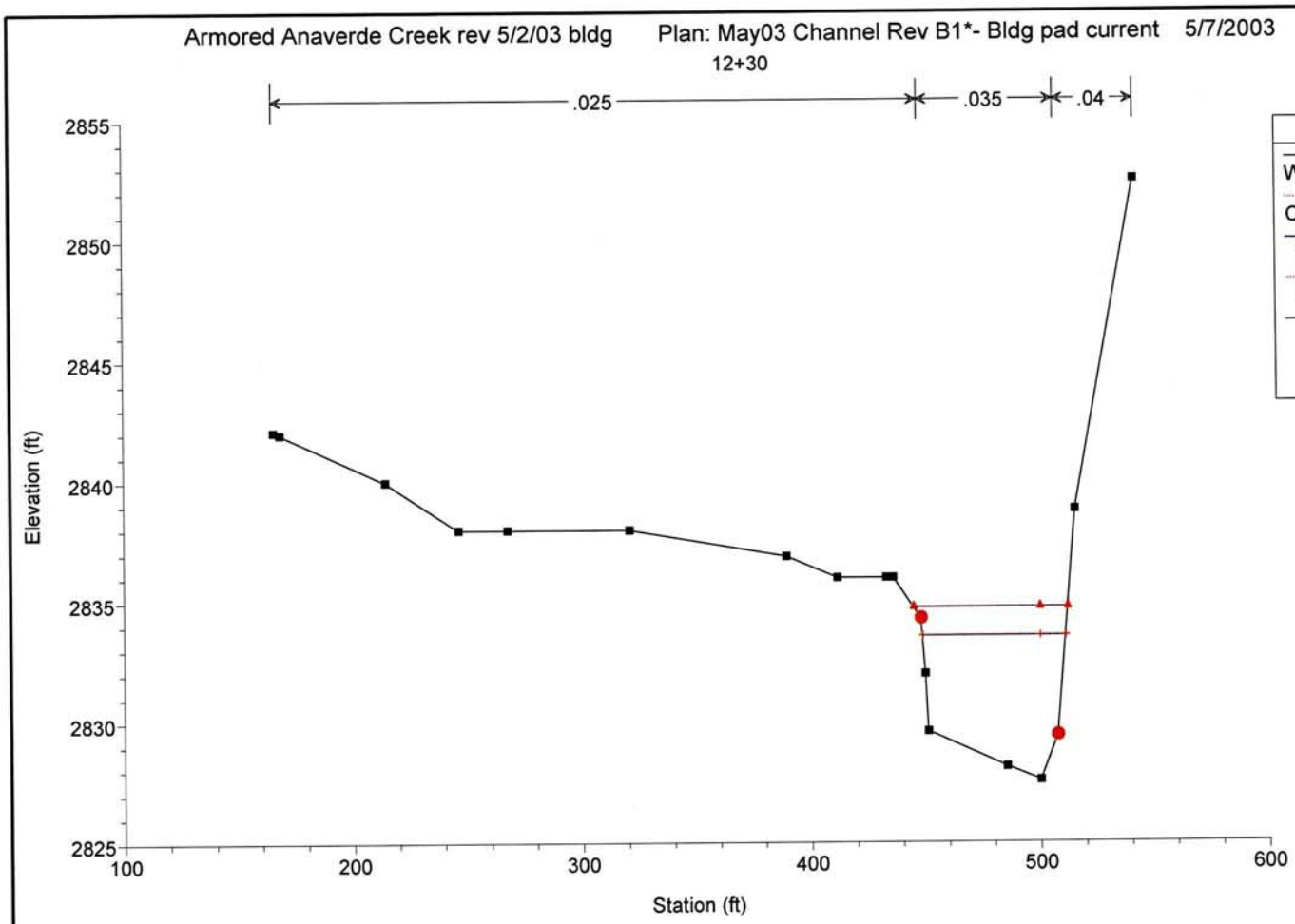

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
17+13
.025
.03
.03
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2854
2852
2850
2848
2846
2844
2842
2840
2838
2836
2834
200
250
300
350
400
450
500
550
600

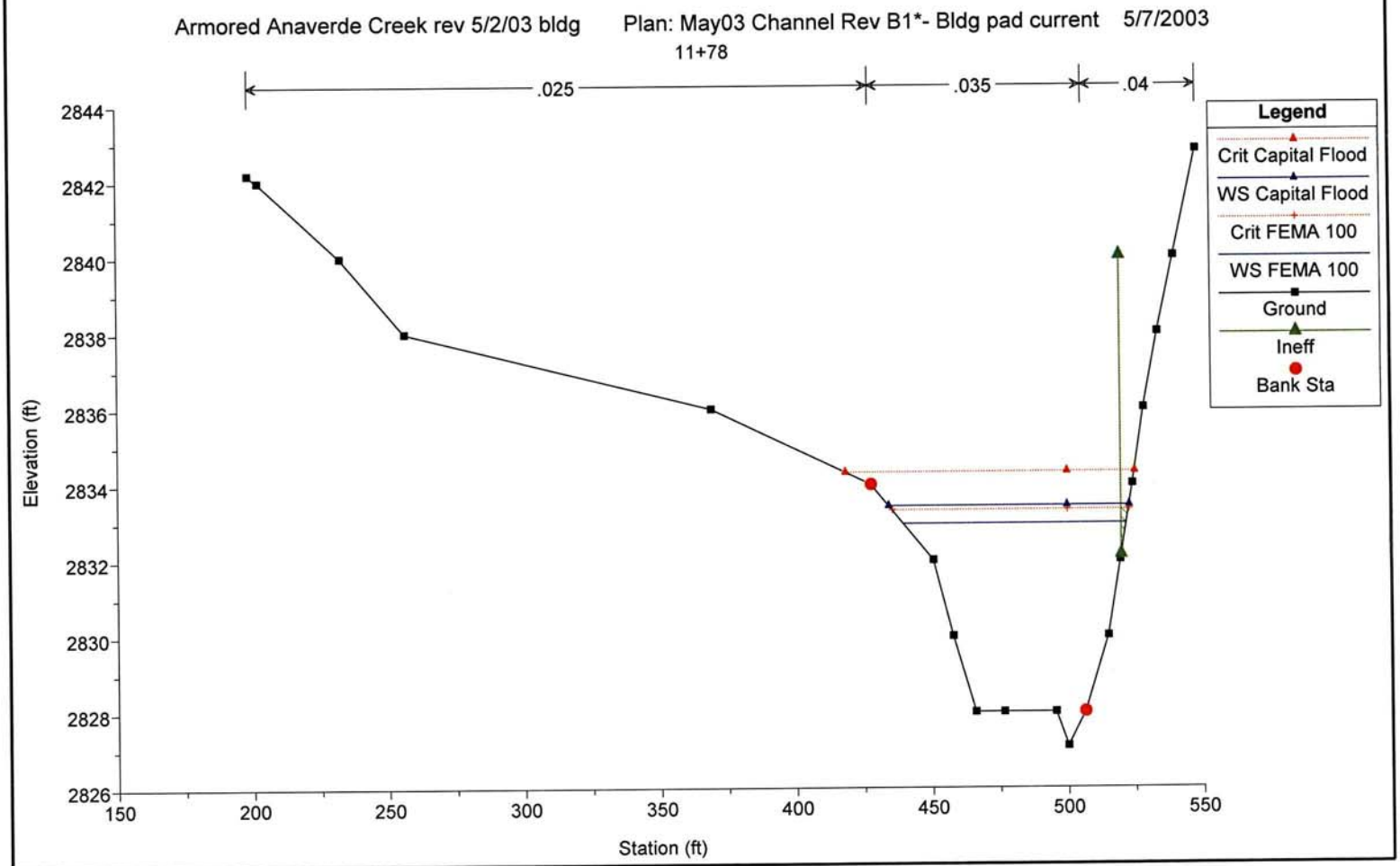

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
16+22
.025
.03
.03
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
2860
2855
2850
2845
2840
2835
2830
100
200
300
400
500
600
Station (ft)

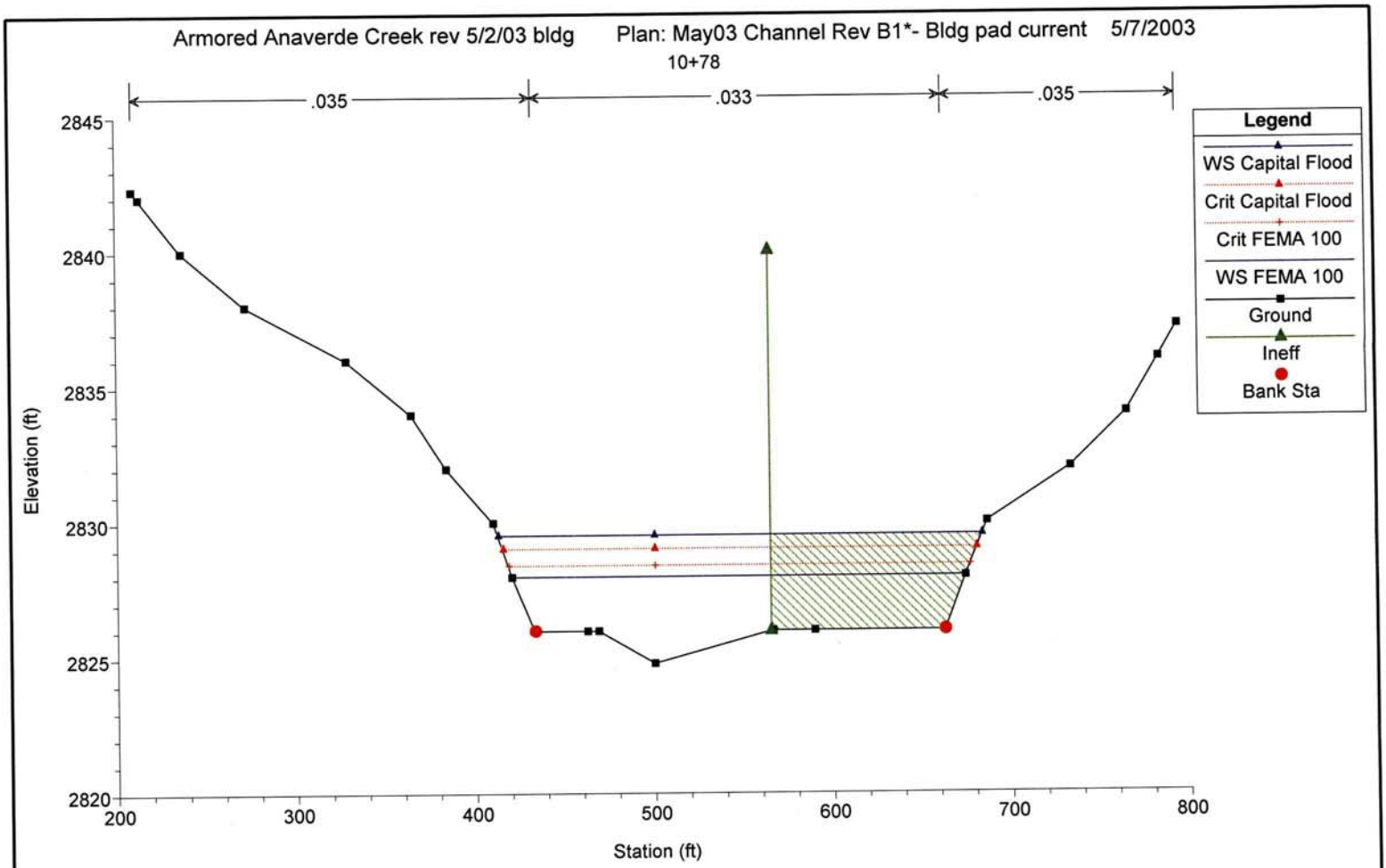

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
15+11
.025
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
2855
2850
2845
2840
2835
2830
150
200
250
300
350
400
450
500
550
Station (ft)

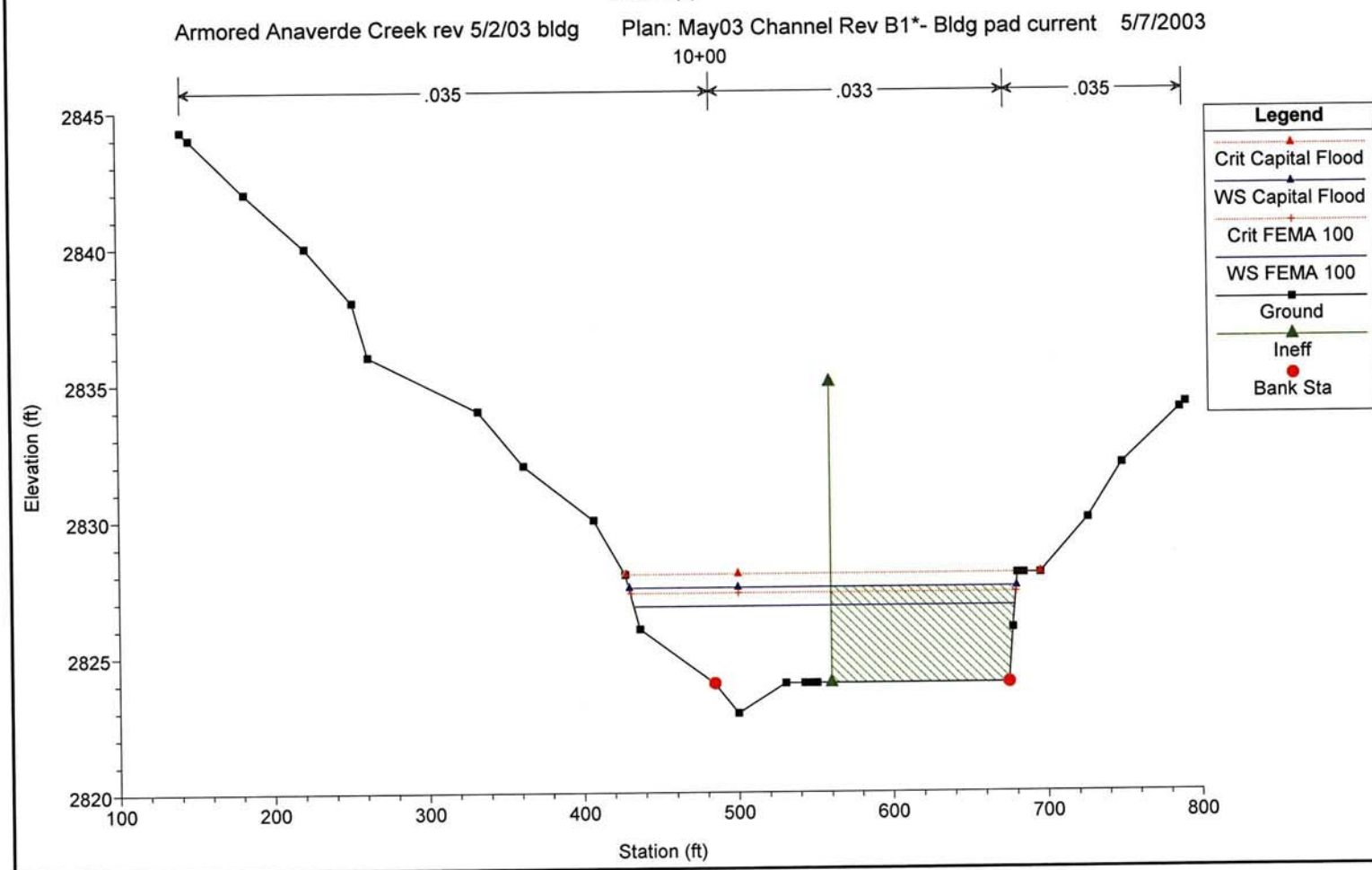

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
14+15
.025
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2855
2850
2845
2840
2835
2830
200
250
300
350
400
450
500
550

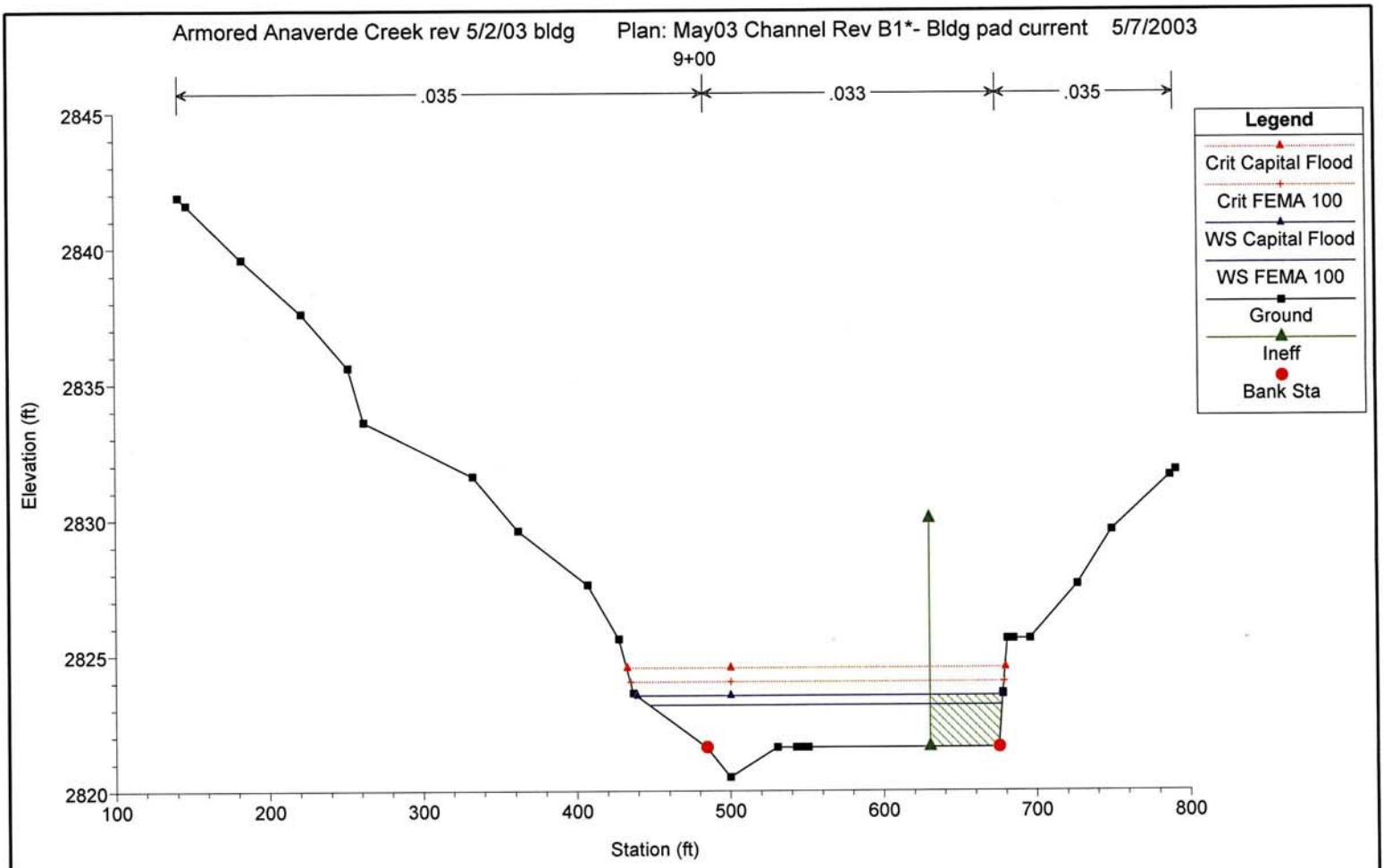

Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
13+14
.025
.035
.04
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2855
2850
2845
2840
2835
2830
2825
150
200
250
300
350
400
450
500
550


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
12+30
.025
.035
.04
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2855
2850
2845
2840
2835
2830
2825
100
200
300
400
500
600


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
11+78
.025
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2844
2842
2840
2838
2836
2834
2832
2830
2828
2826
150
200
250
300
350
400
450
500
550


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
10+78
.035
.033
.035
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2845
2840
2835
2830
2825
2820
200
300
400
500
600
700
800


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
10+00
.035
.033
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2845
2840
2835
2830
2825
2820
100
200
300
400
500
600
700
800


Armored Anaverde Creek rev 5/2/03 bldg
Plan: May03 Channel Rev B1*- Bldg pad current
5/7/2003
9+00
.035
.033
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
2845
2840
2835
2830
2825
2820
100
200
300
400
500
600
700
800
Station (ft)

APPENDIX C

ANAVERDE CREEK
ANTELOPE VALLEY AREA FLOOD CALCULATION BRIEF

Subject	Antelope Valley	Made by	DG-L / TAC	Job	003-1971
HEC-RAS Modeling for		Checked by	TAC	Date	10/03/00 Rev 2/22/01
Capital & 100-yr Floods		Approved by	SGS 6/04	Sheet	1 of 3

OBJECTIVE:
Determine the flood boundaries for the 50-year capital flood and 100-year flood events for Anaverde Creek adjacent to the Antelope Valley Public Landfill near City of Palmdale, California.

METHOD:
HEC-RAS modeling (Ref. 1) was used to determine flood elevations. Geometry data for the model was determined by combining aerial survey provided by Photogrammetric Surveys, Inc. (1992 and 2000) and ground survey data provided by JSA (Sept. 2000). Peak flows for the capital flood event were determined using model output from the Anaverde Creek Basin Hydrology Study (Ref. 2). Peak flows for the 100-year flood event were obtained from the FEMA Flood Insurance Study for City of Palmdale (Ref.3). Boundary conditions for the model were calculated using normal depth.

ASSUMPTIONS:

- Peak flow for the 100-year flood at the furthest upstream cross section (52+86) = 3050 cfs (Table 1. Ref. 3)
- Peak flow for the 100-year flood at cross section 44+77 = 3200 cfs (Table 1. Ref. 3)
- Peak flow for the 100-year flood at cross section 24+73 = 3630 cfs (Table 1. Ref. 3)
- Professional judgement was used to define the characteristics of the channel if there was a discrepancy between the aerial and ground survey data.
- Aerial survey was used to define the cross section beyond the limits of the ground survey.
- Two cross sections were interpolated between stations 36+98 and 37+49. Bridge and Road obstructions were added to these interpolated cross sections using partial ground survey data at these approximate locations.
- *Two cross sections were interpolated between stations 46+92 and 44+77*, three cross sections were interpolated between stations 11+78 and 10+78 and two cross sections were interpolated between stations 10+78 and 10+00. These cross sections were added to smooth transitions for modeling.
- Expansion and contraction coefficients (EC and CC) for the cross sections were set to default values 0.3 and 0.1 respectively for all cross sections except the following which were cross sections just upstream of river locations with abrupt expanding and contracting river geometries (see plan view, Figure2):

11+03*	EC	=	0.8
11+28*	EC	=	0.8
11+28*	EC	=	0.8
11+78	EC	=	0.8
22+17	EC	=	0.6
21+57	CC	=	0.3
36+41	CC	=	0.3
38+24	EC	=	0.6
42+70	CC	=	0.3
44+39	CC	=	0.2
46+92	CC	=	0.2
49+97	EC	=	0.8
50+55	EC	=	0.5
51+50	EC	=	0.5

* Interpolated Cross Sections

- *Ineffective flow areas were used to model water surface elevations where the over banks are much wider than the main channel (e.g. both sides between Stations 49+97 and 43+60, and between 38+24 and 35+46)*

Manning's roughness coefficients for the HEC-RAS model were selected based on field observations (Field Photos are presented in Figures 3, 4, and 5). The following coefficients were used:

Description	Manning's Number
Natural Stream - clean, straight	0.025
Natural Stream - stones/weeds, straight	0.030
Natural Stream - stones/weeds, winding	0.033 - 0.035
Natural Stream - cobbles/some boulders, winding	0.040 - 0.045
Very weedy to heavy timber and underbrush	0.060 - 0.080
Straight, dense willows/trees	0.110

CALCULATIONS:

Peak flows for the Captial flood were determined by multiplying the bulking factor times the "existing" clear water discharge. Results are shown in the following table:

Capital Flood Discharges

Confluence Location per original Document*	150AB	164AD	194AB
HEC-RAS equivalent model station	52+86	44+77	24+73
Clear Water Discharge (cfs)	3963	3894	4212
Bulking Factor for Peak Discharge	1.18	1.18	1.18
Bulked Discharge (cfs)	4676	4595	4970

* Anaverde Creek Basin Hydrology Study, AKM Consulting Engineers. 1995.

Note: Clear water peak discharges for existing conditions were obtained from the 1995 model for the *Anaverde Creek Basin Hydrology Study*. The bulking factor was interpolated using two known points with known bulking factors along the Anaverde Creek also obtained from the *Anaeverde Creek Basin Hydrology Study*.

HEC-RAS Summary table is included in Appendix A, River Long Section, and Cross Section Plots are included as Appendix B.

CONCLUSIONS/RESULTS:

The flood boundaries for the capital and 100-year floods for Anaverde Creek adjacent to the Antelope Valley Public Landfill were estimated and are presented in Figure 2.

REFERENCES:

1) U.S. Army Corps of Engineers. 1998. *HEC-RAS River Analysis System, Version 2.2* [software package]. Hydrologic Engineering Center.

2) *Anaverde Creek Basin Hydrology Study*, AKM Consulting Engineers. 1995.

3) *FEMA Flood Insurance Study for City of Palmdale, California, Los Angeles County*. 1998. Community number 060144.

APPENDIX D

HEC-RAS SUMMARY TABLE – ANAVERDE CREEK SCOUR LIMIT

APPENDIX D: HEC-RAS Summary Table - Anaverde Creek "Scour Limit Conditions"

River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
52+86	FEMA 100	3050	905.1	1031.0	2882.00	2891.11	2889.03	2891.85	0.0020	7.1	483.6	125.9	0.52
52+86	Capital Flood	4676	876.2	1035.0	2882.00	2892.52	2890.65	2893.44	0.0021	8.2	686.4	158.8	0.54
52+04	FEMA 100	3050	947.3	1030.7	2881.90	2889.34	2889.34	2891.33	0.0071	11.4	281.1	83.4	0.93
52+04	Capital Flood	4676	891.2	1038.2	2881.90	2891.50	2891.04	2893.09	0.0043	10.6	526.6	147.0	0.75
51+50	FEMA 100	3050	943.9	1026.4	2881.80	2888.84	2888.91	2890.94	0.0068	11.9	283.6	82.5	0.93
51+50	Capital Flood	4676	914.6	1031.5	2881.80	2890.50	2890.50	2892.73	0.0053	12.7	448.8	116.8	0.86
50+55	FEMA 100	3050	930.5	1051.6	2881.70	2885.99	2886.86	2888.92	0.0345	13.8	221.9	121.0	1.79
50+55	Capital Flood	4676	922.3	1053.5	2881.70	2886.51	2887.78	2890.67	0.0352	16.4	287.4	131.2	1.88
49+97	FEMA 100	3050	878.7	1151.7	2881.60	2886.37	2884.59	2886.65	0.0015	4.3	716.5	273.1	0.41
49+97	Capital Flood	4676	866.5	1155.7	2881.60	2887.05	2885.34	2887.50	0.0020	5.4	864.8	289.2	0.48
48+51	FEMA 100	3050	769.8	1628.4	2880.40	2886.41	2882.82	2886.45	0.0001	1.6	1950.1	858.7	0.13
48+51	Capital Flood	4676	755.0	1655.6	2880.40	2887.14	2883.26	2887.21	0.0002	2.2	2251.5	900.6	0.16
47+48	FEMA 100	3050	735.0	1397.9	2878.00	2886.41	2880.39	2886.43	0.0000	1.2	2864.5	662.9	0.07
47+48	Capital Flood	4676	723.6	1419.8	2878.00	2887.15	2880.90	2887.19	0.0001	1.6	3193.3	696.2	0.10
46+92	FEMA 100	3050	727.7	1285.2	2878.00	2886.41	2880.81	2886.43	0.0000	1.3	2600.4	557.5	0.08
46+92	Capital Flood	4676	707.6	1294.7	2878.00	2887.14	2881.40	2887.18	0.0001	1.8	2904.8	587.1	0.11
46+20.3*	FEMA 100	3050	700.7	1202.2	2877.80	2886.37	2881.70	2886.42	0.0001	1.8	1876.1	501.5	0.12
46+20.3*	Capital Flood	4676	681.3	1209.5	2877.80	2887.08	2882.37	2887.16	0.0002	2.4	2131.0	528.2	0.16
45+48.7*	FEMA 100	3050	674.9	1099.2	2877.60	2886.29	2883.02	2886.39	0.0003	2.5	1263.6	424.3	0.20
45+48.7*	Capital Flood	4676	657.1	1111.6	2877.60	2886.94	2883.78	2887.11	0.0005	3.3	1456.0	454.5	0.25
44+77	FEMA 100	3200	662.5	1032.3	2877.40	2884.94	2884.94	2885.82	0.0107	7.5	427.1	369.7	0.99
44+77	Capital Flood	4595	659.0	1034.3	2877.40	2885.44	2885.44	2886.54	0.0097	8.4	547.7	375.3	0.98
44+39	FEMA 100	3200	885.6	1021.4	2877.10	2878.93	2880.18	2883.65	0.0833	17.4	183.6	135.8	2.64
44+39	Capital Flood	4595	776.7	1030.3	2877.10	2883.27	2880.89	2883.75	0.0015	5.6	823.3	239.3	0.44
43+60	FEMA 100	3200	907.7	1021.8	2876.40	2880.03	2880.03	2881.70	0.0087	10.3	309.4	114.1	0.99
43+60	Capital Flood	4595	905.8	1025.0	2876.40	2880.98	2880.98	2883.05	0.0081	11.5	398.2	119.1	0.99
42+70	FEMA 100	3200	896.0	1029.9	2875.30	2879.78	2878.30	2880.35	0.0023	6.1	533.0	133.9	0.53
42+70	Capital Flood	4595	894.0	1035.5	2875.30	2880.82	2879.07	2881.55	0.0023	6.9	675.8	141.6	0.55
41+82	FEMA 100	3200	898.2	1041.2	2873.90	2879.81	2877.03	2880.14	0.0009	4.7	707.6	143.0	0.35
41+82	Capital Flood	4595	896.1	1051.8	2873.90	2880.85	2877.81	2881.33	0.0010	5.7	863.5	155.7	0.38
40+96	FEMA 100	3200	901.6	1049.5	2873.10	2879.80	2876.36	2880.05	0.0006	4.1	814.7	147.9	0.29
40+96	Capital Flood	4595	899.5	1052.9	2873.10	2880.85	2877.12	2881.22	0.0007	5.0	973.6	153.4	0.32
40+11	FEMA 100	3200	930.1	1072.4	2872.30	2879.77	2875.95	2880.00	0.0005	3.9	862.1	142.3	0.26
40+11	Capital Flood	4595	928.0	1074.2	2872.30	2880.82	2876.71	2881.15	0.0006	4.7	1012.9	146.3	0.30
39+36	FEMA 100	3200	407.6	548.9	2871.10	2879.80	2874.34	2879.95	0.0002	3.2	1049.4	141.3	0.19
39+36	Capital Flood	4595	405.5	550.9	2871.10	2880.85	2875.12	2881.09	0.0003	4.0	1200.7	145.4	0.23
38+91	FEMA 100	3200	391.5	543.8	2870.58	2879.82	2873.45	2879.93	0.0002	2.7	1233.2	152.3	0.16
38+91	Capital Flood	4595	389.4	545.8	2870.58	2880.88	2874.21	2881.06	0.0002	3.5	1397.7	156.5	0.19
38+24	FEMA 100	3200	385.0	863.4	2869.81	2879.82	2872.97	2879.91	0.0002	2.5	1396.1	425.9	0.14
38+24	Capital Flood	4595	382.8	883.5	2869.81	2880.89	2873.74	2881.03	0.0003	3.1	1655.5	500.6	0.17
37+89	FEMA 100	3200	389.2	884.0	2869.41	2879.82	2872.65	2879.89	0.0002	2.1	1639.9	494.8	0.12
37+89	Capital Flood	4595	387.0	896.5	2869.41	2880.90	2873.50	2881.00	0.0003	2.7	1849.4	509.4	0.14
37+49	FEMA 100	3200	403.9	937.3	2875.24	2879.53	2877.49	2879.81	0.0025	3.9	779.7	533.5	0.33
37+49	Capital Flood	4595	401.8	952.5	2875.24	2880.54	2878.10	2880.92	0.0025	4.5	969.7	550.7	0.35
37+36.5*	FEMA 100	3200	441.0	898.6	2875.24	2878.74	2878.12	2879.64	0.0152	5.3	496.1	457.6	0.50
37+36.5*	Capital Flood	4595	438.3	922.0	2875.24	2879.54	2878.89	2880.72	0.0154	6.1	615.9	483.7	0.52

APPENDIX D: HEC-RAS Summary Table - Anaverde Creek "Scour Limit Conditions"

River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
37+24	FEMA 100	3200	436.3	867.6	2874.64	2878.85	2877.46	2879.39	0.0064	3.9	615.2	431.4	0.33
37+24	Capital Flood	4595	432.4	910.0	2874.64	2879.69	2878.20	2880.45	0.0067	4.5	749.8	477.6	0.35
36+98	FEMA 100	3200	426.3	765.1	2874.64	2877.44	2877.44	2878.77	0.0201	5.2	375.8	338.8	0.55
36+98	Capital Flood	4595	420.5	780.3	2874.64	2878.18	2878.18	2879.85	0.0177	5.8	483.1	359.8	0.54
36+41	FEMA 100	3200	421.3	526.1	2867.69	2869.53	2870.91	2874.70	0.1096	18.3	175.6	104.8	2.46
36+41	Capital Flood	4595	420.3	526.5	2867.69	2870.05	2871.77	2876.22	0.0943	20.0	231.2	106.2	2.35
35+46	FEMA 100	3200	407.5	535.6	2866.60	2870.36	2869.68	2871.27	0.0072	7.8	425.0	128.2	0.71
35+46	Capital Flood	4595	405.4	542.7	2866.60	2871.38	2870.48	2872.48	0.0064	8.6	559.7	137.3	0.70
35+09	FEMA 100	3200	407.2	535.5	2866.18	2870.06	2869.41	2871.01	0.0069	7.9	418.0	128.3	0.72
35+09	Capital Flood	4595	405.1	544.8	2866.18	2871.16	2870.23	2872.25	0.0059	8.6	565.1	139.8	0.69
34+57	FEMA 100	3200	411.4	540.7	2865.59	2869.87	2868.78	2870.63	0.0054	7.1	467.3	129.3	0.61
34+57	Capital Flood	4595	409.1	550.8	2865.59	2871.02	2869.61	2871.92	0.0047	7.8	622.6	141.7	0.59
33+85	FEMA 100	3200	422.5	520.6	2864.50	2868.27	2868.27	2869.88	0.0131	10.3	314.2	98.2	0.99
33+85	Capital Flood	4595	420.7	523.7	2864.50	2869.17	2869.17	2871.19	0.0125	11.5	404.8	103.0	0.98
32+88	FEMA 100	3200	433.6	520.2	2861.96	2867.64	2865.86	2868.46	0.0039	7.4	445.7	86.6	0.55
32+88	Capital Flood	4595	431.3	521.1	2861.96	2868.83	2866.89	2869.94	0.0041	8.6	550.5	89.9	0.58
31+97	FEMA 100	3200	441.6	517.2	2861.21	2865.43	2865.43	2867.35	0.0180	11.1	287.6	75.7	0.97
31+97	Capital Flood	4595	439.4	520.3	2861.21	2866.52	2866.52	2868.89	0.0162	12.4	373.2	80.9	0.96
30+88	FEMA 100	3200	427.7	518.8	2859.94	2863.62	2863.8	2865.53	0.0154	11.2	289.8	91.1	1.08
30+88	Capital Flood	4595	426.4	519.0	2859.94	2864.23	2864.76	2867	0.0179	13.5	346.0	92.6	1.20
29+98	FEMA 100	3200	429.0	516.2	2857.5	2860.51	2861.3	2863.43	0.0294	13.8	233.9	87.2	1.45
29+98	Capital Flood	4595	427.5	516.6	2857.5	2861.27	2862.27	2864.91	0.0270	15.4	301.5	89.2	1.44
29+08	FEMA 100	3200	418.9	510.0	2855.5	2858.55	2859.09	2860.94	0.0219	12.5	259.2	91.1	1.27
29+08	Capital Flood	4595	417.7	510.6	2855.5	2859.16	2860.02	2862.5	0.0239	14.8	315.8	92.9	1.37
27+96	FEMA 100	3200	414.6	512.0	2852.87	2855.57	2856.25	2858.17	0.0273	13.0	248.1	97.4	1.41
27+96	Capital Flood	4595	413.3	512.2	2852.87	2856.2	2857.14	2859.64	0.0272	15.0	310.0	98.8	1.46
26+81	FEMA 100	3200	391.8	515.5	2850.88	2855.01	2853.98	2855.76	0.0050	7.0	458.7	123.7	0.63
26+81	Capital Flood	4595	390.0	515.8	2850.88	2855.86	2854.78	2856.89	0.0052	8.2	565.5	125.8	0.67
25+97	FEMA 100	3200	398.8	529.5	2850.48	2853.6	2853.6	2854.98	0.0121	9.5	340.2	130.8	0.98
25+97	Capital Flood	4595	397.3	533.2	2850.48	2854.36	2854.36	2856.12	0.0115	10.7	433.0	135.9	0.99
24+73	FEMA 100	3630	403.7	521.2	2848	2851.16	2851.45	2853.04	0.0184	11.0	330.4	117.6	1.15
24+73	Capital Flood	4970	402.5	525.3	2848	2851.74	2852.18	2854.14	0.0193	12.5	400.1	122.8	1.20
23+97	FEMA 100	3630	401.4	514.3	2846	2848.79	2849.38	2851.19	0.0293	12.5	293.2	112.9	1.34
23+97	Capital Flood	4970	400.2	515.1	2846	2849.42	2850.13	2852.34	0.0273	13.8	364.3	115.0	1.33
23+00	FEMA 100	3630	402.8	512.4	2844.5	2848.16	2848.16	2849.81	0.0155	10.3	353.4	109.6	0.99
23+00	Capital Flood	4970	401.3	513.5	2844.5	2848.93	2848.93	2850.94	0.0146	11.4	439.0	112.2	0.99
22+17	FEMA 100	3630	408.3	513.9	2842.91	2846.28	2846.6	2848.36	0.0182	11.7	321.1	105.6	1.13
22+17	Capital Flood	4970	406.8	514.9	2842.91	2847.01	2847.4	2849.57	0.0173	12.9	399.5	108.2	1.14
21+57	FEMA 100	3630	408.1	523.5	2842.5	2845.93	2845.93	2847.52	0.0132	10.2	360.3	115.4	0.99
21+57	Capital Flood	4970	407.7	523.7	2842.5	2846.13	2846.67	2848.77	0.0203	13.1	383.6	115.9	1.24
20+51	FEMA 100	3630	419.0	541.9	2840.92	2843.93	2844.21	2845.79	0.0181	11.0	333.4	122.9	1.16
20+51	Capital Flood	4970	417.1	543.1	2840.92	2844.88	2844.93	2846.79	0.0130	11.2	452.5	126.0	1.01
19+50	FEMA 100	3630	409.4	537.9	2839.3	2842.09	2842.41	2843.94	0.0182	11.0	332.8	128.4	1.19
19+50	Capital Flood	4970	408.5	539.2	2839.3	2842.54	2843.1	2845.06	0.0201	12.8	391.6	130.7	1.28
18+53	FEMA 100	3630	398.8	518.1	2837.49	2840.58	2840.76	2842.33	0.0145	10.7	344.5	119.3	1.08
18+53	Capital Flood	4970	396.9	519.4	2837.49	2841.56	2841.49	2843.38	0.0105	10.9	462.5	122.5	0.96

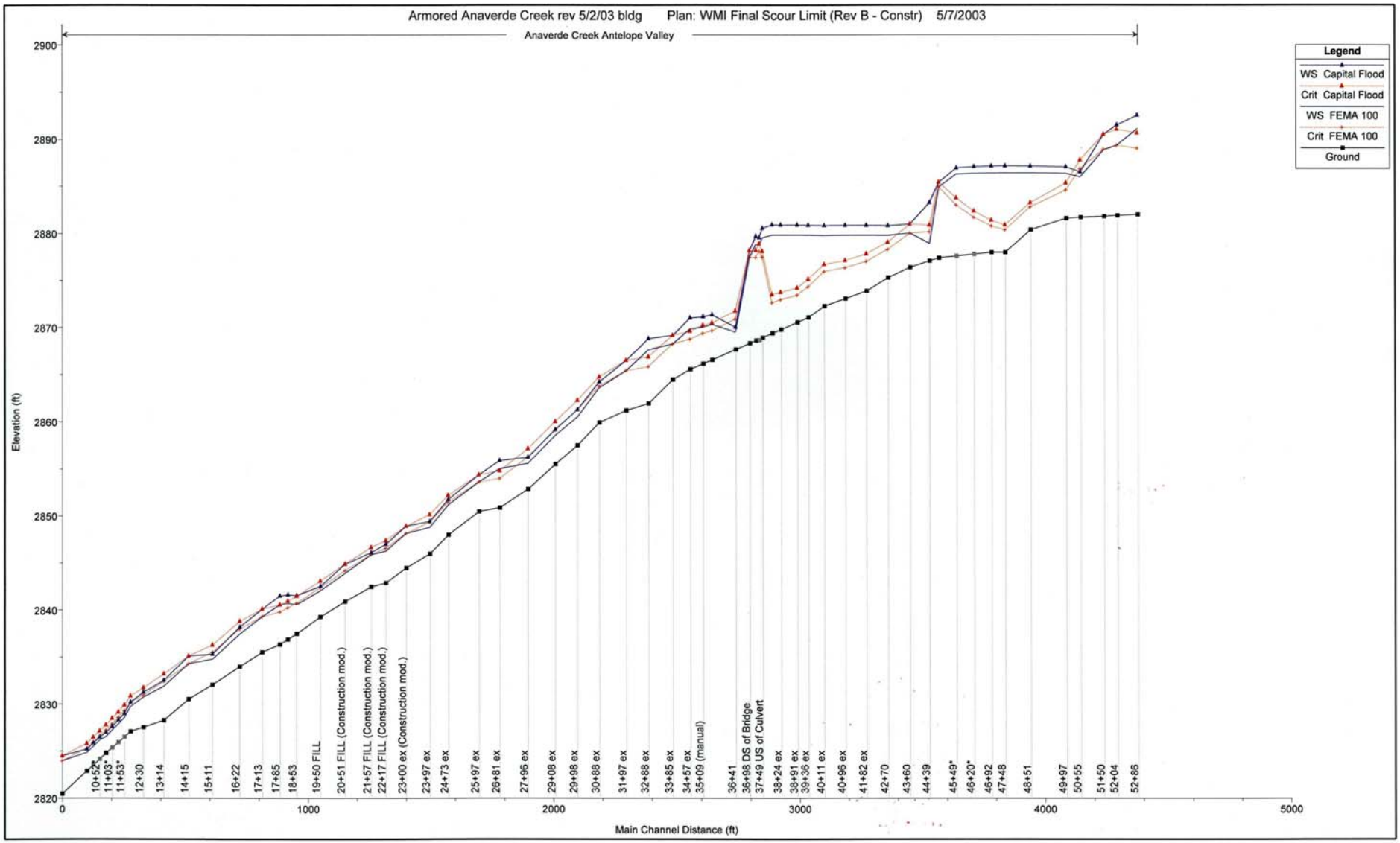
APPENDIX D: HEC-RAS Summary Table - Anaverde Creek "Scour Limit Conditions"

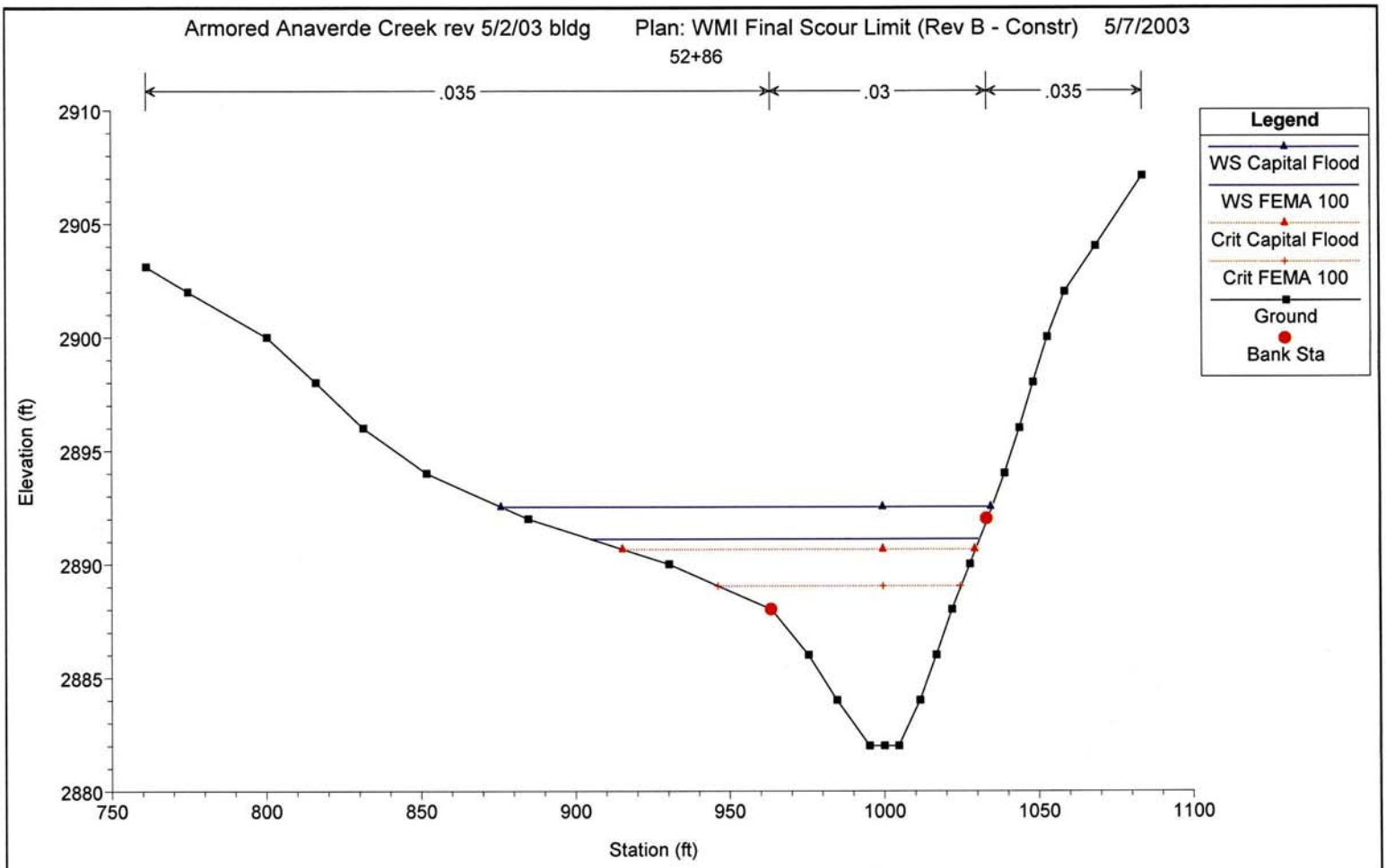
River Sta	Profile	Q Total	Sta W.S. Lft	Sta W.S. Rgt	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
18+18	FEMA 100	3630	402.4	531.6	2836.9	2840.72	2840.27	2841.83	0.0076	8.5	430.7	129.2	0.80
18+18	Capital Flood	4970	400.5	532.2	2836.9	2841.65	2840.97	2842.92	0.0064	9.1	550.3	131.7	0.77
17+85	FEMA 100	3630	411.6	538.2	2836.35	2840.57	2839.82	2841.58	0.0056	8.2	461.6	126.6	0.71
17+85	Capital Flood	4970	409.7	544.5	2836.35	2841.5	2840.58	2842.71	0.0052	9.0	583.9	134.8	0.70
17+13	FEMA 100	3630	432.4	540.0	2835.53	2839.33	2839.33	2841	0.0087	10.5	352.3	107.6	1.00
17+13	Capital Flood	4970	430.8	540.3	2835.53	2840.11	2840.11	2842.15	0.0081	11.6	437.5	109.5	1.00
16+22	FEMA 100	3630	431.0	530.2	2834	2837.48	2837.99	2839.88	0.0143	12.5	293.6	99.2	1.26
16+22	Capital Flood	4970	429.6	530.7	2834	2838.21	2838.83	2841.11	0.0131	13.8	366.8	101.1	1.25
15+11	FEMA 100	3630	399.5	509.8	2832.07	2834.8	2835.53	2837.51	0.0277	13.3	275.6	110.2	1.46
15+11	Capital Flood	4970	398.5	510.1	2832.07	2835.33	2836.29	2838.79	0.0276	15.0	334.3	111.6	1.50
14+15	FEMA 100	3630	412.4	518.4	2830.55	2834.33	2834.33	2836.02	0.0117	10.5	349.6	105.9	1.00
14+15	Capital Flood	4970	410.8	519.2	2830.55	2835.13	2835.13	2837.18	0.0108	11.6	435.2	108.4	0.99
13+14	FEMA 100	3630	417.8	523.2	2828.31	2831.91	2832.44	2834.29	0.0211	12.5	293.4	105.4	1.30
13+14	Capital Flood	4970	416.6	523.5	2828.31	2832.53	2833.23	2835.51	0.0204	13.9	359.7	106.9	1.31
12+30	FEMA 100	3630	398.6	508.6	2827.56	2830.76	2830.97	2832.63	0.0148	11.0	331.7	110.0	1.10
12+30	Capital Flood	4970	397.6	509.1	2827.56	2831.27	2831.75	2833.84	0.0166	12.9	388.8	111.5	1.19
11+78	FEMA 100	3630	382.7	514.0	2827.1	2829.77	2830.19	2831.72	0.0195	11.3	326.4	131.3	1.23
11+78	Capital Flood	4970	381.8	515.5	2827.1	2830.22	2830.88	2832.85	0.0213	13.2	386.2	133.7	1.32
11+53.0*	FEMA 100	3630	381.9	550.9	2826.53	2828.6	2829.32	2831.02	0.0330	12.5	291.3	169.0	1.57
11+53.0*	Capital Flood	4970	381.1	552.9	2826.53	2829.01	2829.91	2832.12	0.0331	14.2	351.7	171.9	1.62
11+28.0*	FEMA 100	3630	380.1	589.4	2825.95	2827.91	2828.61	2830.27	0.0356	12.3	294.9	209.3	1.61
11+28.0*	Capital Flood	4970	379.2	591.7	2825.95	2828.34	2829.16	2831.22	0.0329	13.7	365.4	212.5	1.60
11+03.0*	FEMA 100	3630	378.2	627.9	2825.38	2827.27	2827.93	2829.55	0.0376	12.2	299.3	249.6	1.63
11+03.0*	Capital Flood	4970	377.5	629.9	2825.38	2827.64	2828.51	2830.53	0.0366	13.7	364.6	252.4	1.67
10+78	FEMA 100	3630	376.5	665.9	2824.8	2826.56	2827.27	2829	0.0434	12.6	289.8	289.4	1.78
10+78	Capital Flood	4970	375.6	668.5	2824.8	2827.01	2827.82	2829.73	0.0343	13.3	375.8	292.9	1.65
10+52.0*	FEMA 100	3630	369.0	669.3	2824.17	2826.19	2826.64	2827.89	0.0245	10.5	347.8	300.3	1.37
10+52.0*	Capital Flood	4970	368.3	670.2	2824.17	2826.51	2827.15	2828.81	0.0270	12.2	408.1	301.9	1.48
10+26.0*	FEMA 100	3630	363.0	672.6	2823.53	2825.52	2825.96	2827.24	0.0256	10.5	346.1	309.6	1.40
10+26.0*	Capital Flood	4970	362.3	673.2	2823.53	2825.88	2826.49	2828.1	0.0260	12.0	416.3	310.9	1.45
10+00	FEMA 100	3630	356.1	676.3	2822.9	2824.87	2825.32	2826.56	0.0261	10.5	348.1	320.3	1.40
10+00	Capital Flood	4970	355.4	676.8	2822.9	2825.21	2825.82	2827.41	0.0267	11.9	418.2	321.4	1.46
09+00	FEMA 100	3630	434.8	678.5	2820.5	2824.01	2824.01	2825.11	0.0105	8.7	444.1	243.7	0.95
09+00	Capital Flood	4970	432.4	679.3	2820.5	2824.52	2824.52	2825.88	0.0103	9.7	544.9	246.9	0.97

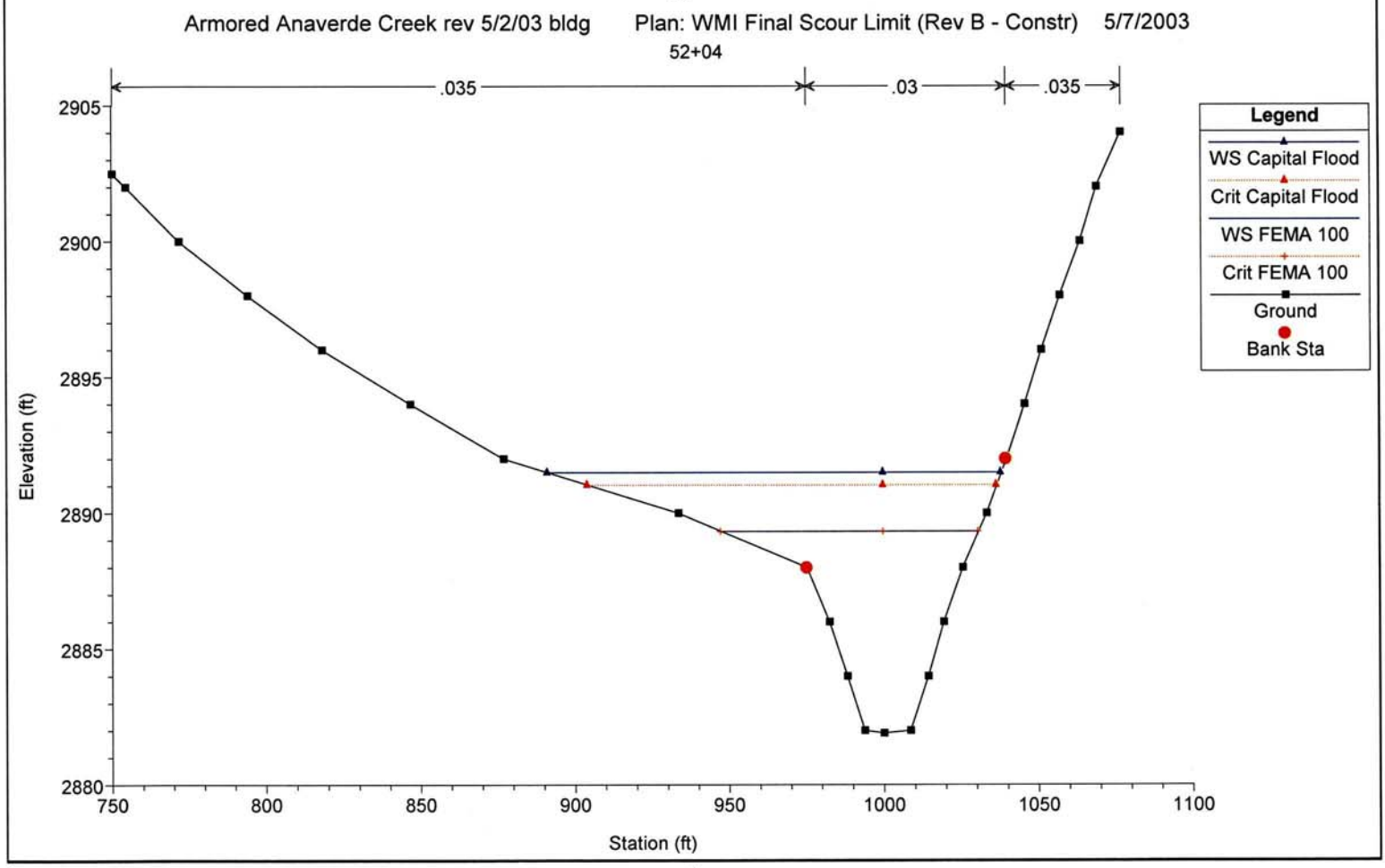
* indicates interpolated cross section

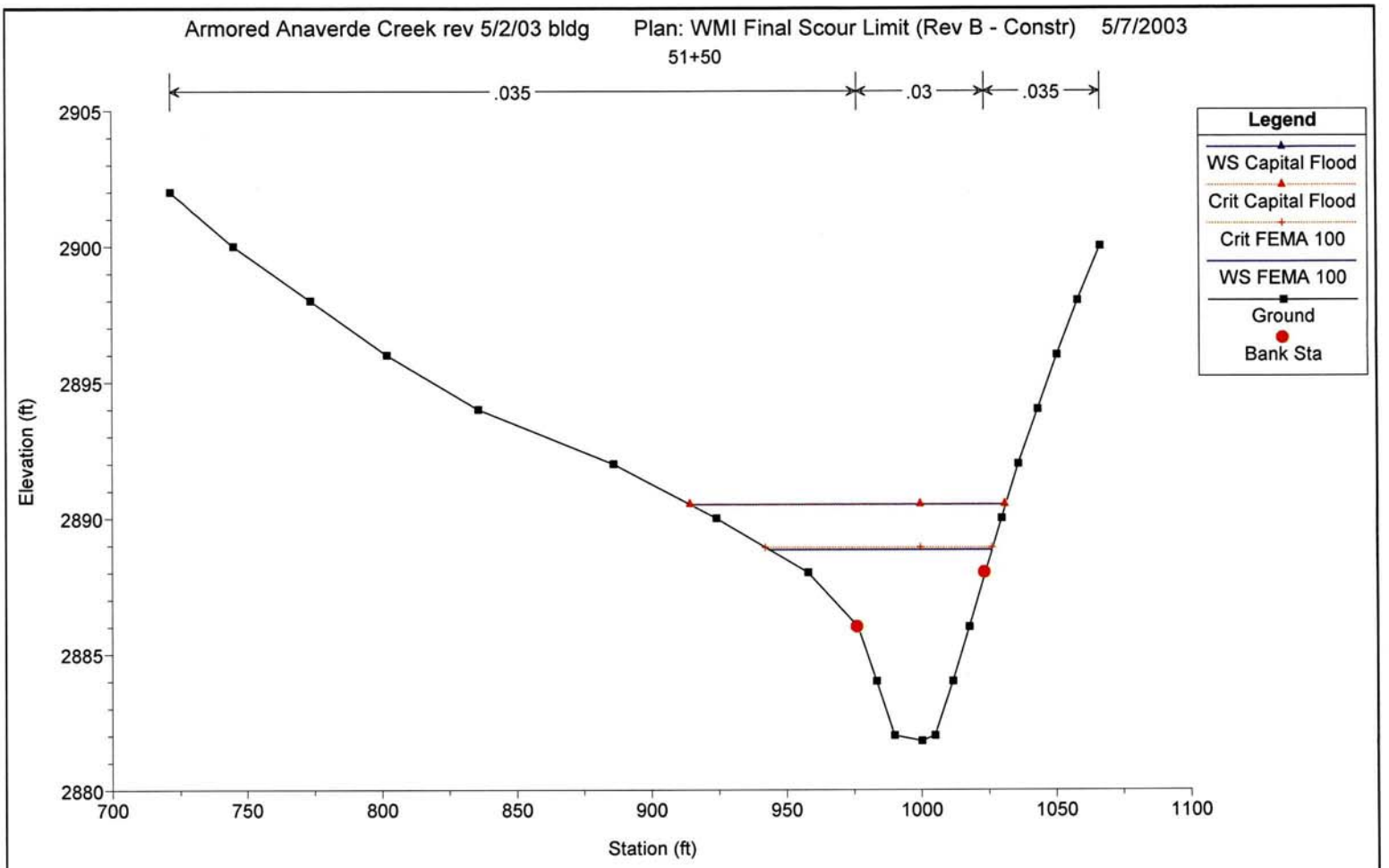
APPENDIX E

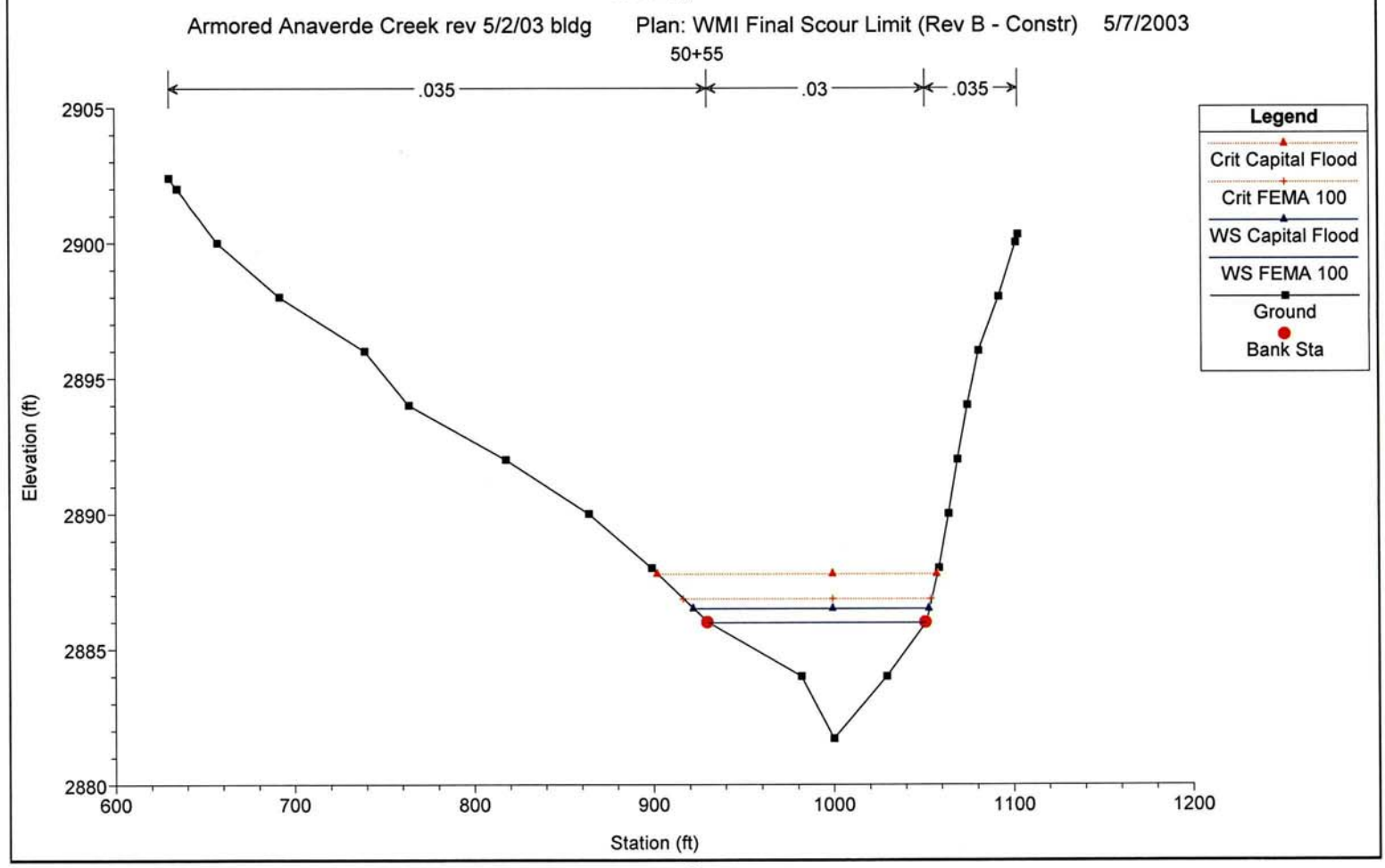
ANAVERDE CREEK
SCOUR LIMIT FLOOD PROFILE & CROSS-SECTIONS

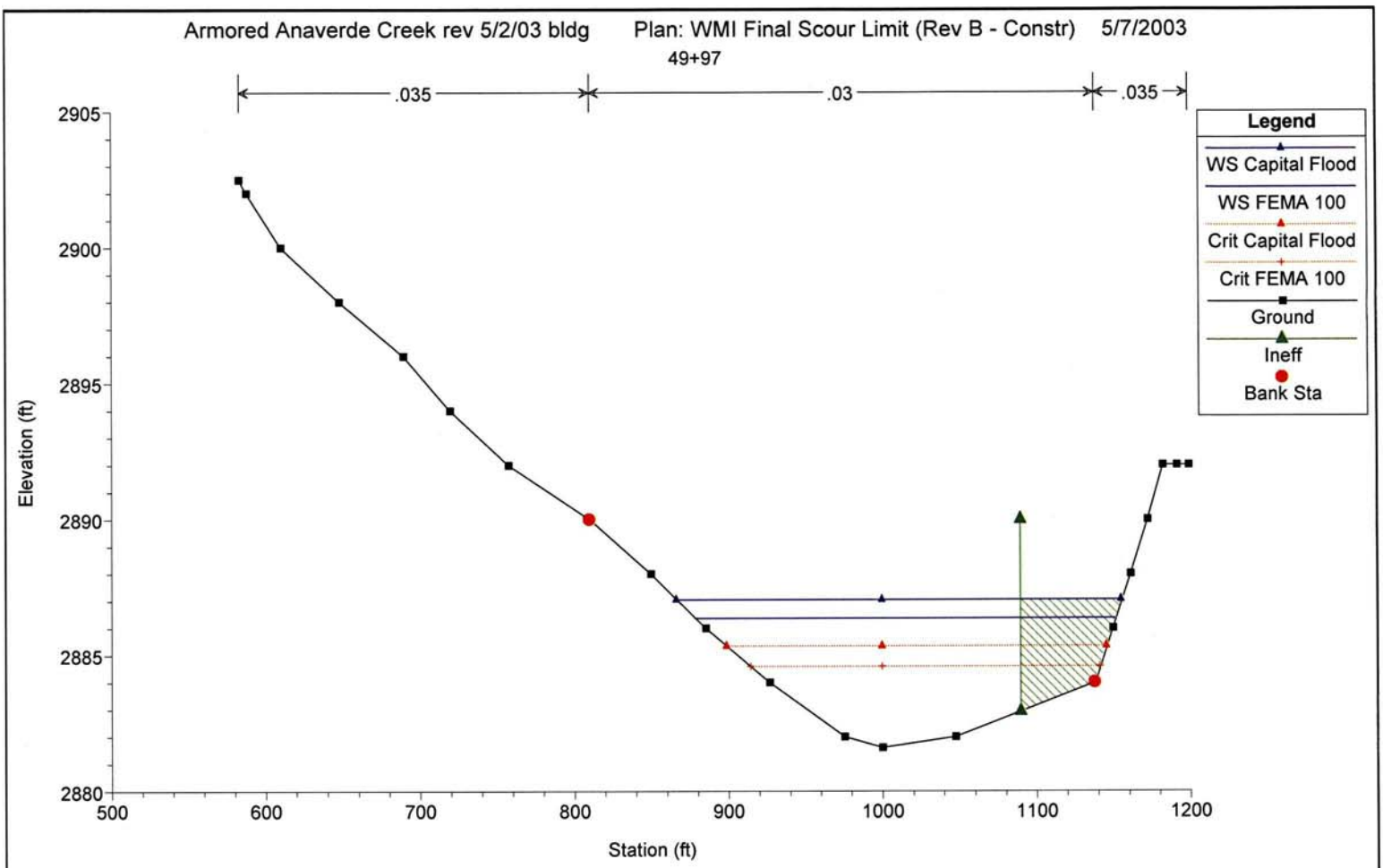

Armored Anaverde Creek rev 5/2/03 bldg Plan: WMI Final Scour Limit (Rev B - Constr) 5/7/2003
Anaverde Creek Antelope Valley
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Elevation (ft)
2900
2890
2880
2870
2860
2850
2840
2830
2820
0
1000
2000
3000
4000
5000
Main Channel Distance (ft)
10+52*
11+03*
11+53*
12+30
13+14
14+15
15+11
16+22
17+13
17+85
18+53
19+50 FILL
20+51 FILL (Construction mod.)
21+57 FILL (Construction mod.)
22+17 FILL (Construction mod.)
23+00 ex (Construction mod.)
23+97 ex
24+73 ex
25+97 ex
26+81 ex
27+96 ex
29+08 ex
29+98 ex
30+88 ex
31+97 ex
32+88 ex
33+85 ex
34+57 ex
35+09 (manual)
36+41
36+98 DS of Bridge
37+49 US of Culvert
38+24 ex
38+91 ex
39+36 ex
40+11 ex
40+96 ex
41+82 ex
42+70
43+60
44+39
45+49*
46+20*
46+92
47+48
48+51
49+97
50+55
51+50
52+04
52+86

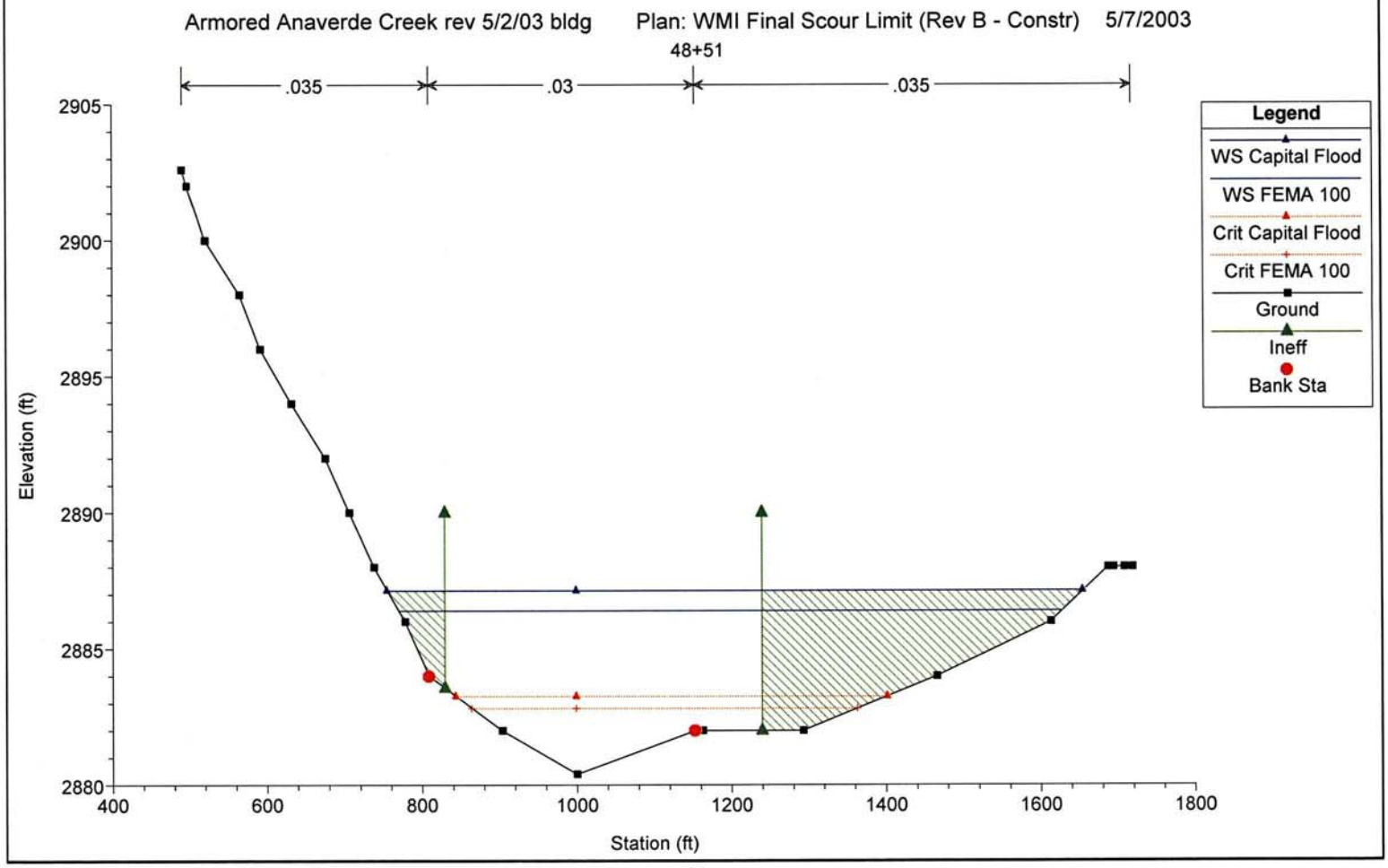

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
52+86
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2910
2905
2900
2895
2890
2885
2880
750
800
850
900
950
1000
1050
1100

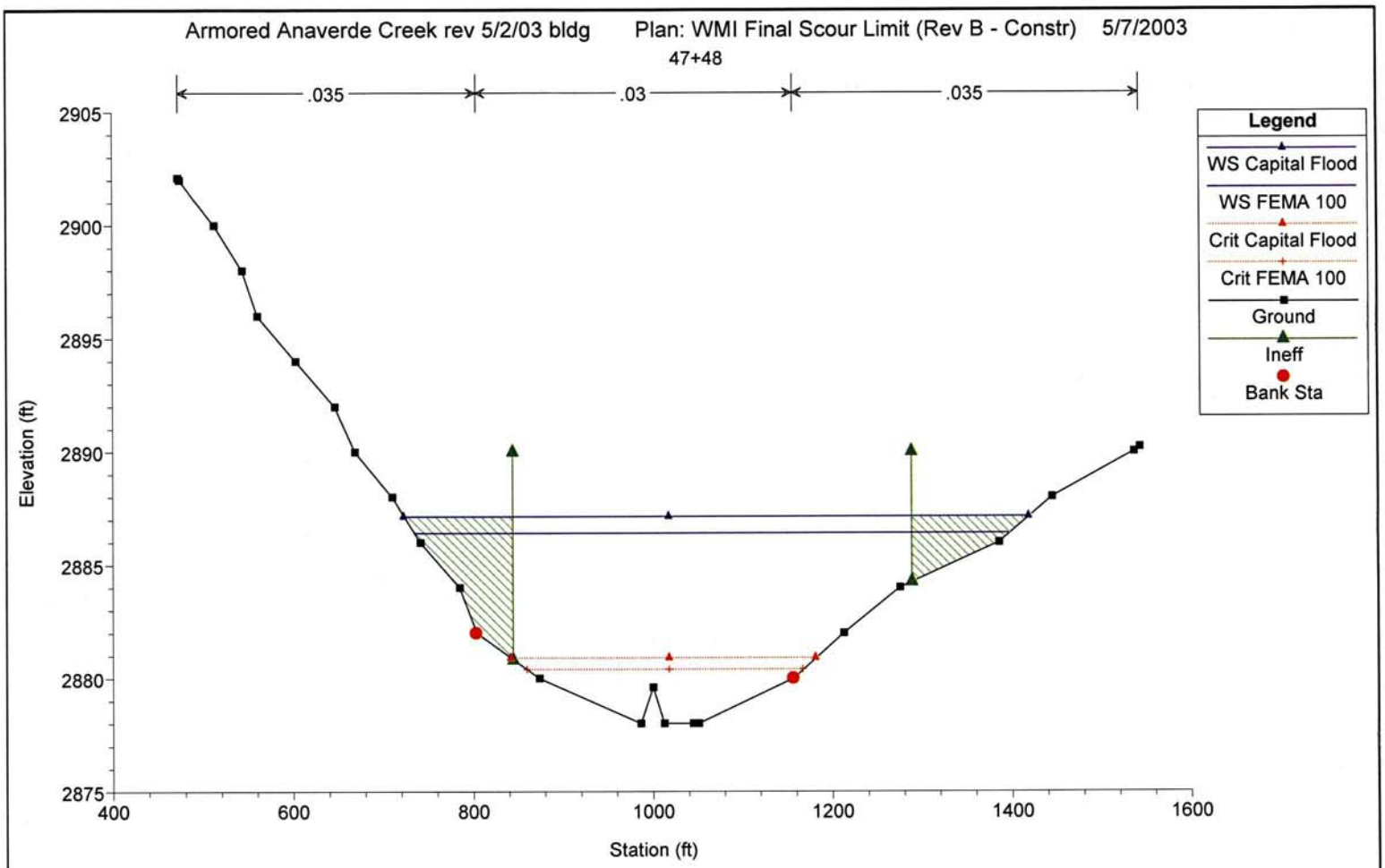

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
52+04
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
750
800
850
900
950
1000
1050
1100

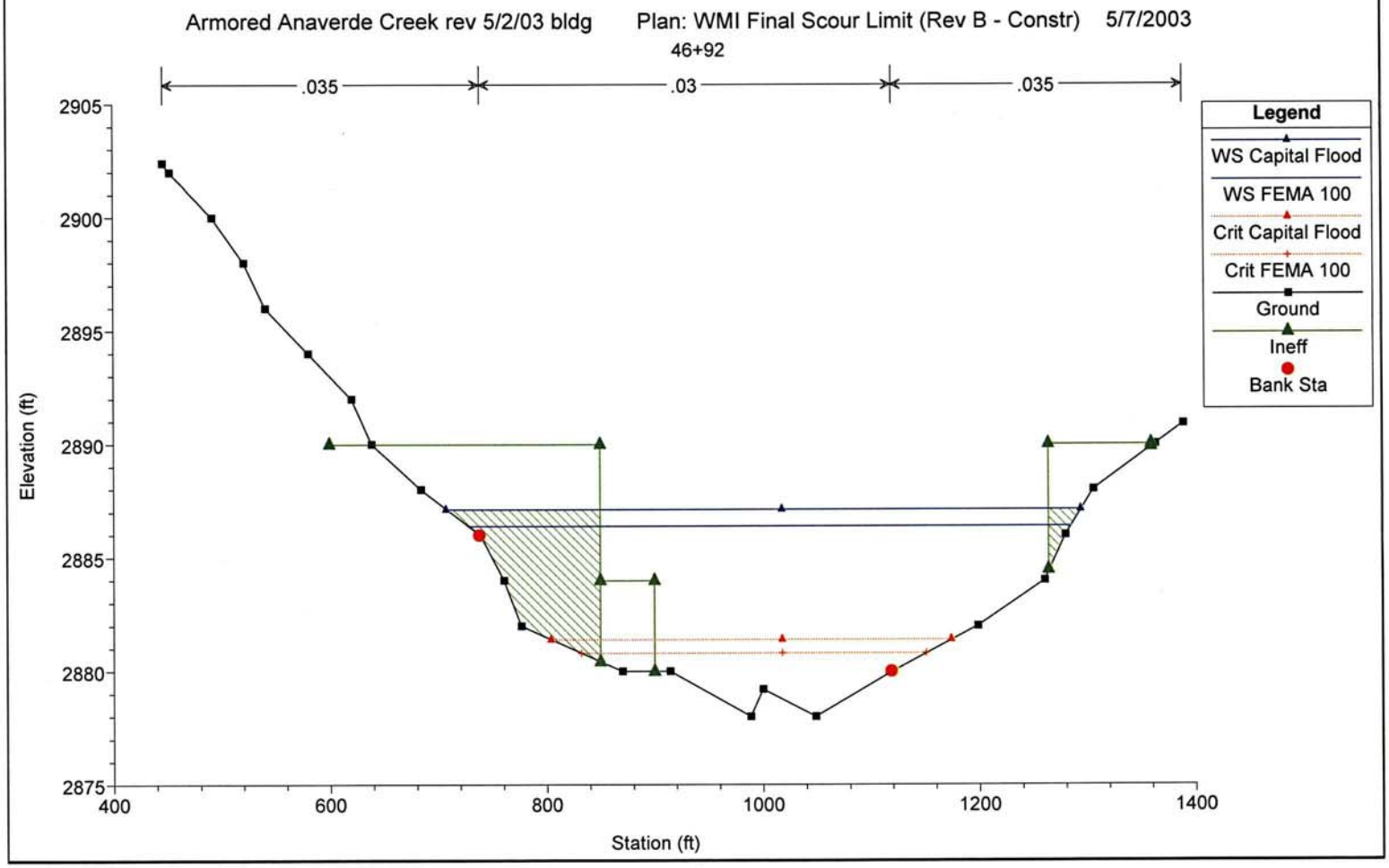

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
51+50
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
700
750
800
850
900
950
1000
1050
1100

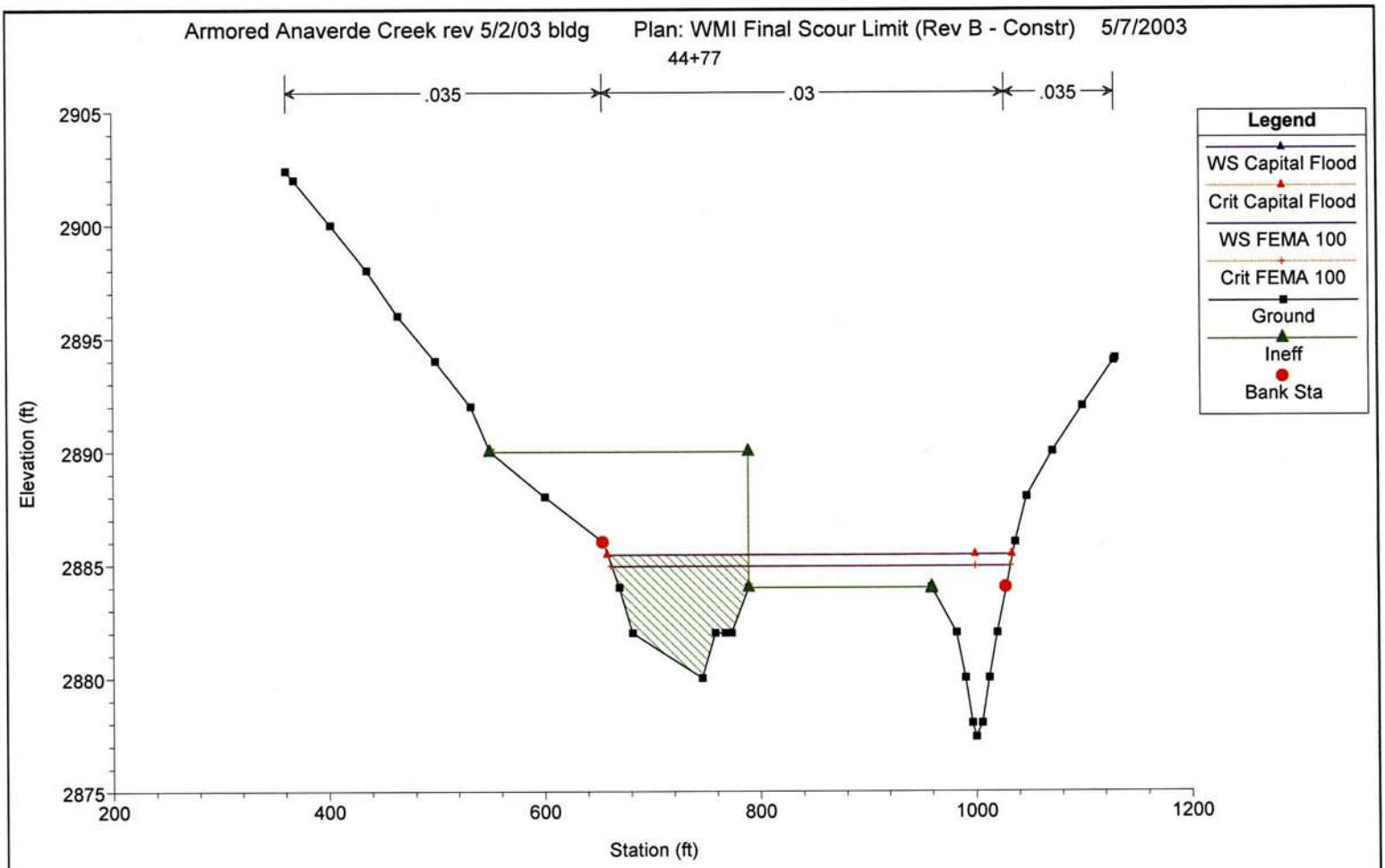

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
50+55
.035
.03
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
600
700
800
900
1000
1100
1200

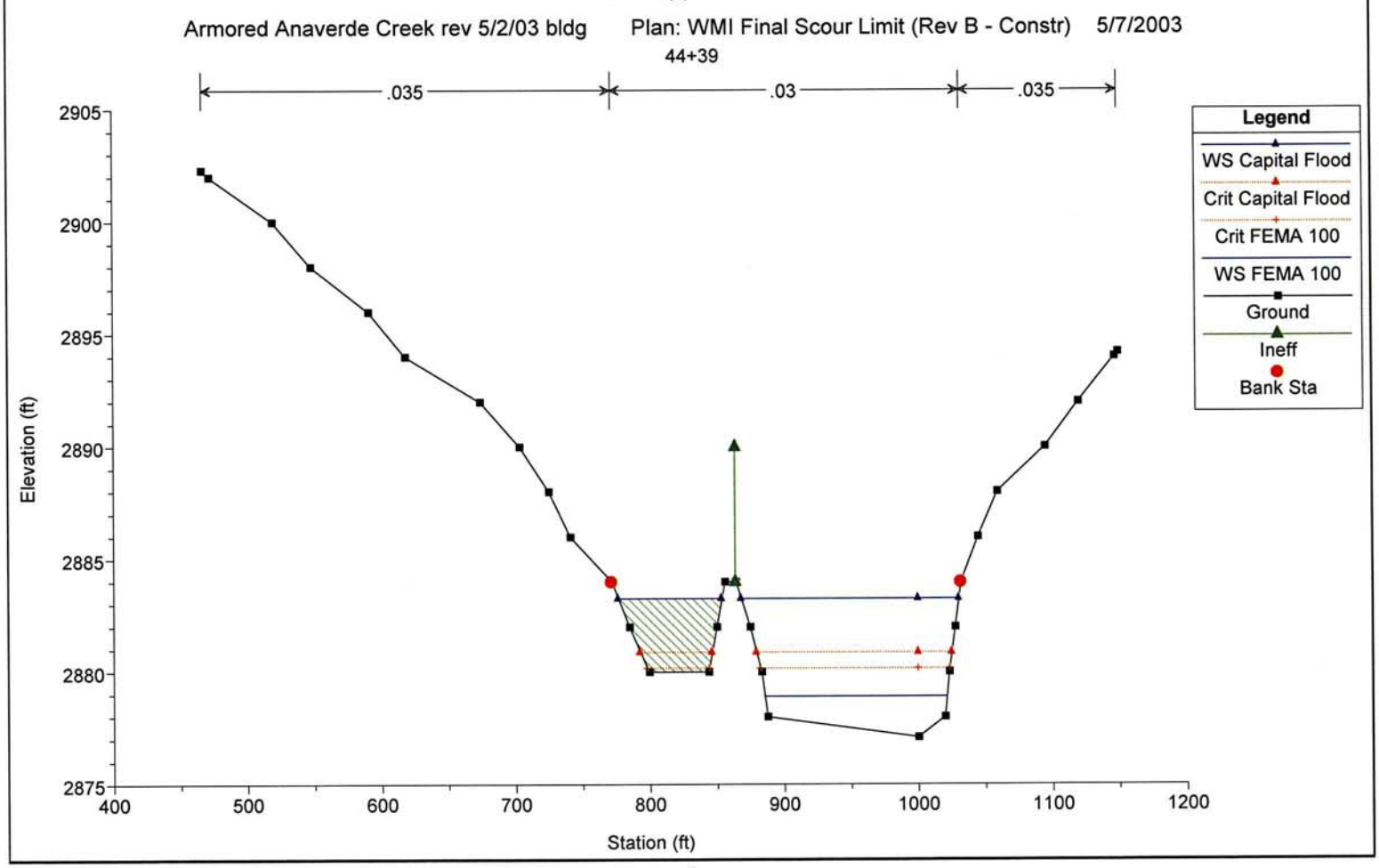

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
49+97
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
500
600
700
800
900
1000
1100
1200

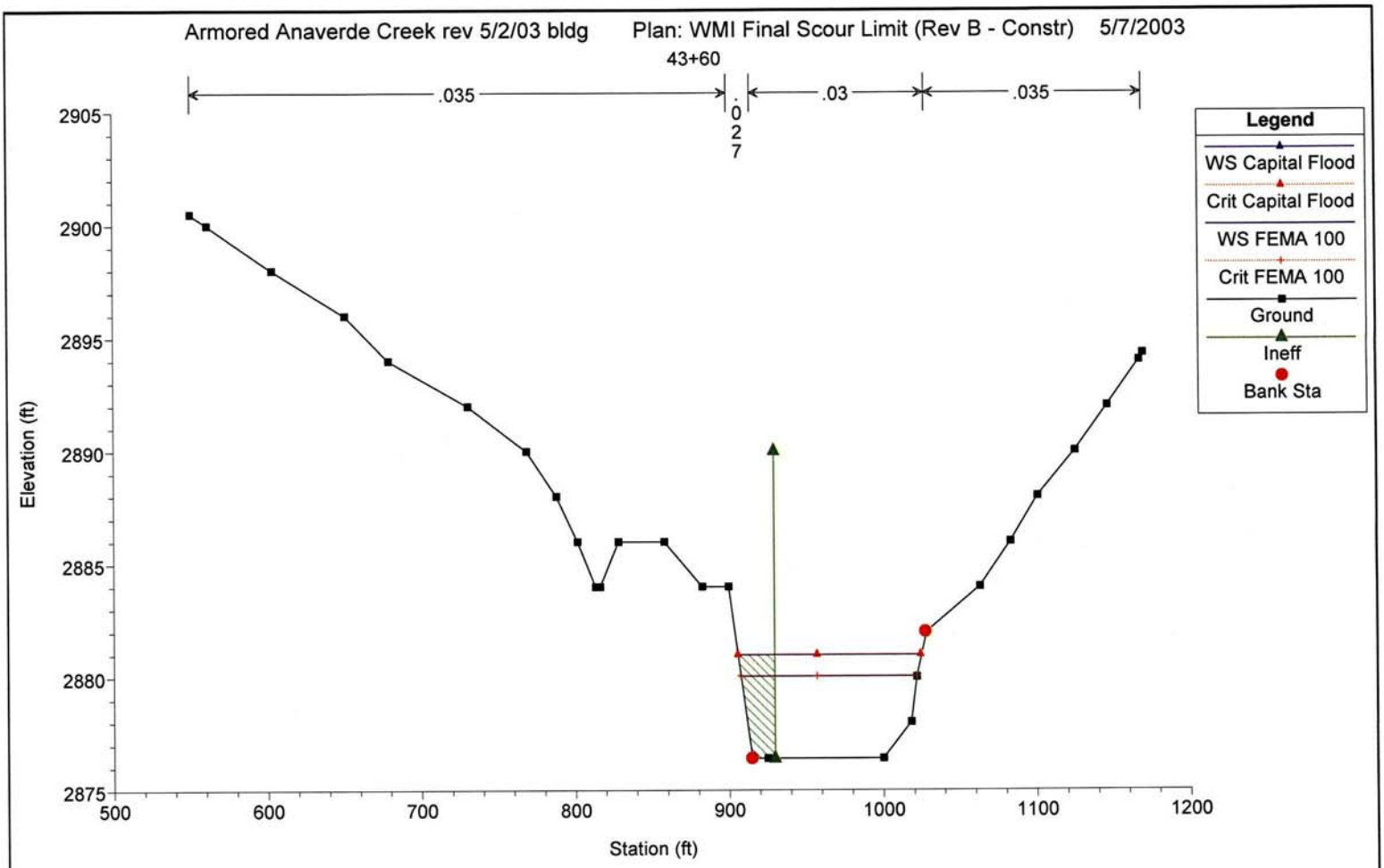

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
48+51
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
400
600
800
1000
1200
1400
1600
1800

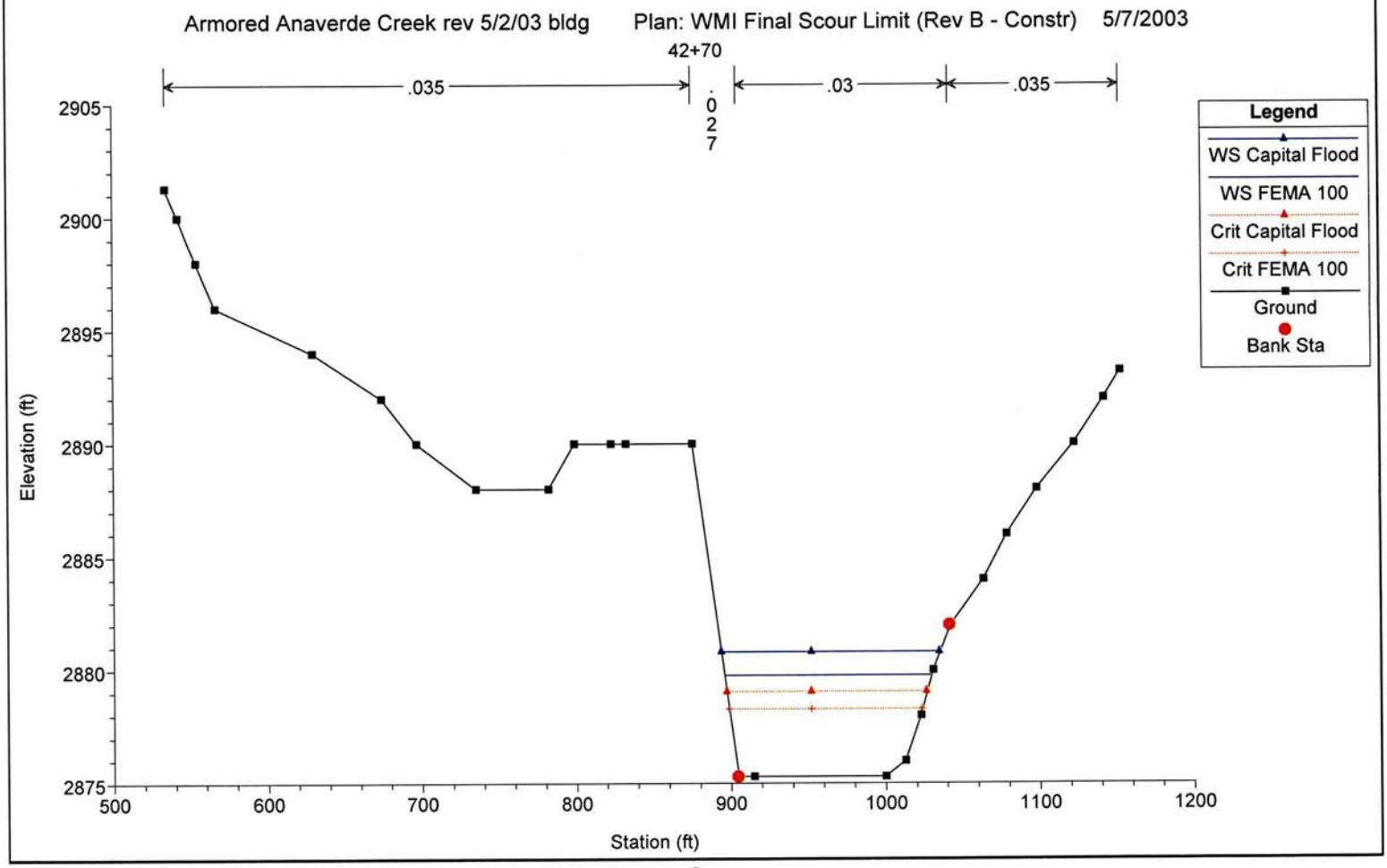

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
47+48
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
400
600
800
1000
1200
1400
1600

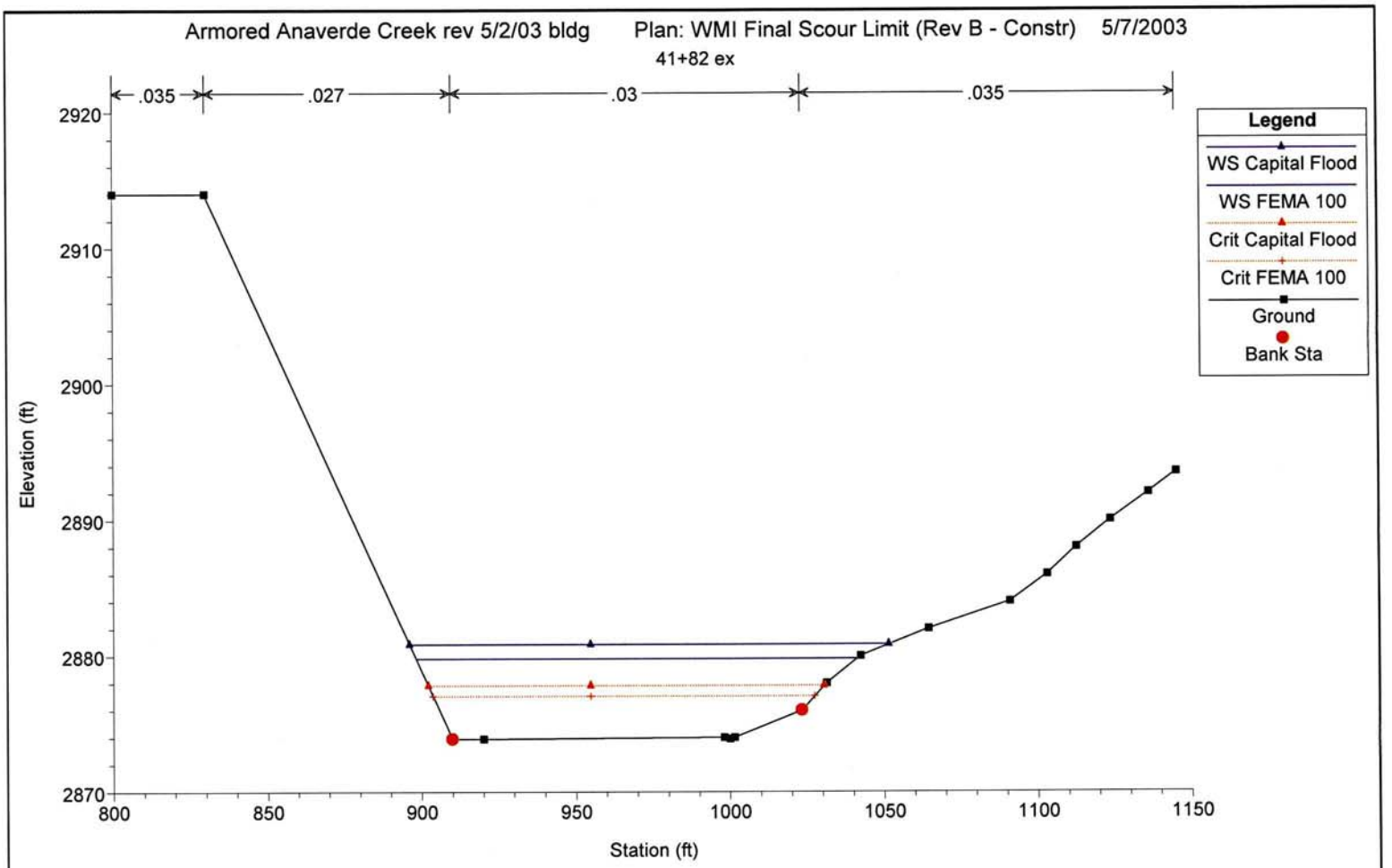

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
46+92
.035
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
400
600
800
1000
1200
1400

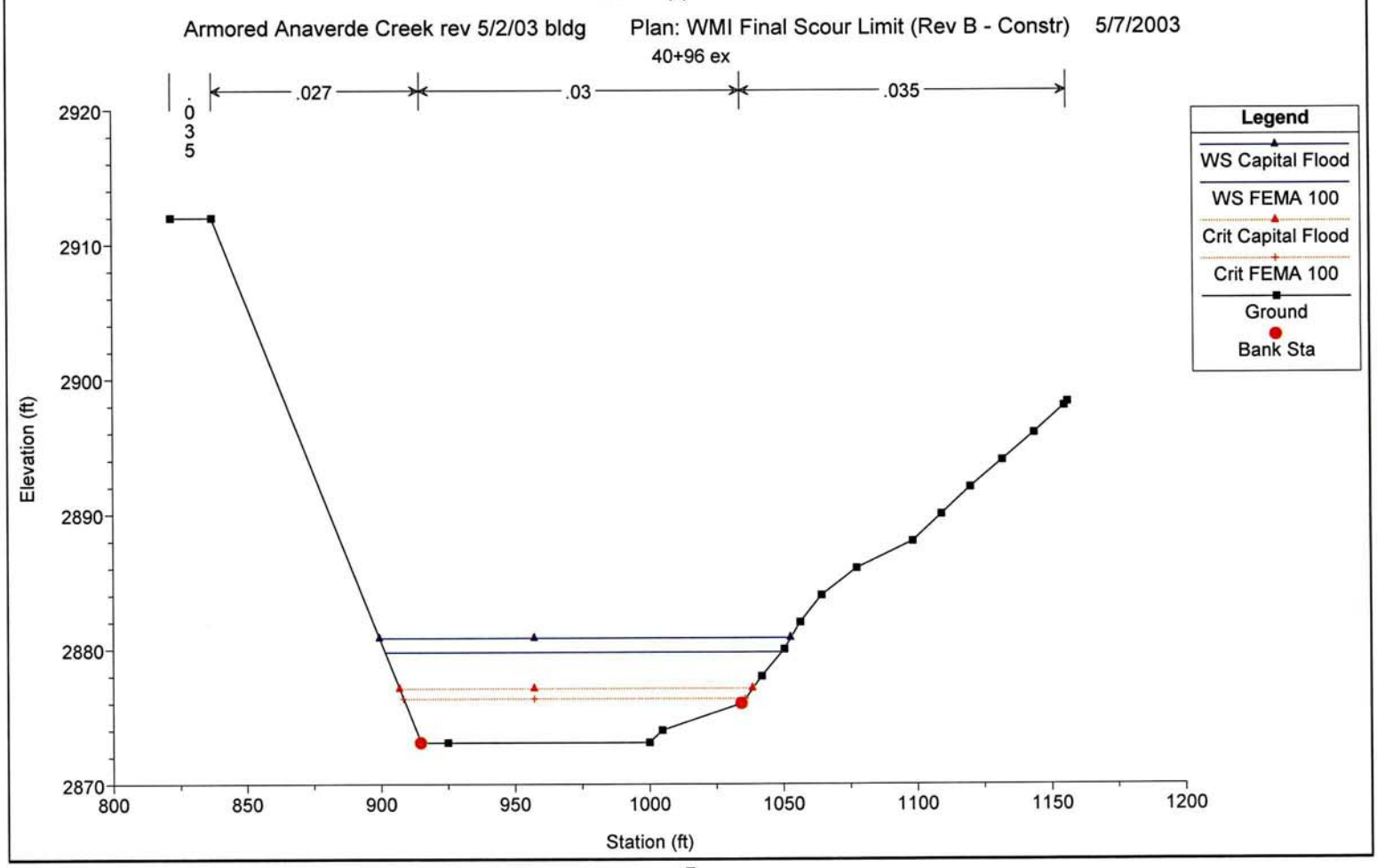

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
44+77
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

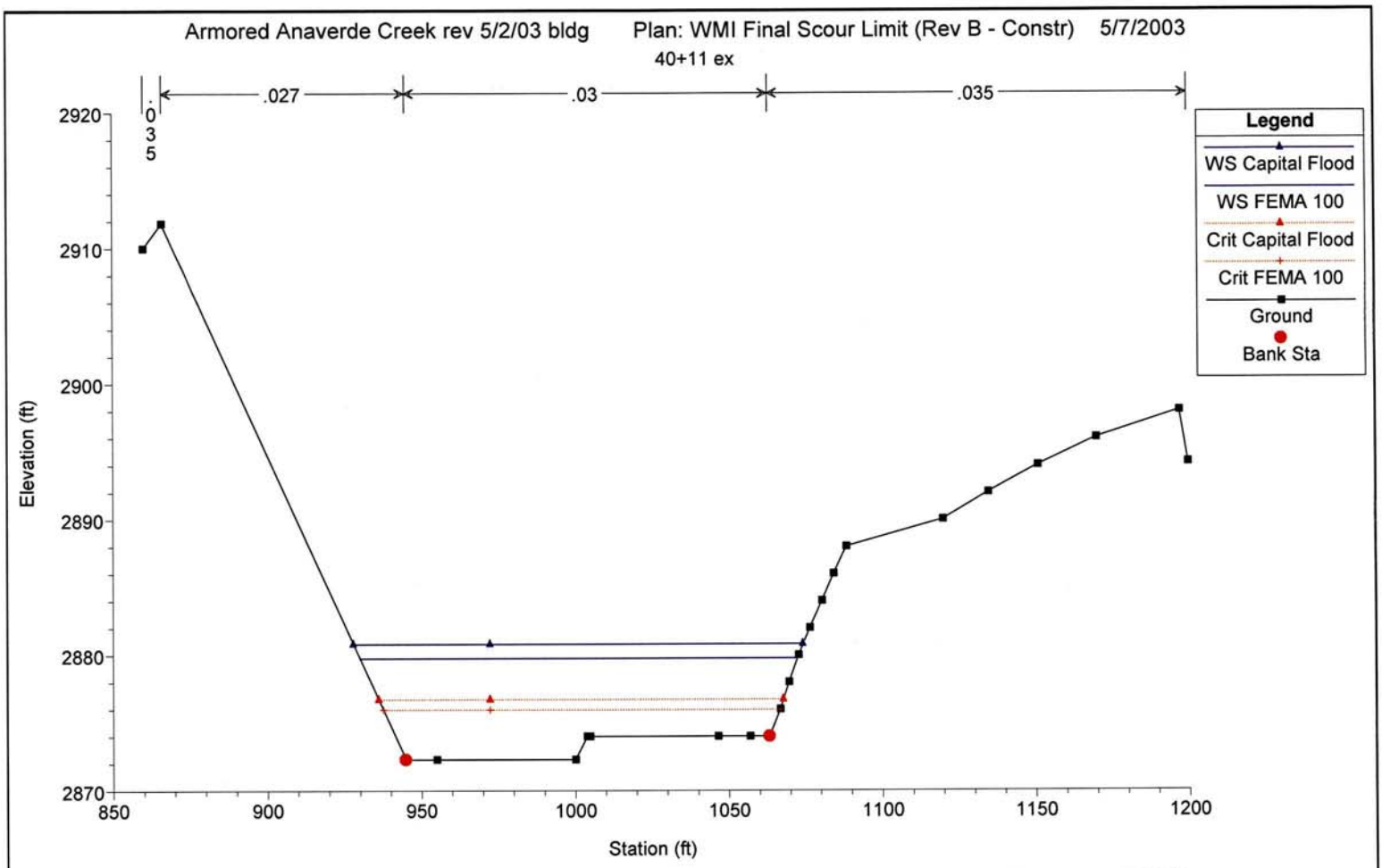

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
44+39
.035
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

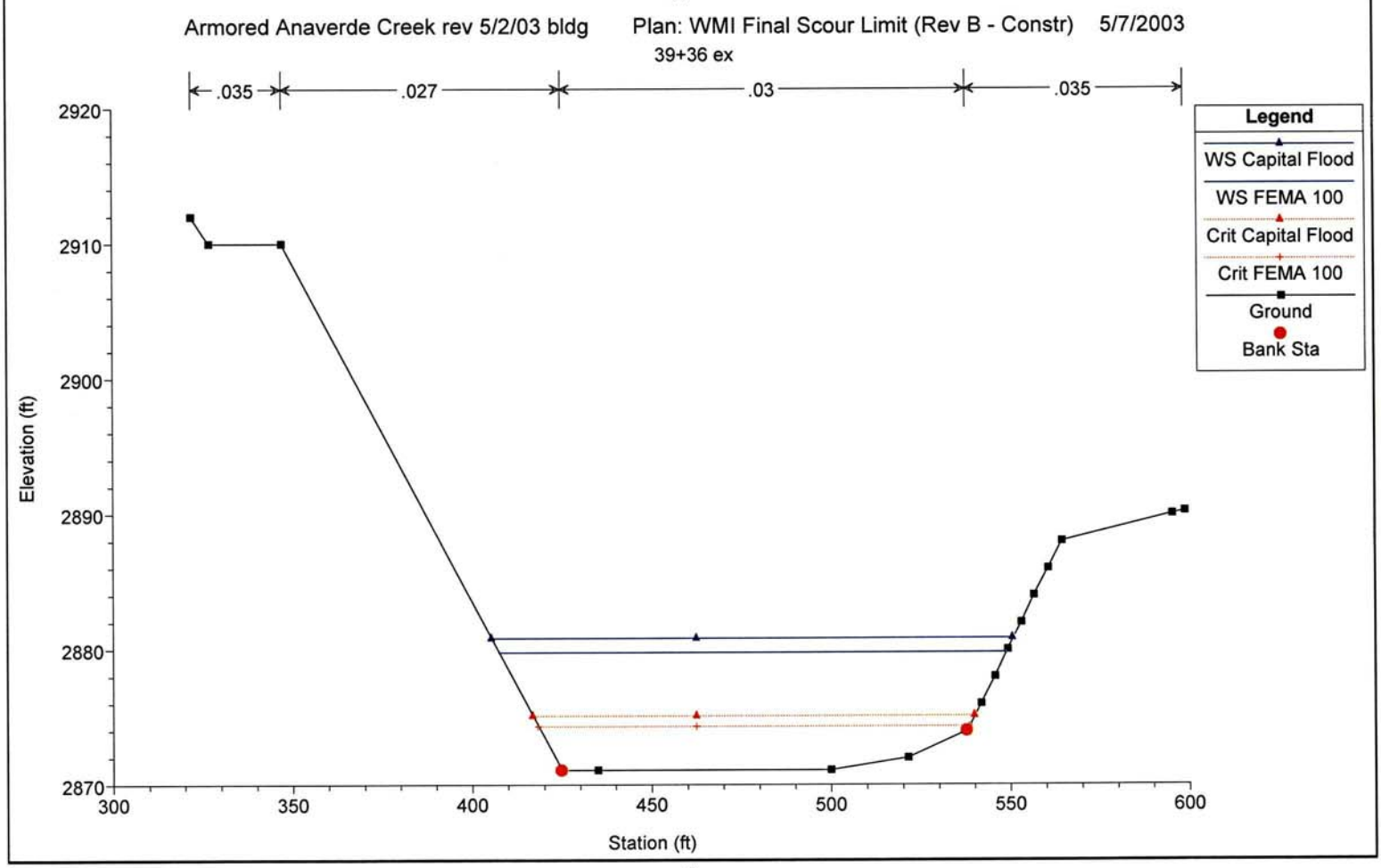

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
43+60
.035
.027
.03
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
500
600
700
800
900
1000
1100
1200

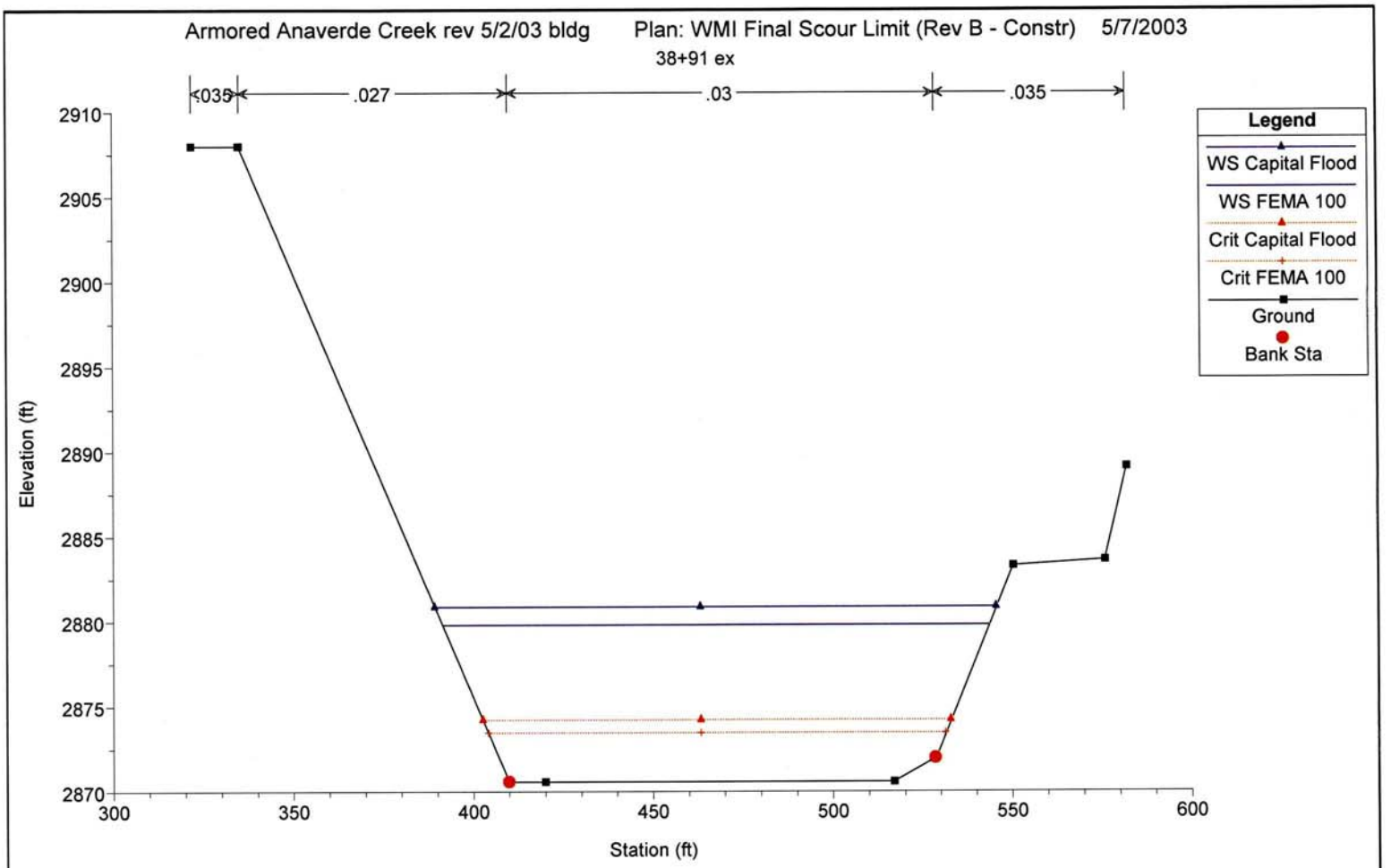

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
42+70
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2905
2900
2895
2890
2885
2880
2875
500
600
700
800
900
1000
1100
1200

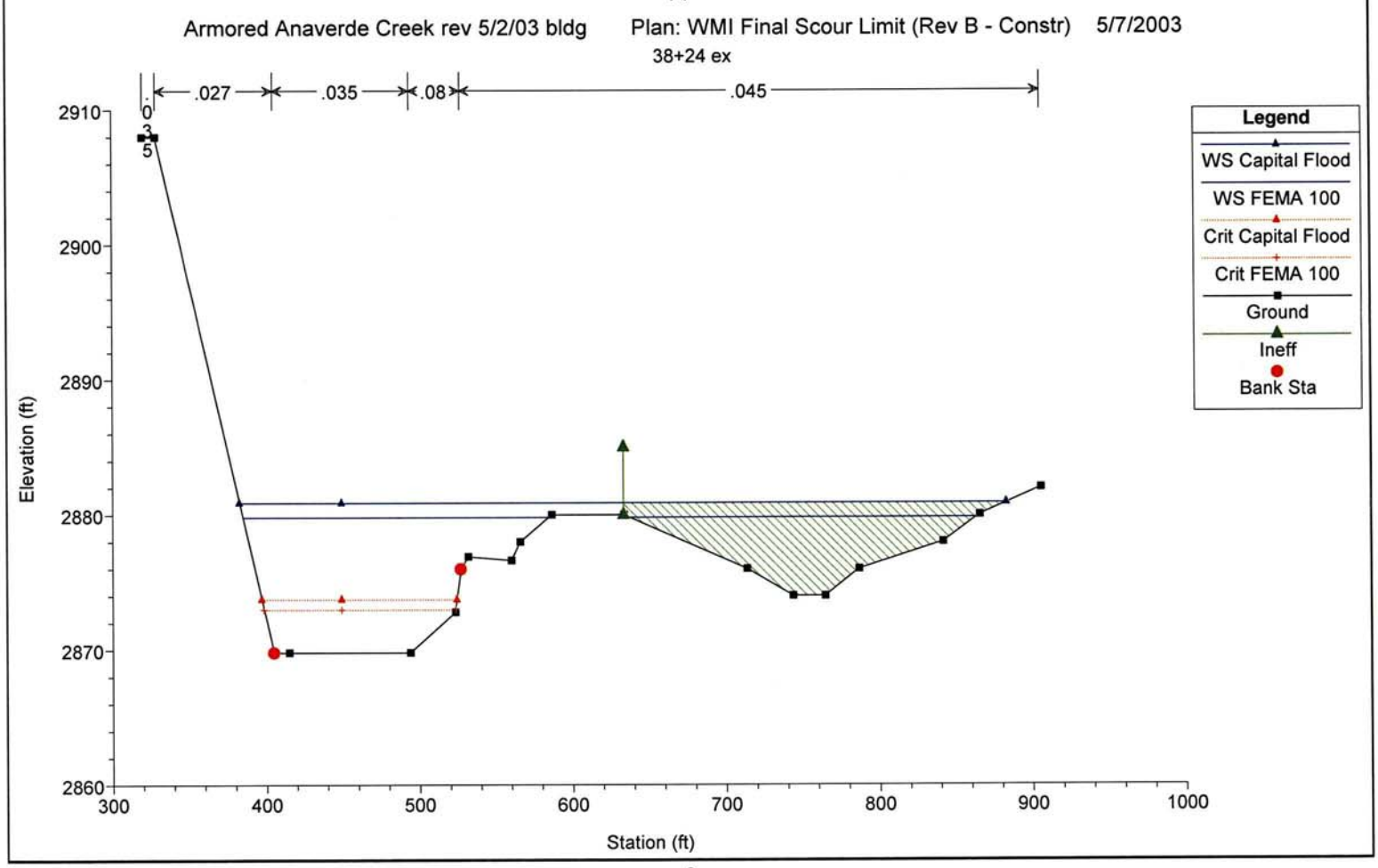

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
41+82 ex
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
40+96 ex
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
40+11 ex
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
2920
2910
2900
2890
2880
2870
850
900
950
1000
1050
1100
1150
1200
Station (ft)

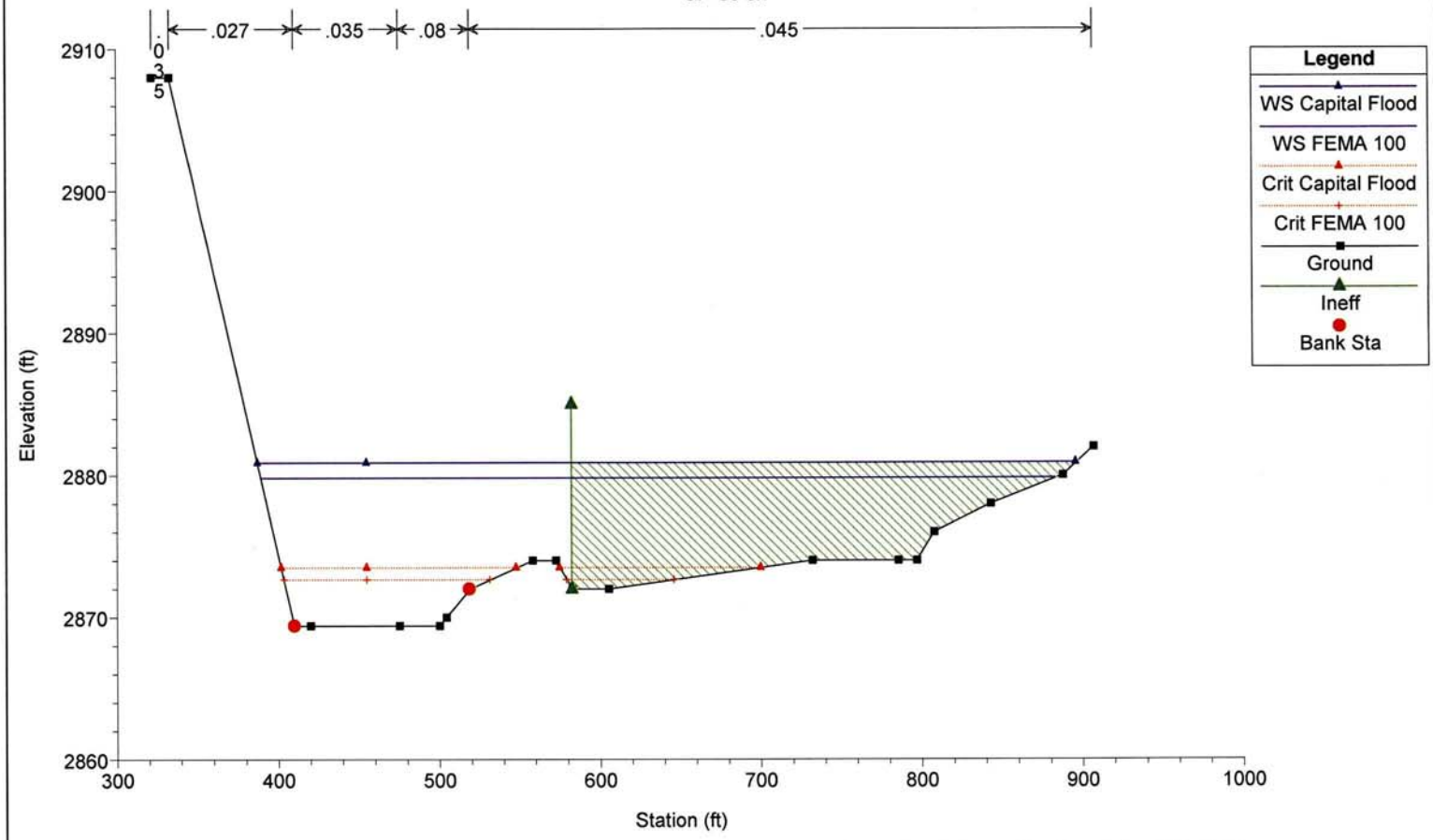

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
39+36 ex
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
2920
2910
2900
2890
2880
2870
300
350
400
450
500
550
600
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
38+91 ex
.035
.027
.03
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
38+24 ex
.027
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

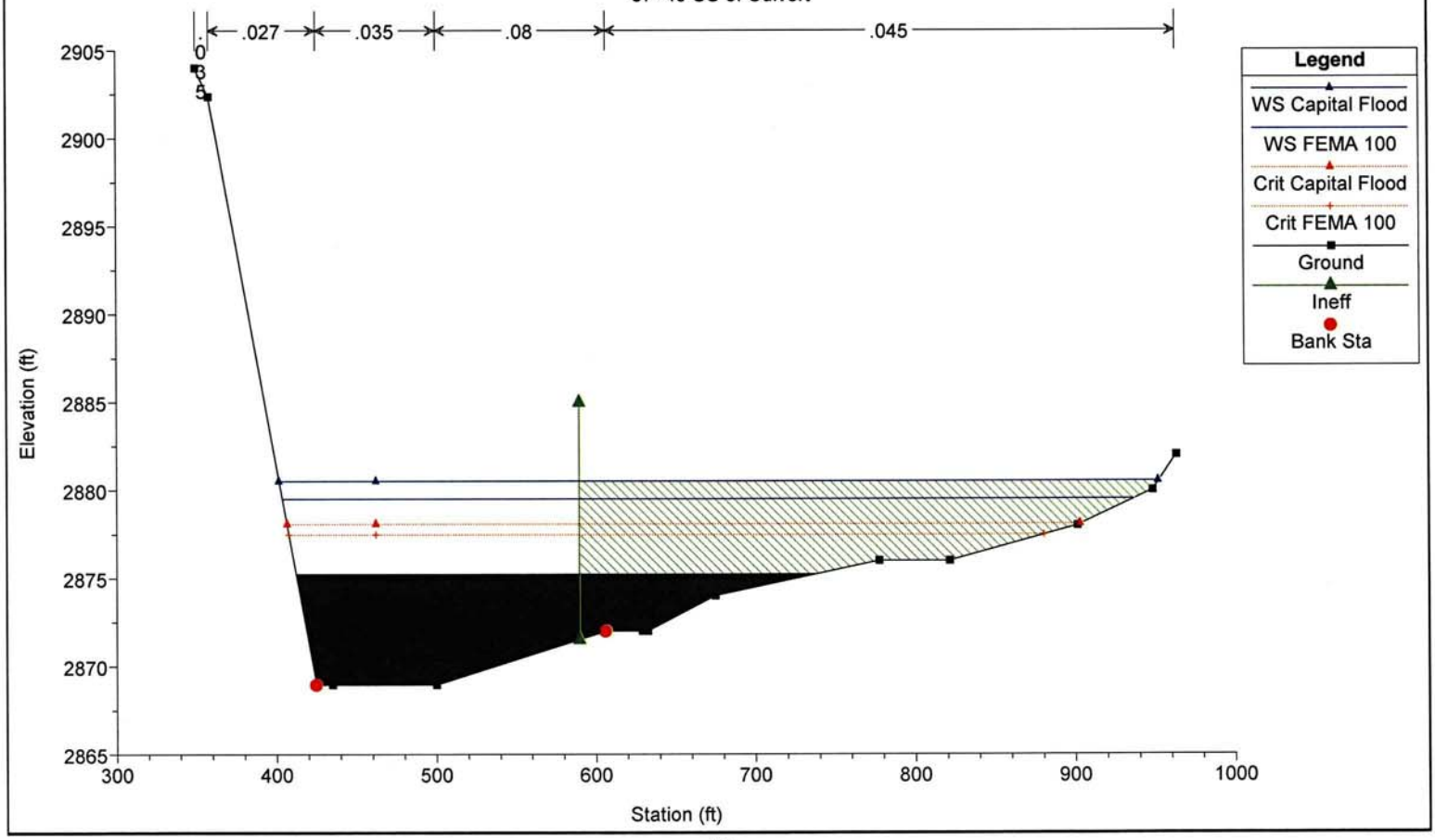
Armored Anaverde Creek rev 5/2/03 bldg Plan: WMI Final Scour Limit (Rev B - Constr) 5/7/2003

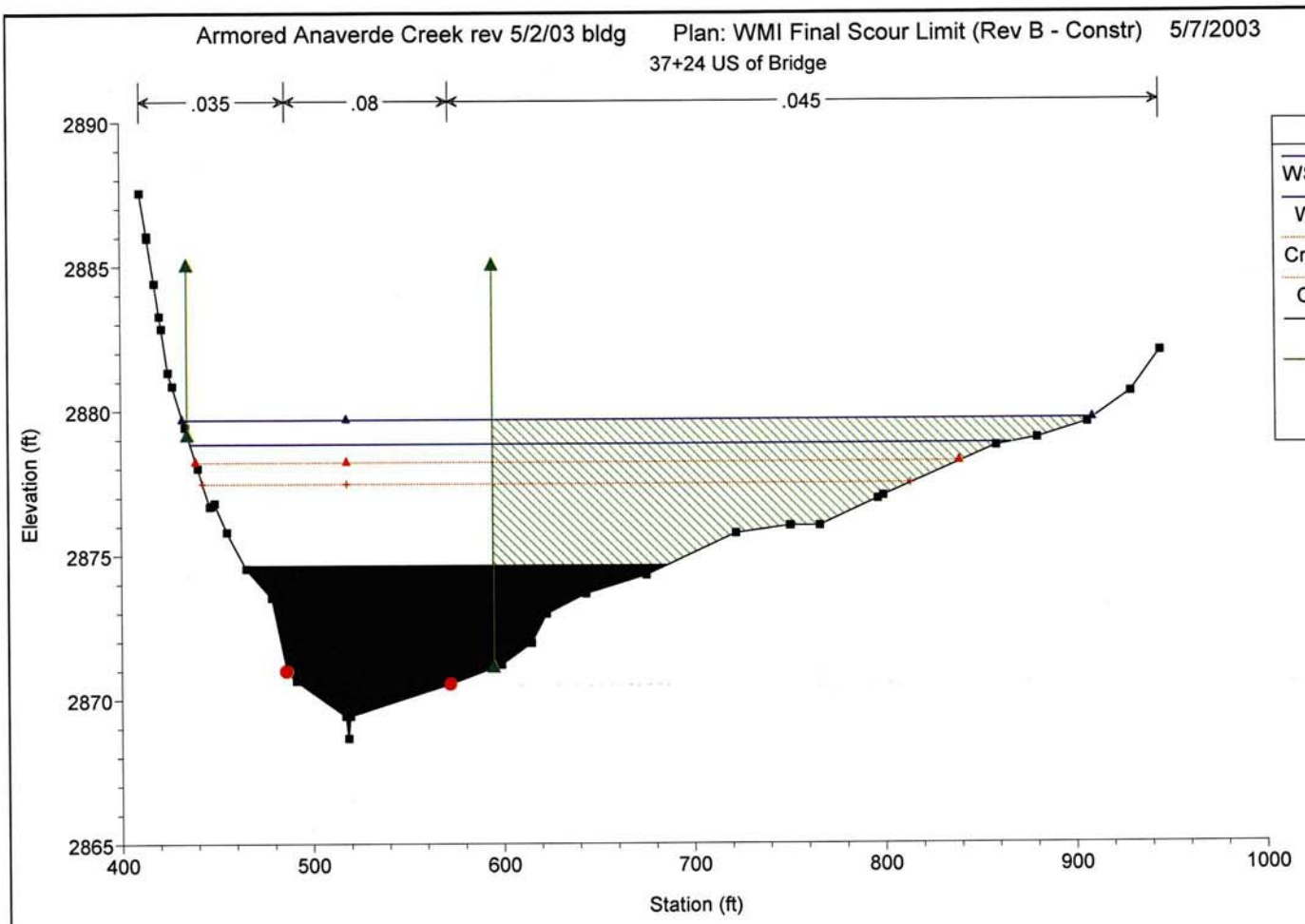
37+89 ex

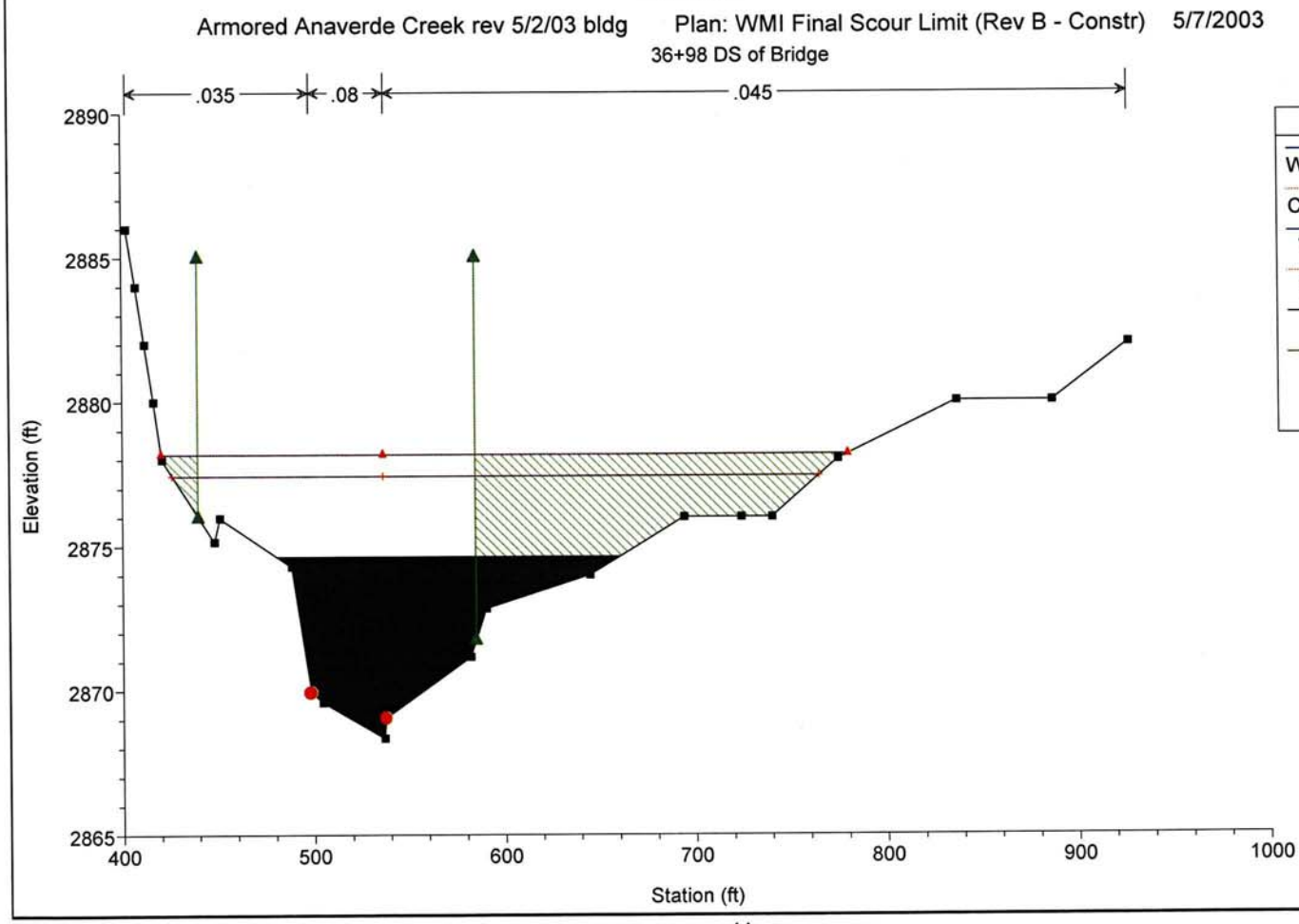


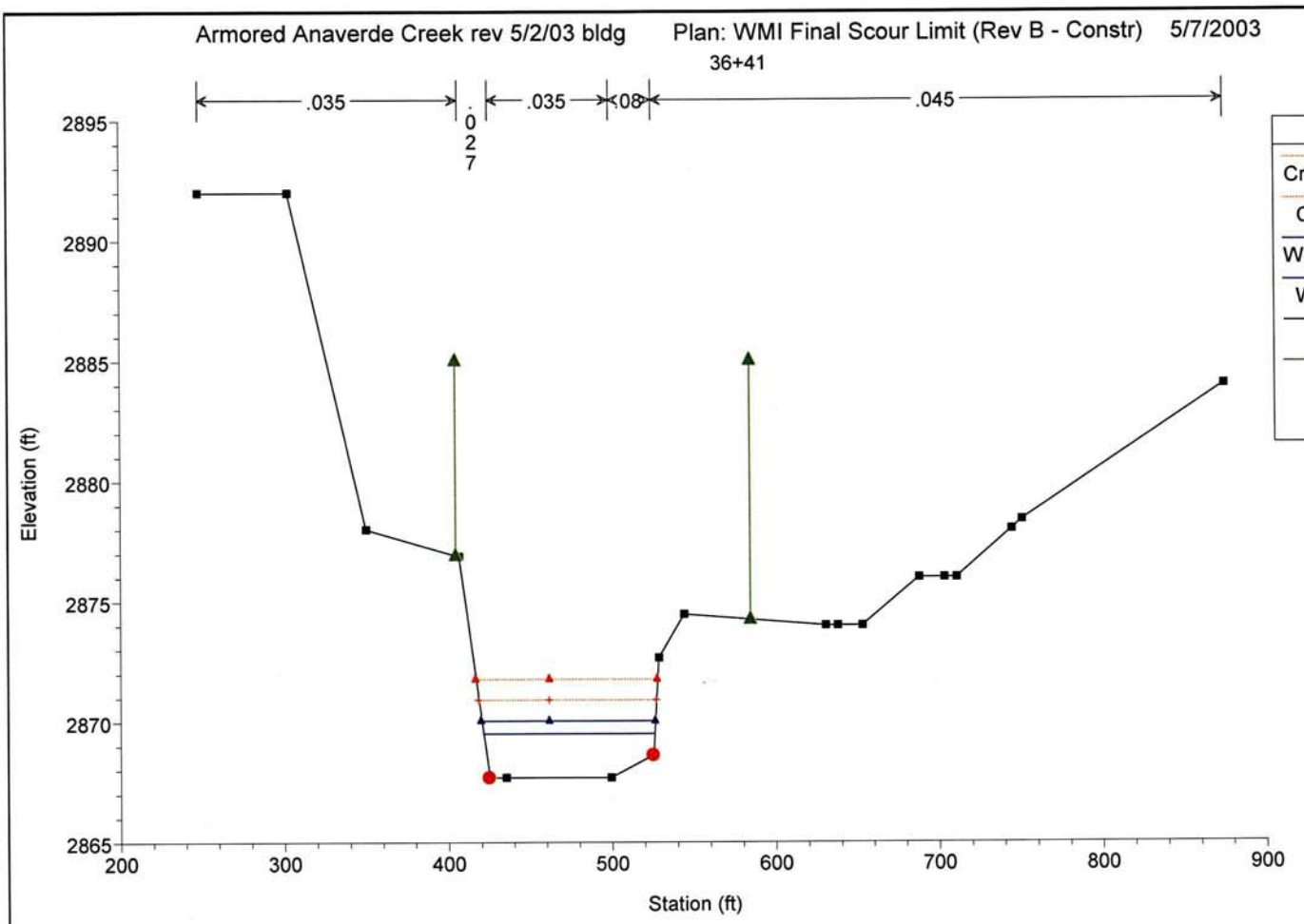
Armored Anaverde Creek rev 5/2/03 bldg Plan: WMI Final Scour Limit (Rev B - Constr) 5/7/2003

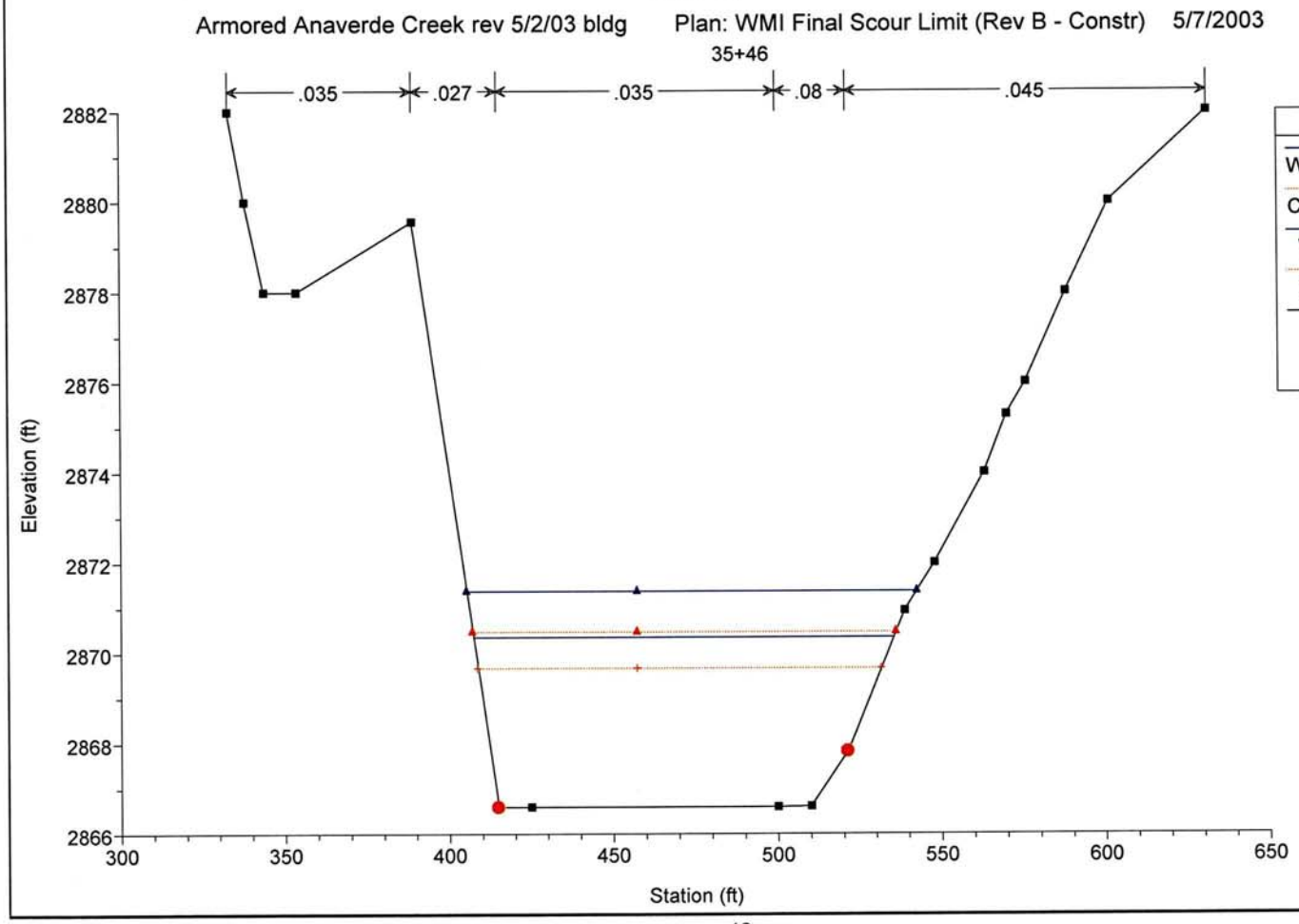
37+49 US of Culvert

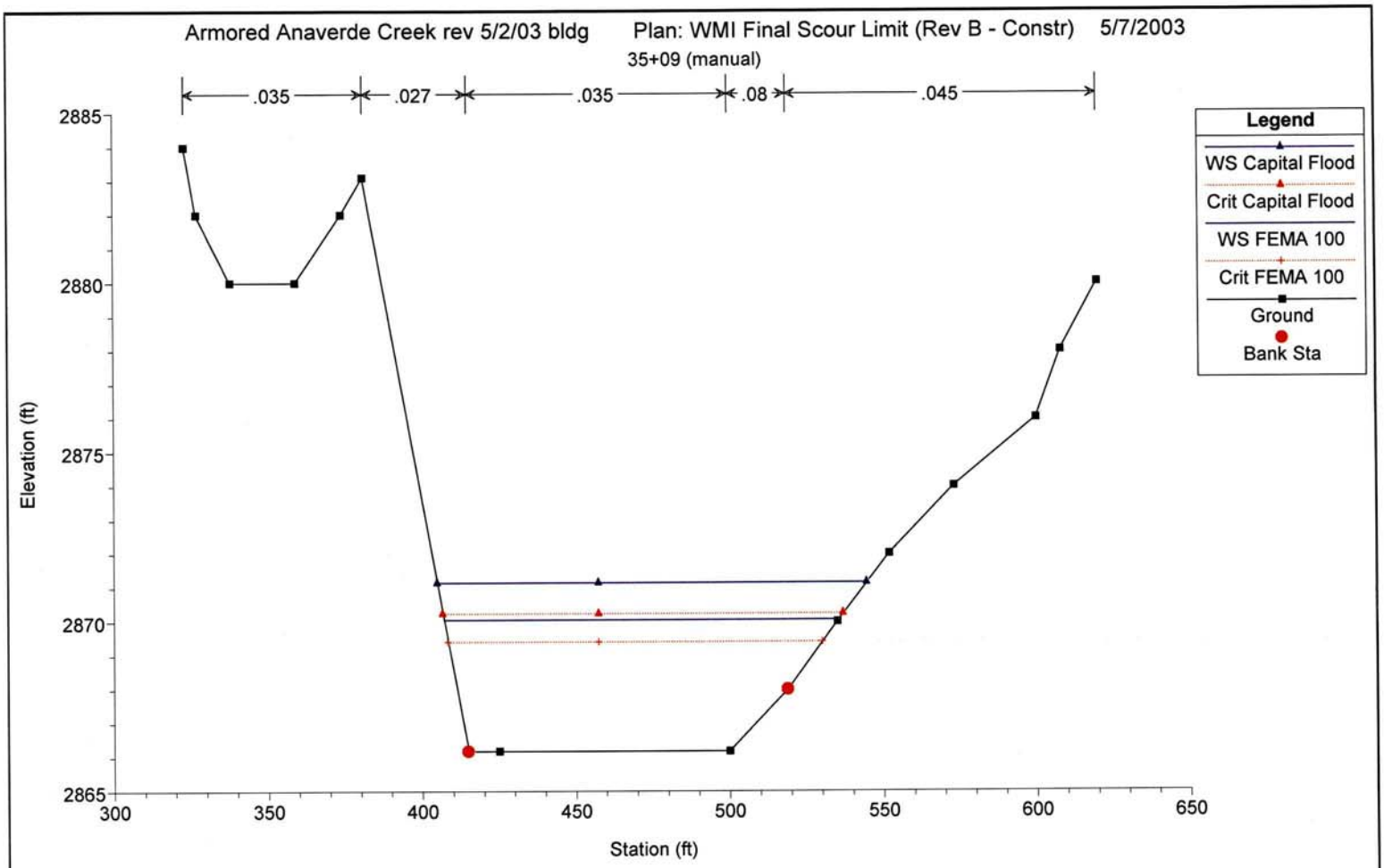


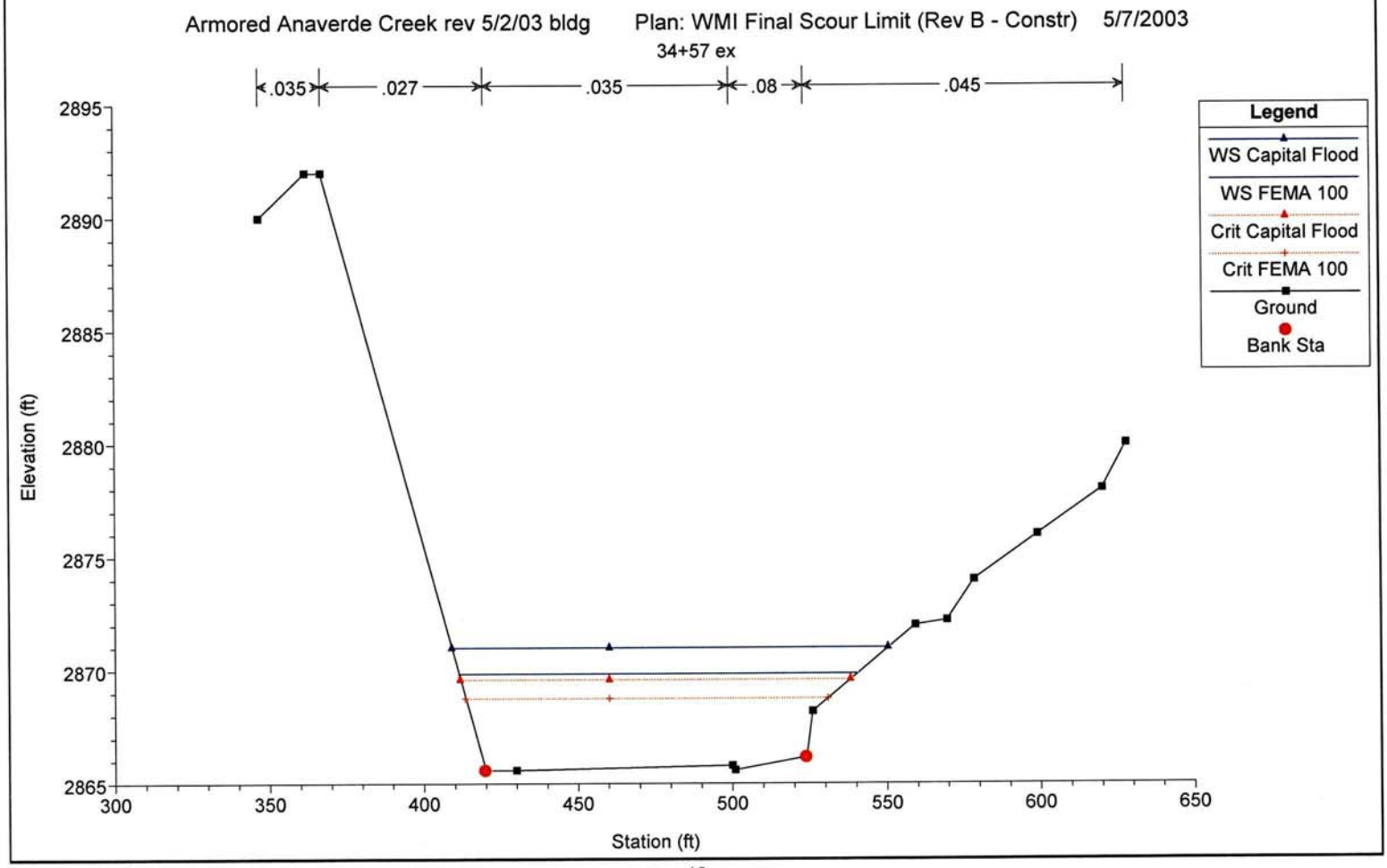

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
37+24 US of Bridge
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

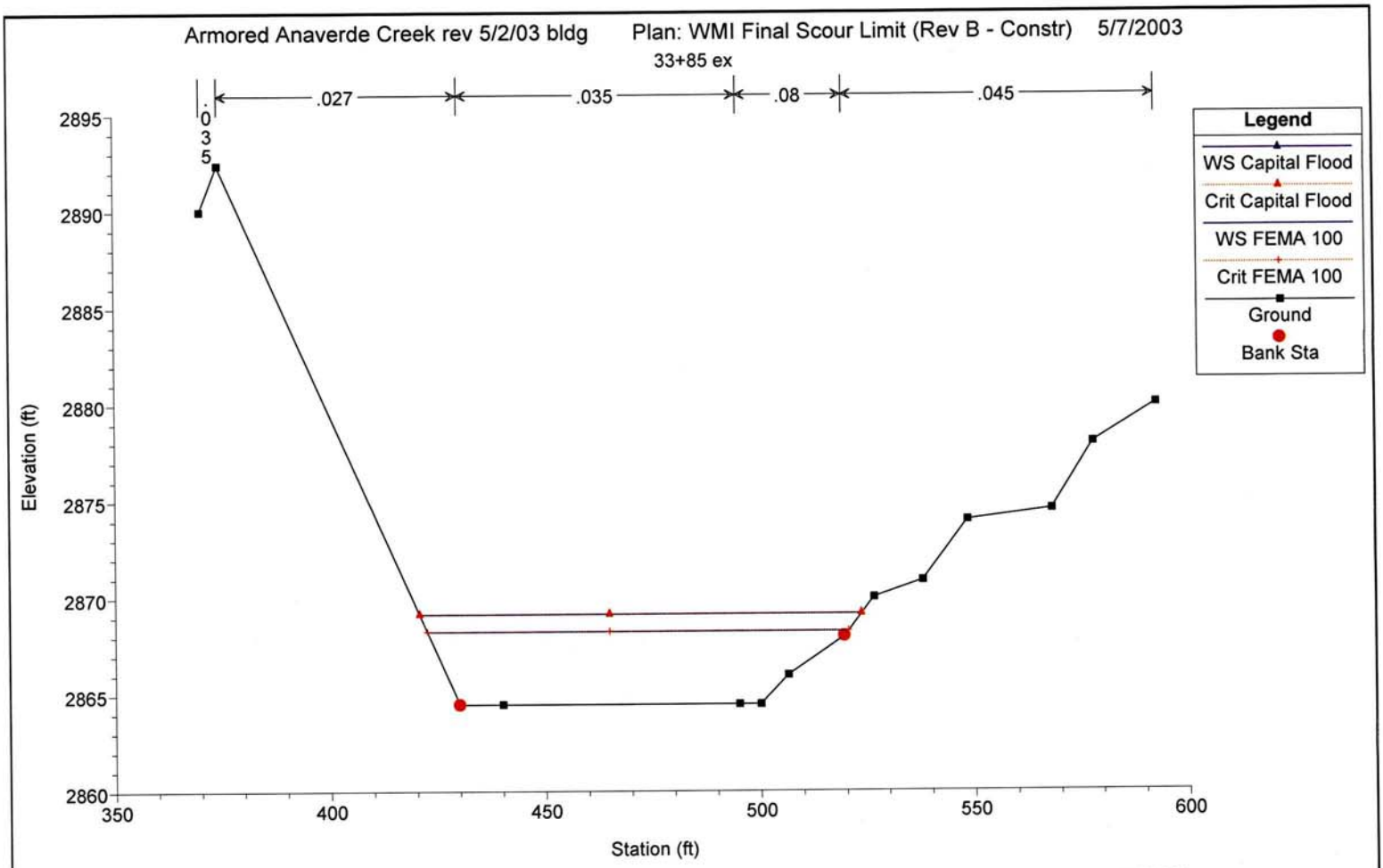

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
36+98 DS of Bridge
.035
.08
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2890
2885
2880
2875
2870
2865
400
500
600
700
800
900
1000

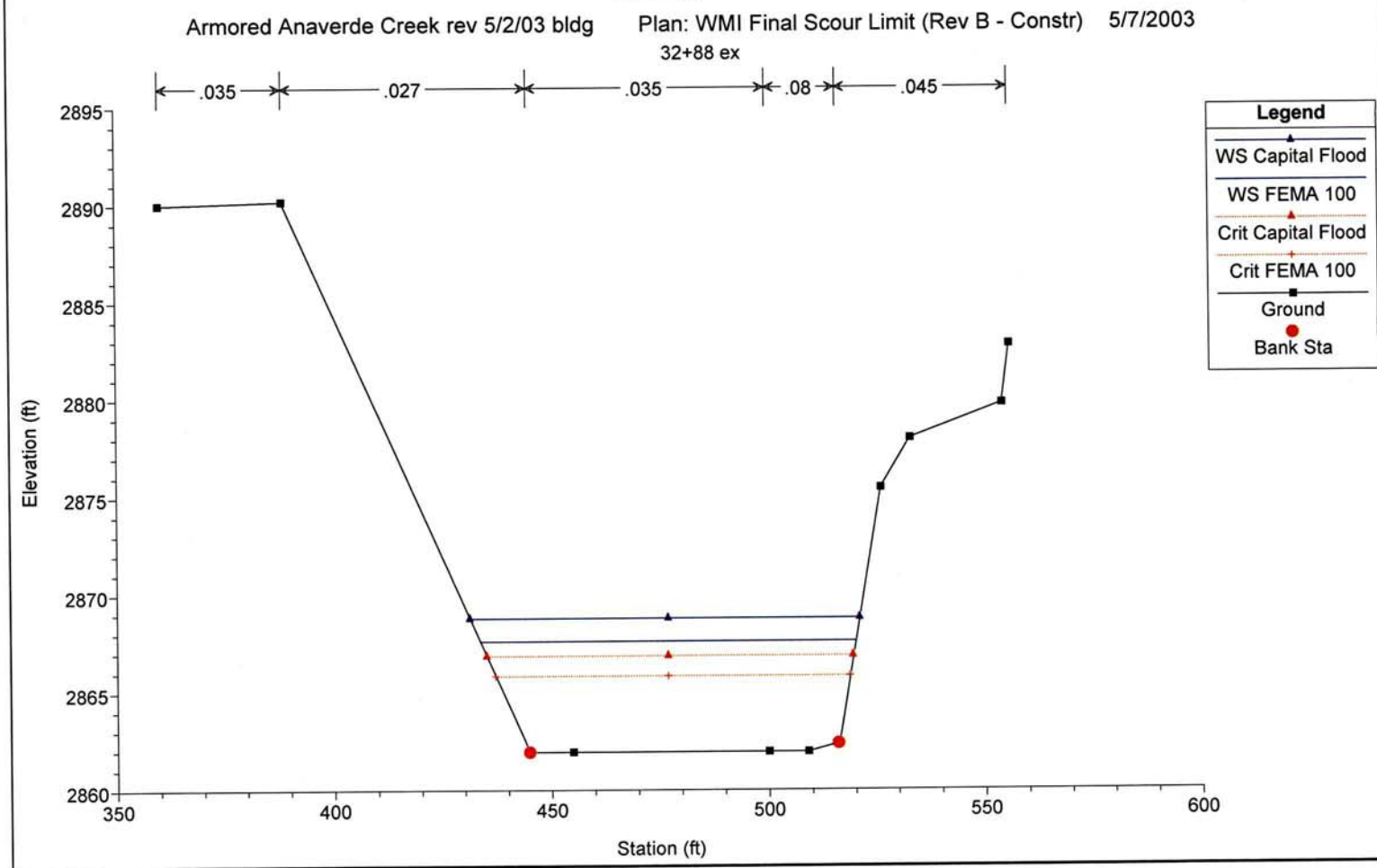

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
36+41
.035
.027
.035
.08
.045
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

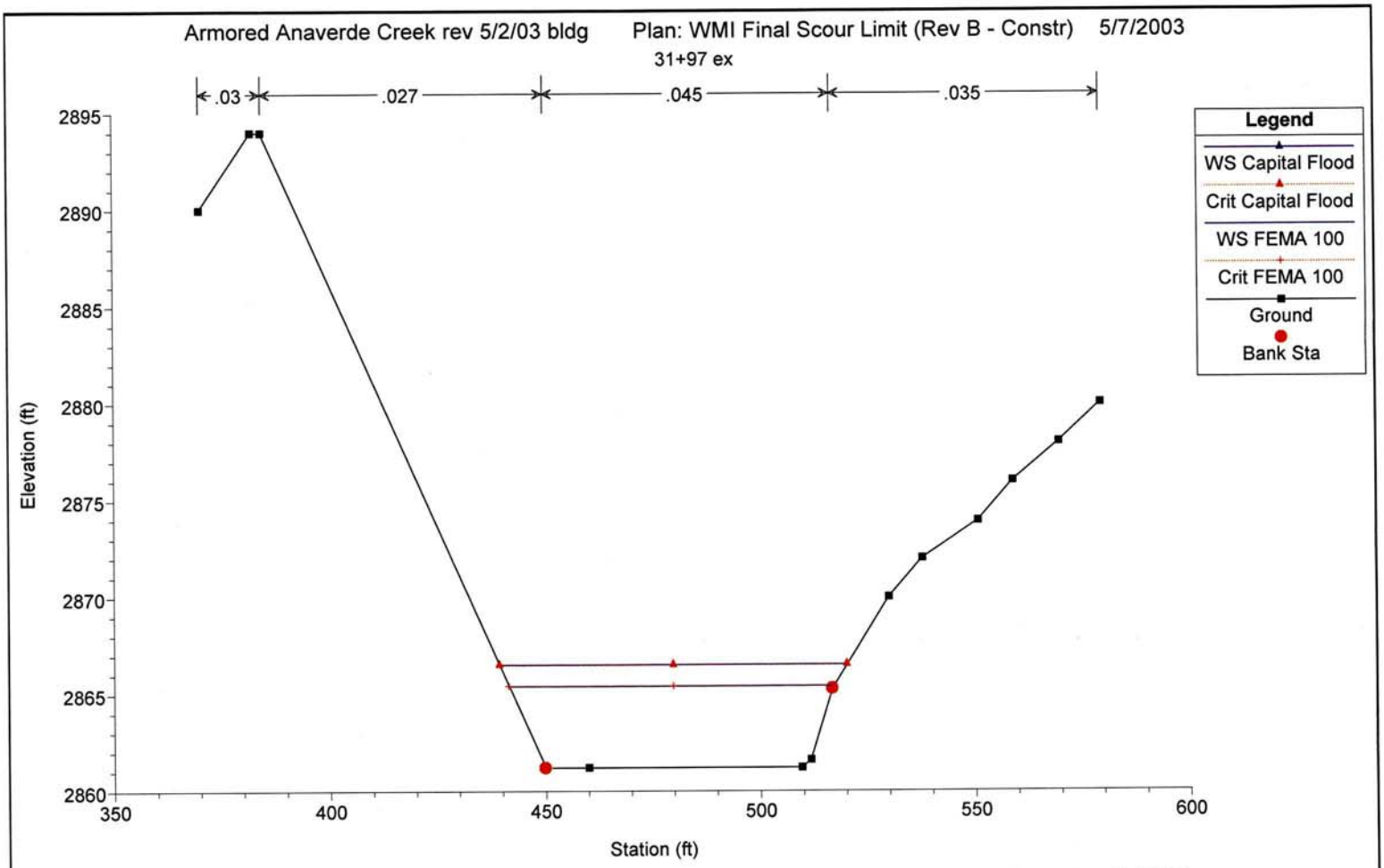

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
35+46
.035
.027
.035
.08
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

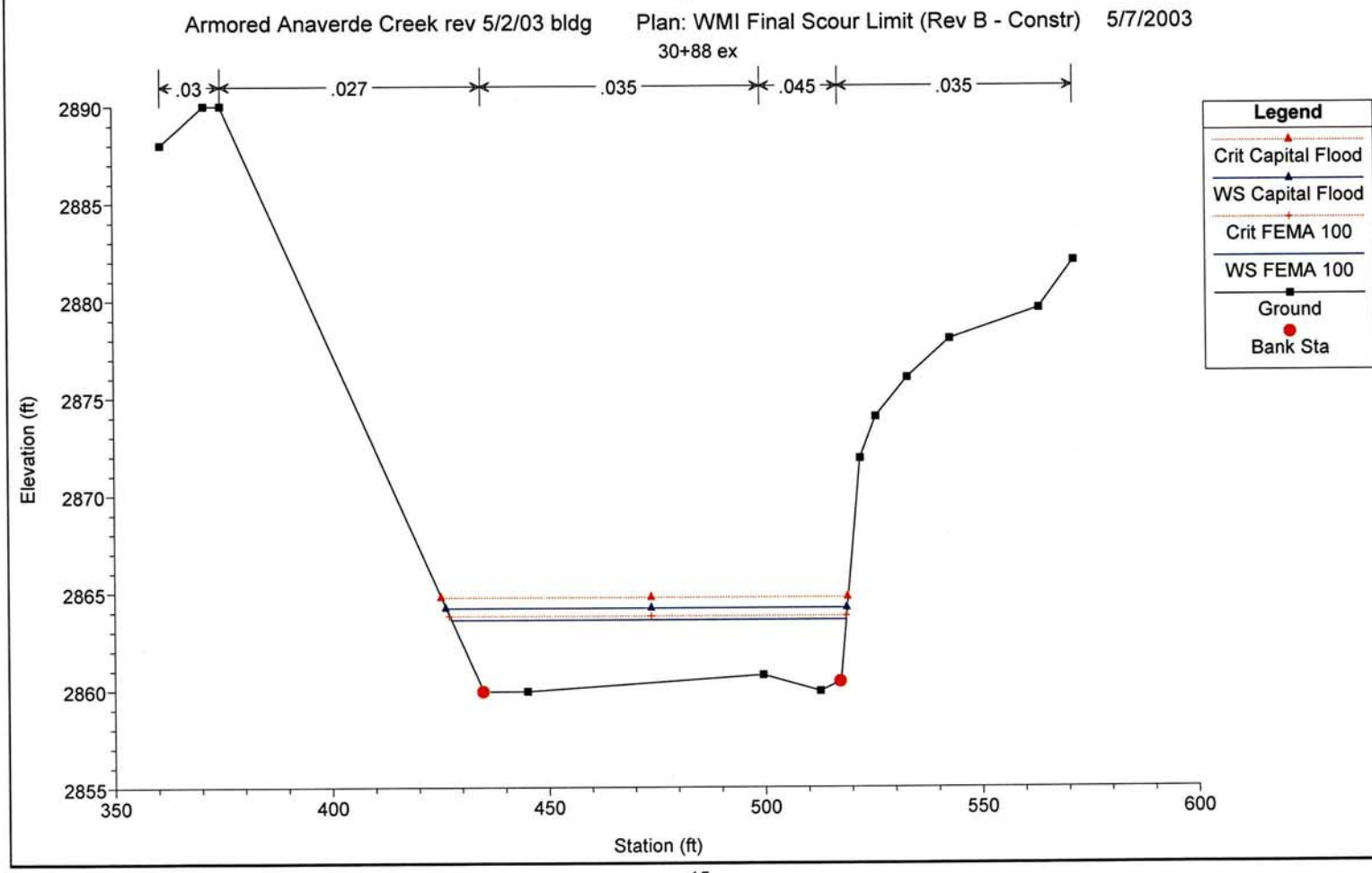

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
35+09 (manual)
.035
.027
.035
.08
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2885
2880
2875
2870
2865
300
350
400
450
500
550
600
650

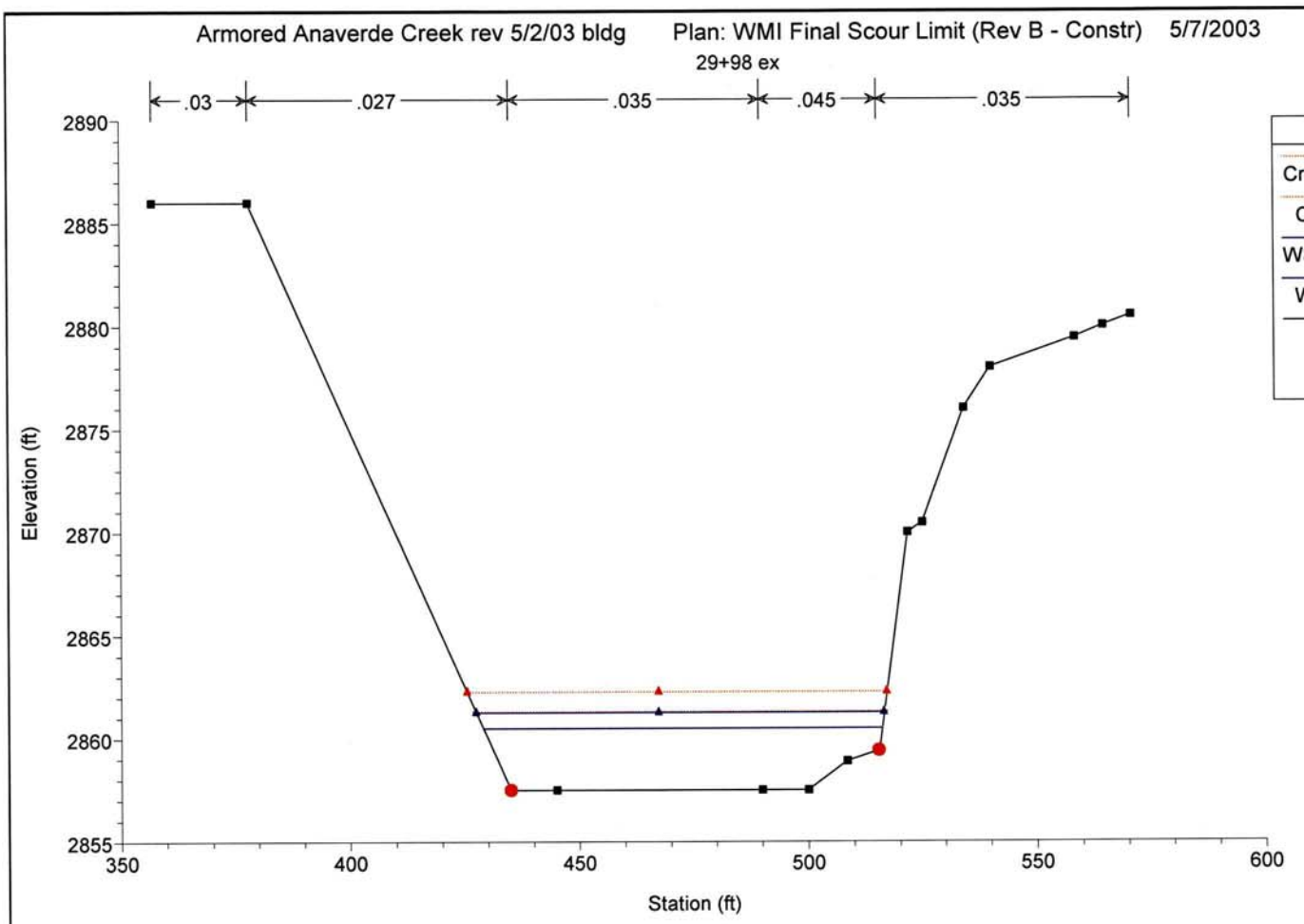

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
34+57 ex
.035
.027
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
2865
300
350
400
450
500
550
600
650

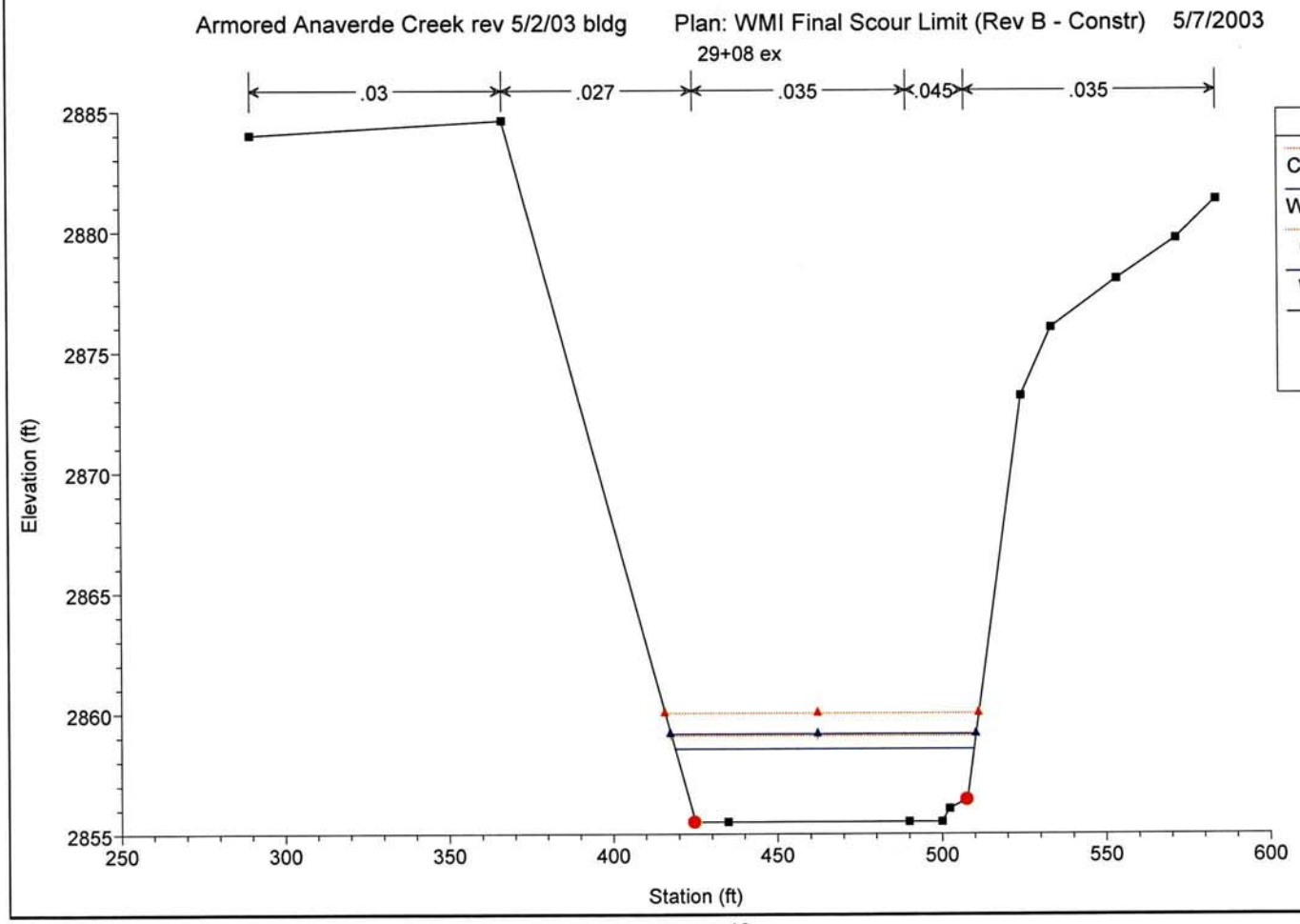

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
33+85 ex
.035
.027
.035
.08
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
2865
2860
350
400
450
500
550
600

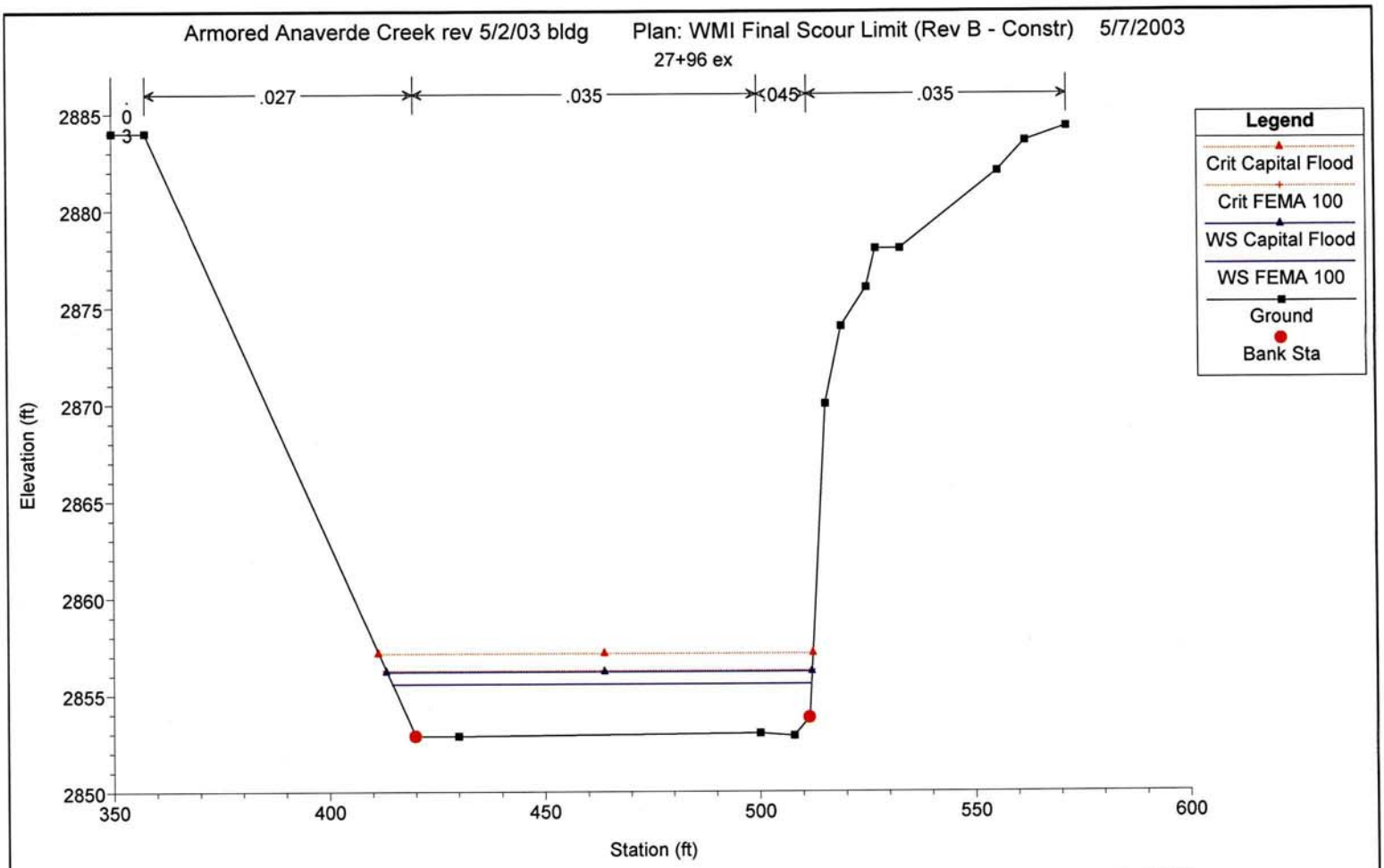

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
32+88 ex
.035
.027
.035
.08
.045
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2895
2890
2885
2880
2875
2870
2865
2860
350
400
450
500
550
600

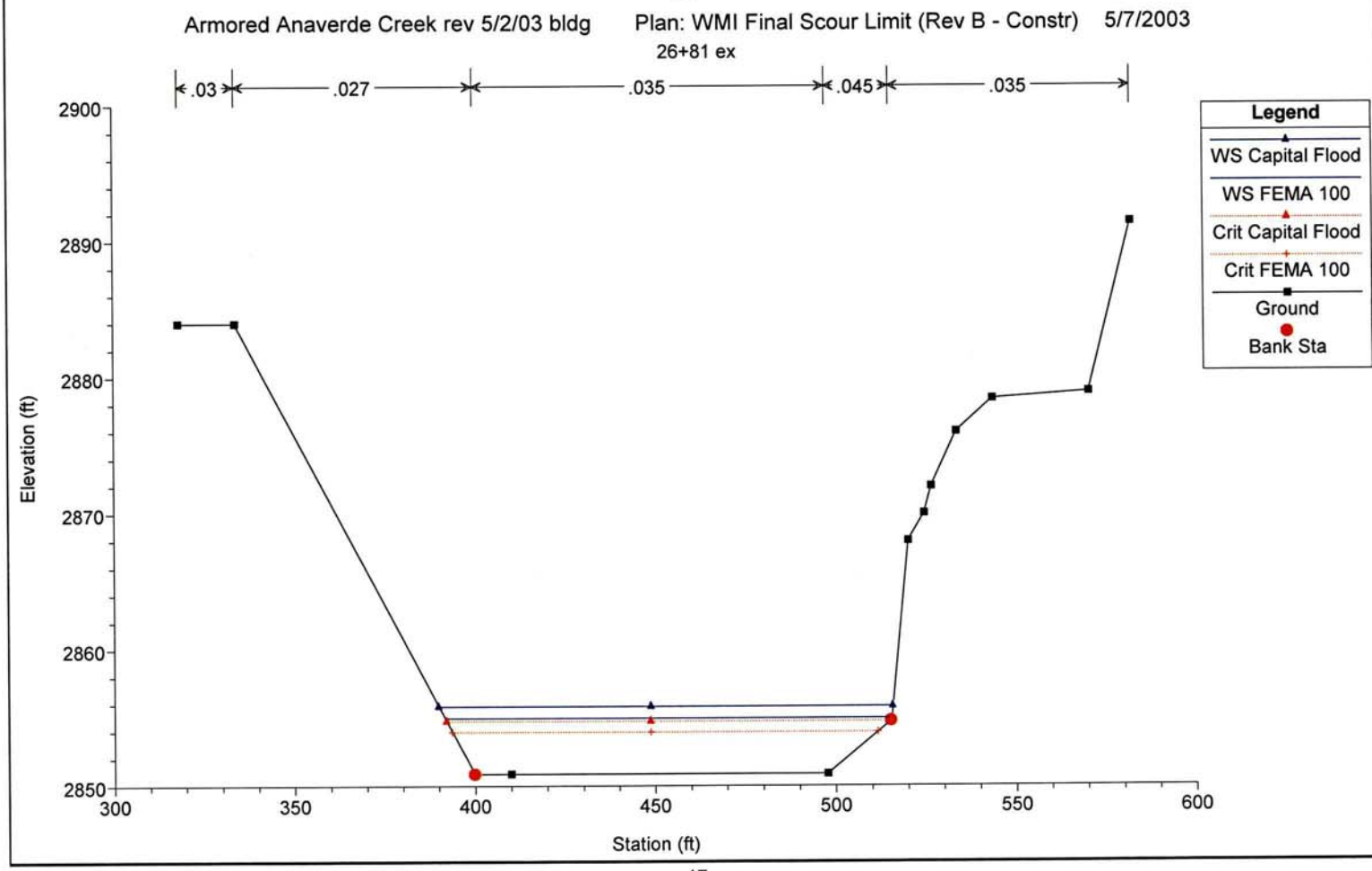

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
31+97 ex
.03
.027
.045
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

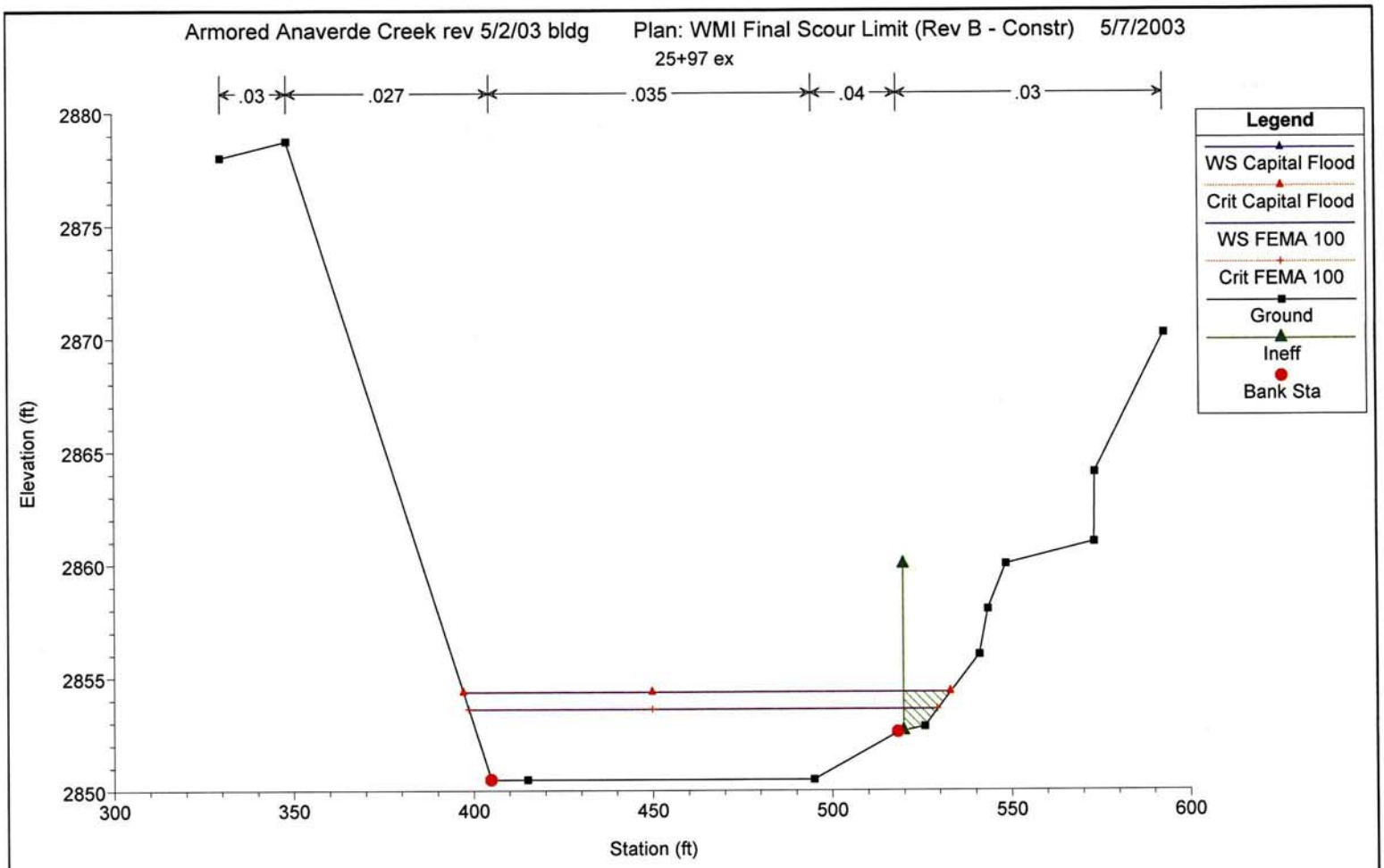

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
30+88 ex
.03
.027
.035
.045
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

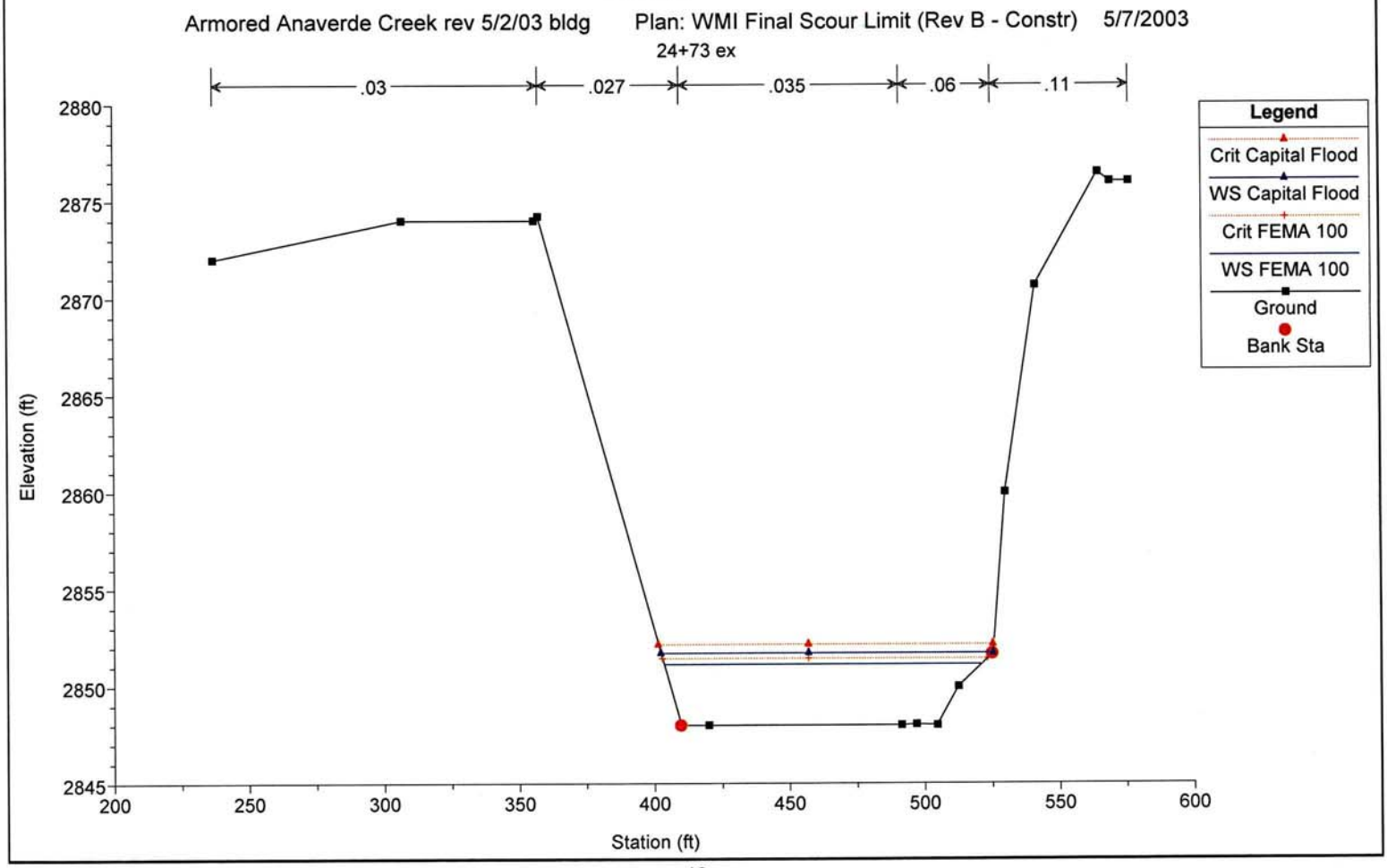

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
29+98 ex
.03
.027
.035
.045
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

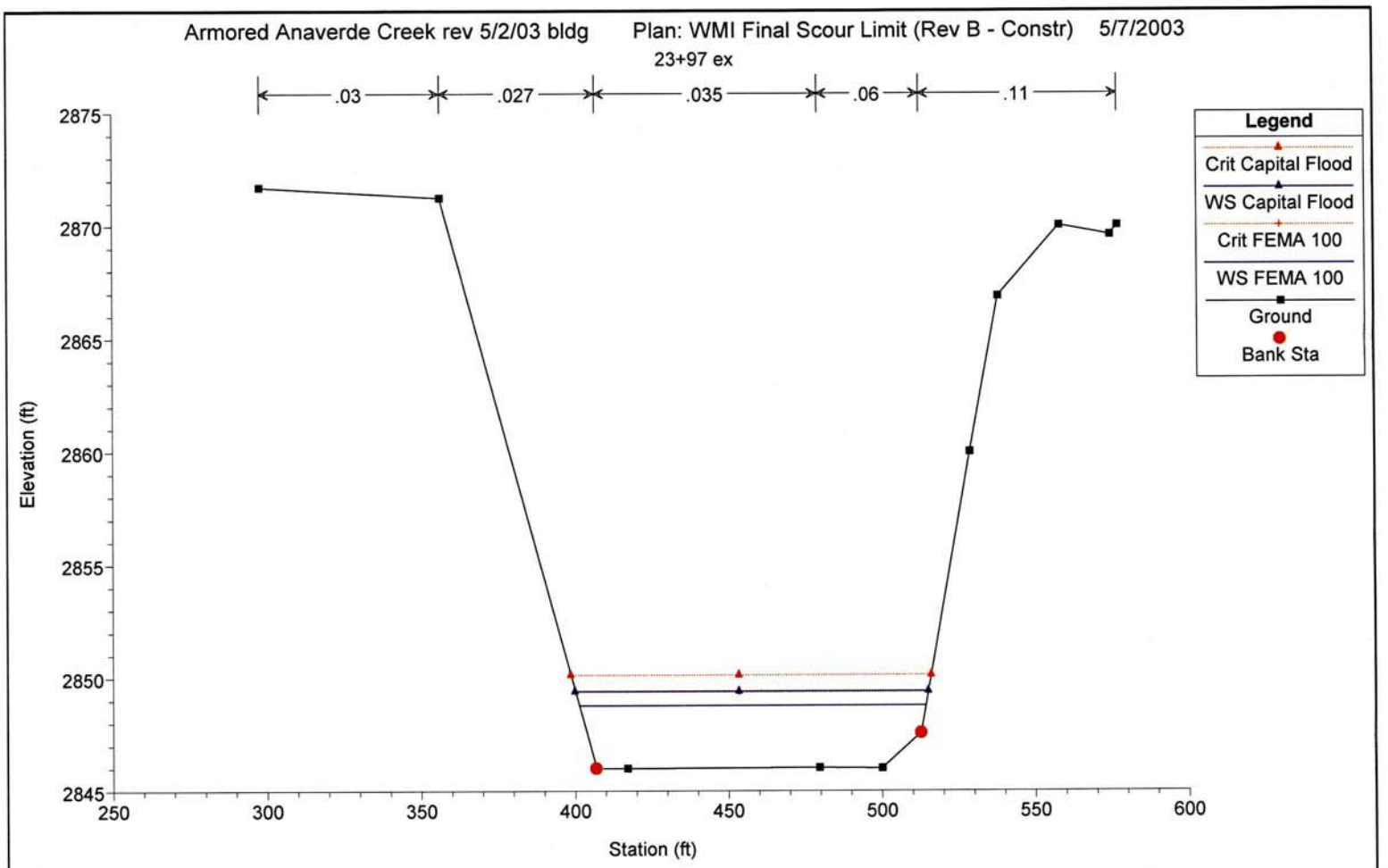

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
29+08 ex
.03
.027
.035
.045
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

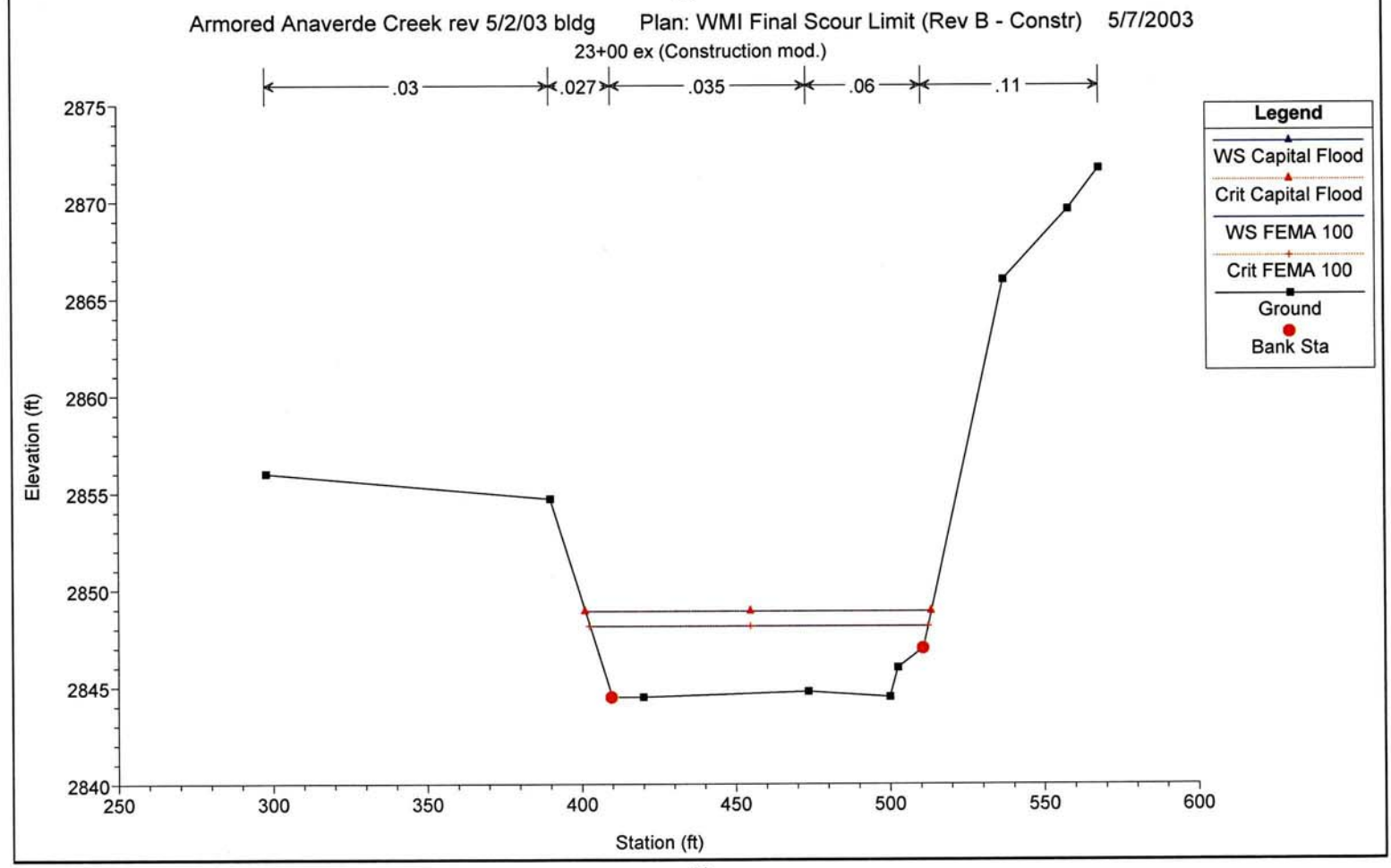

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
27+96 ex
.027
.035
.045
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
26+81 ex
.03
.027
.035
.045
.035
Legend
WS Capital Flood
WS FEMA 100
Crit Capital Flood
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
25+97 ex
.03
.027
.035
.04
.03
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

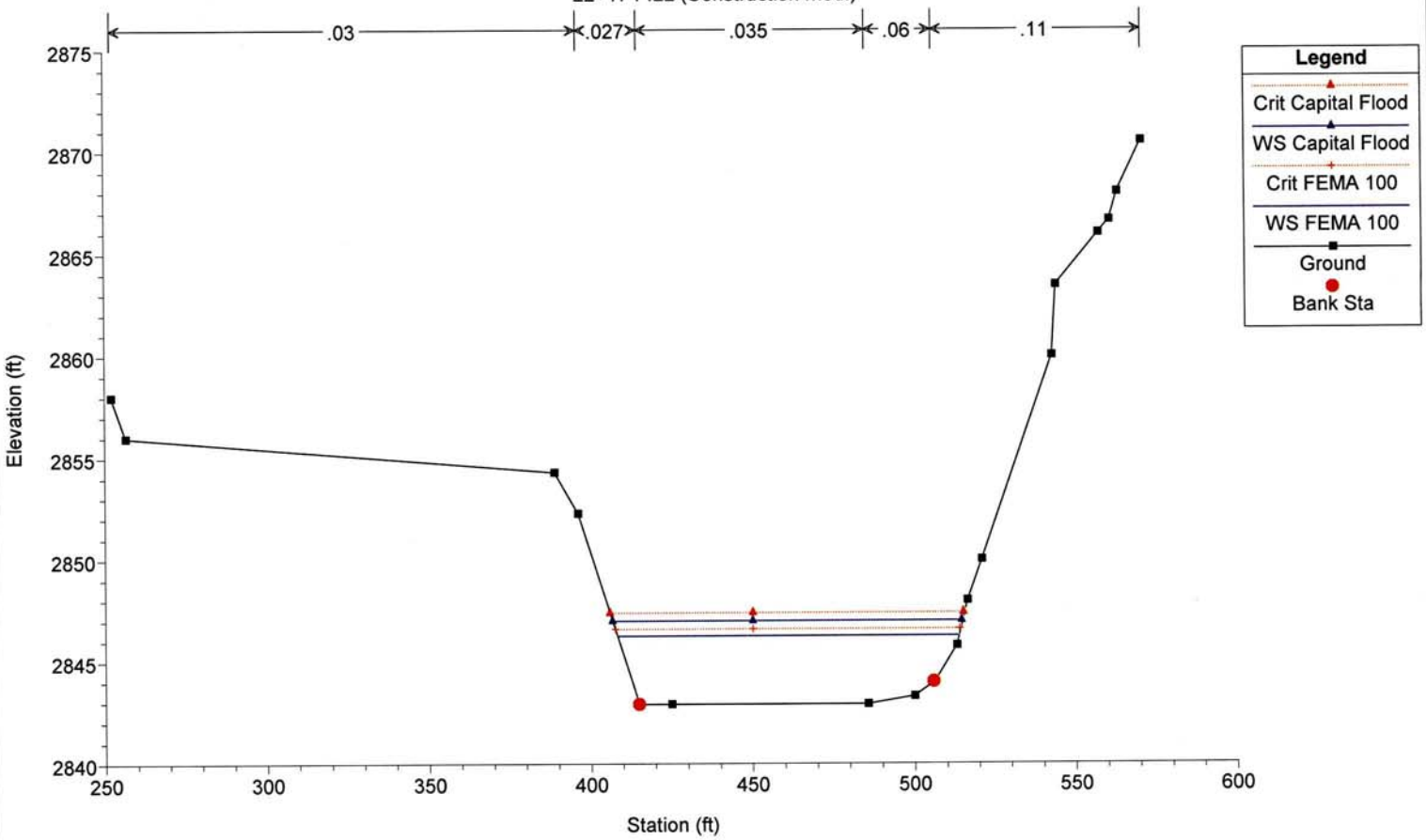

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
24+73 ex
.03
.027
.035
.06
.11
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
23+97 ex
.03
.027
.035
.06
.11
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2875
2870
2865
2860
2855
2850
2845
250
300
350
400
450
500
550
600


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
23+00 ex (Construction mod.)
.03
.027
.035
.06
.11
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2875
2870
2865
2860
2855
2850
2845
2840
250
300
350
400
450
500
550
600

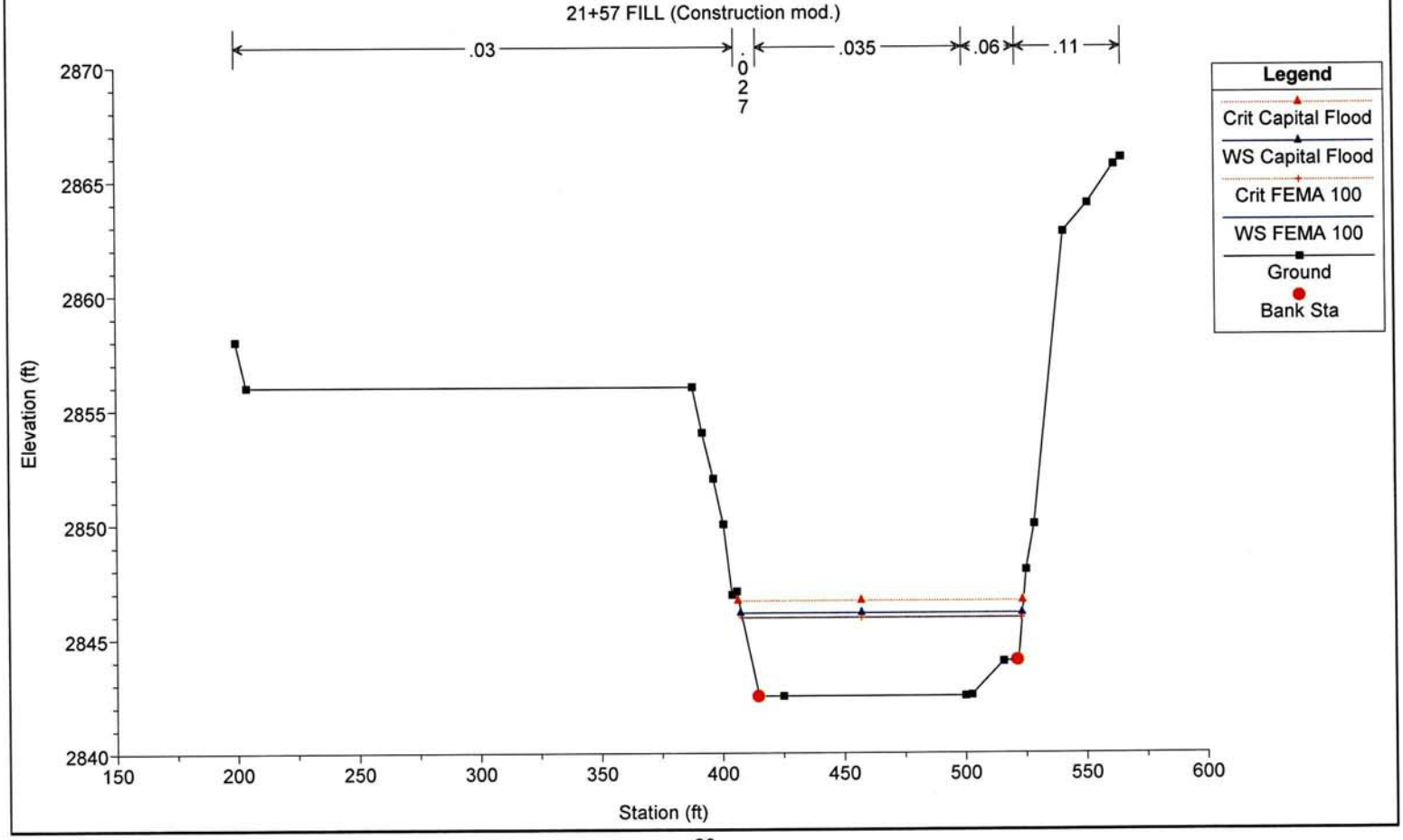
Armored Anaverde Creek rev 5/2/03 bldg Plan: WMI Final Scour Limit (Rev B - Constr) 5/7/2003

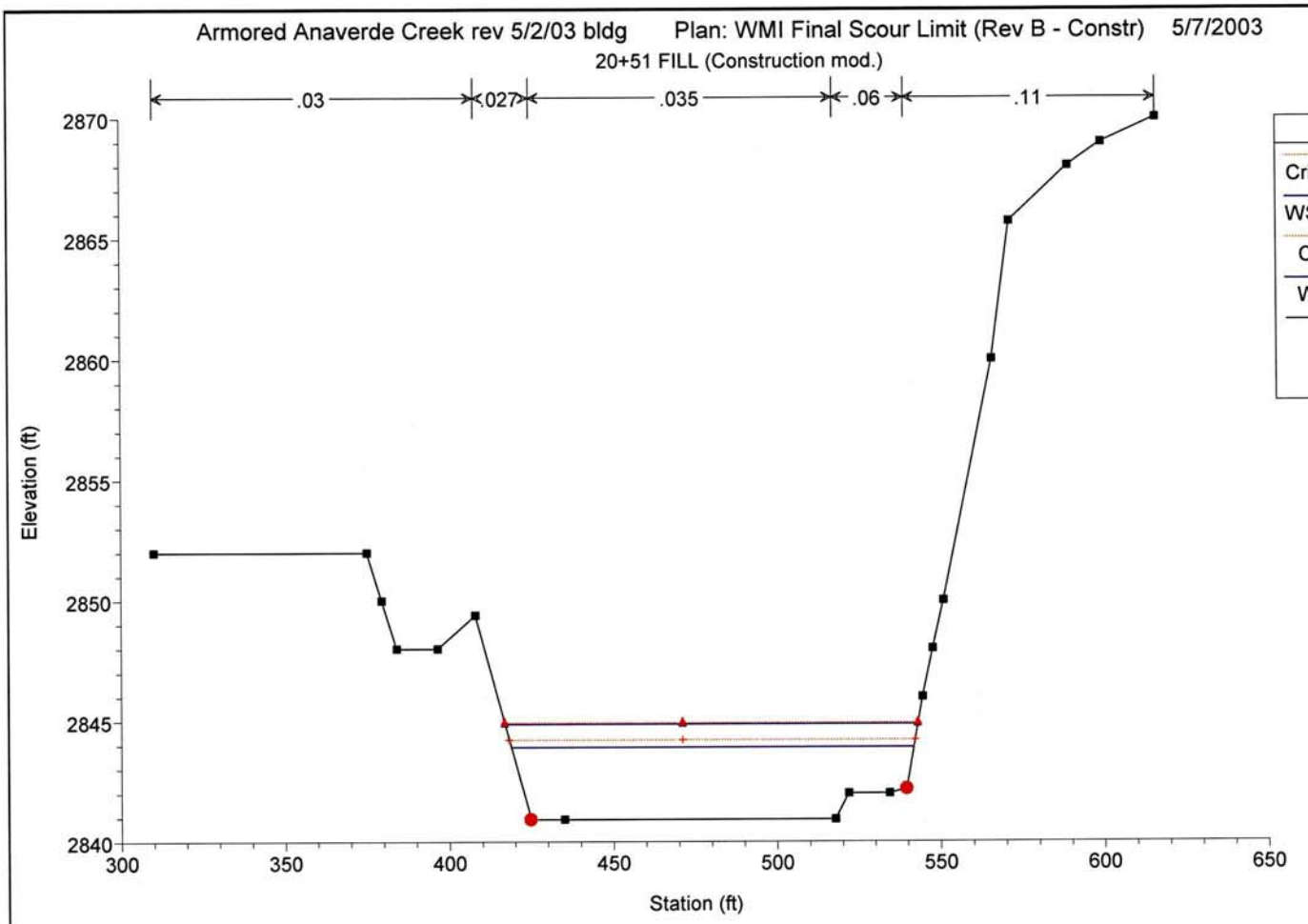
22+17 FILL (Construction mod.)

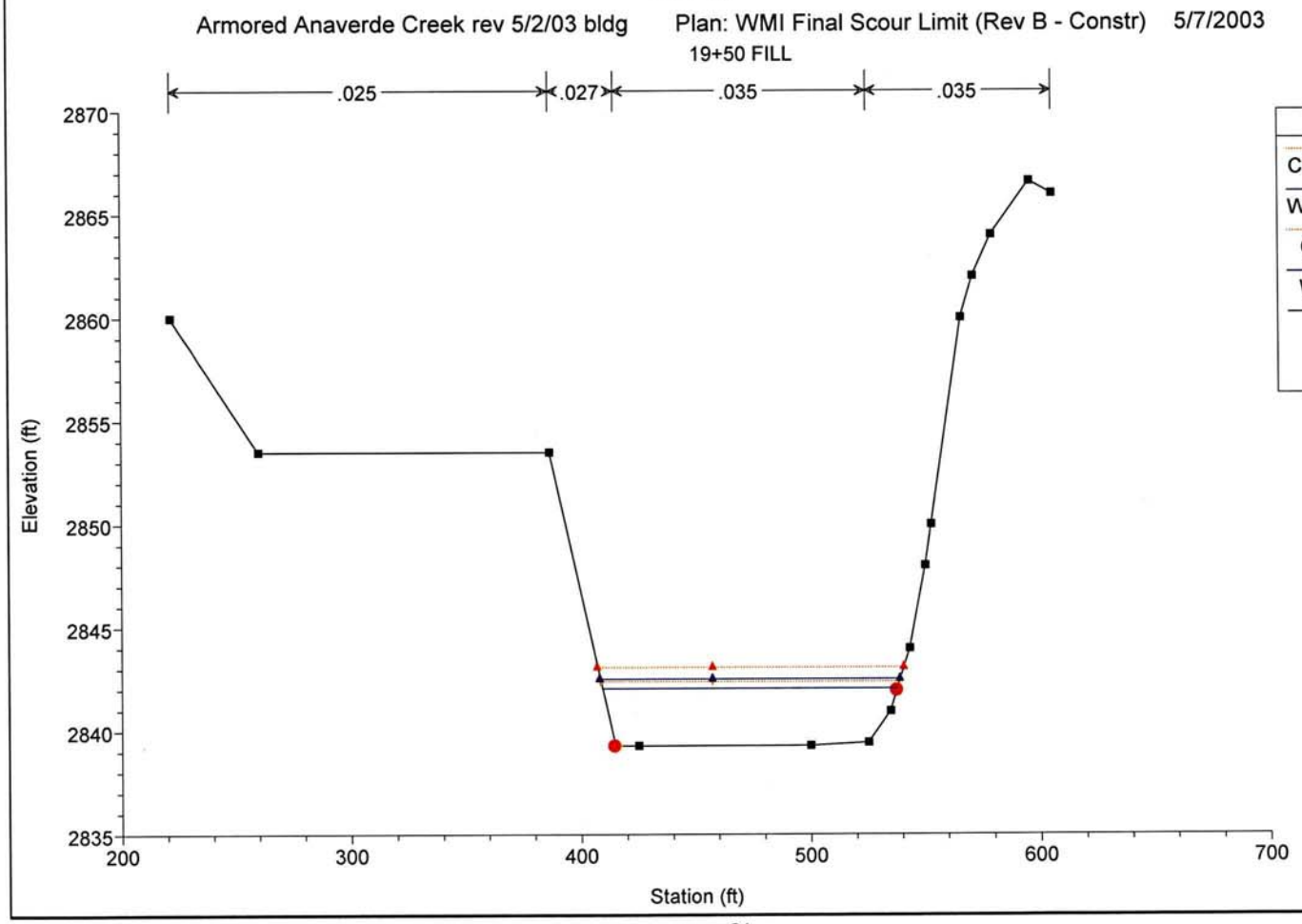


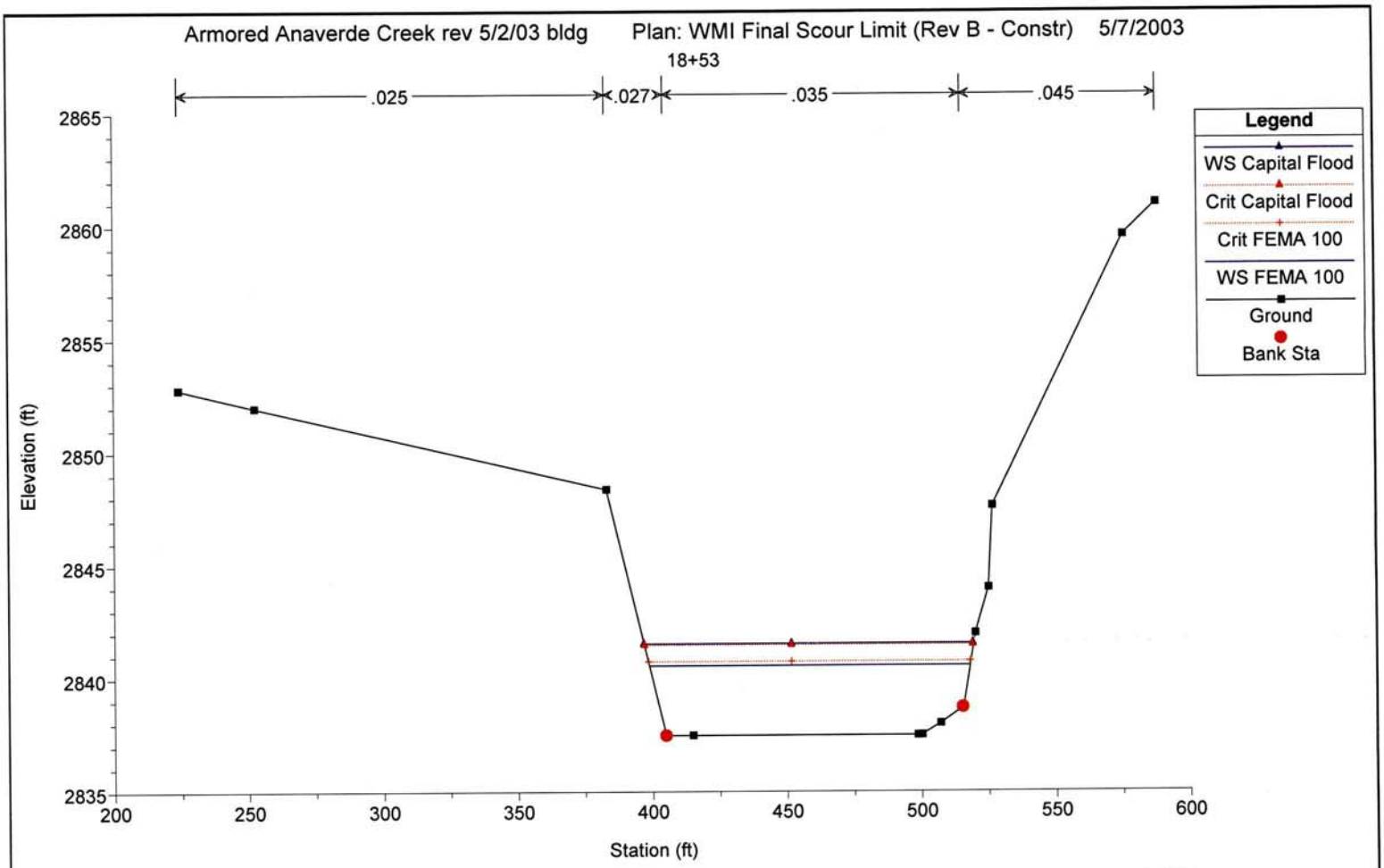
Armored Anaverde Creek rev 5/2/03 bldg Plan: WMI Final Scour Limit (Rev B - Constr) 5/7/2003

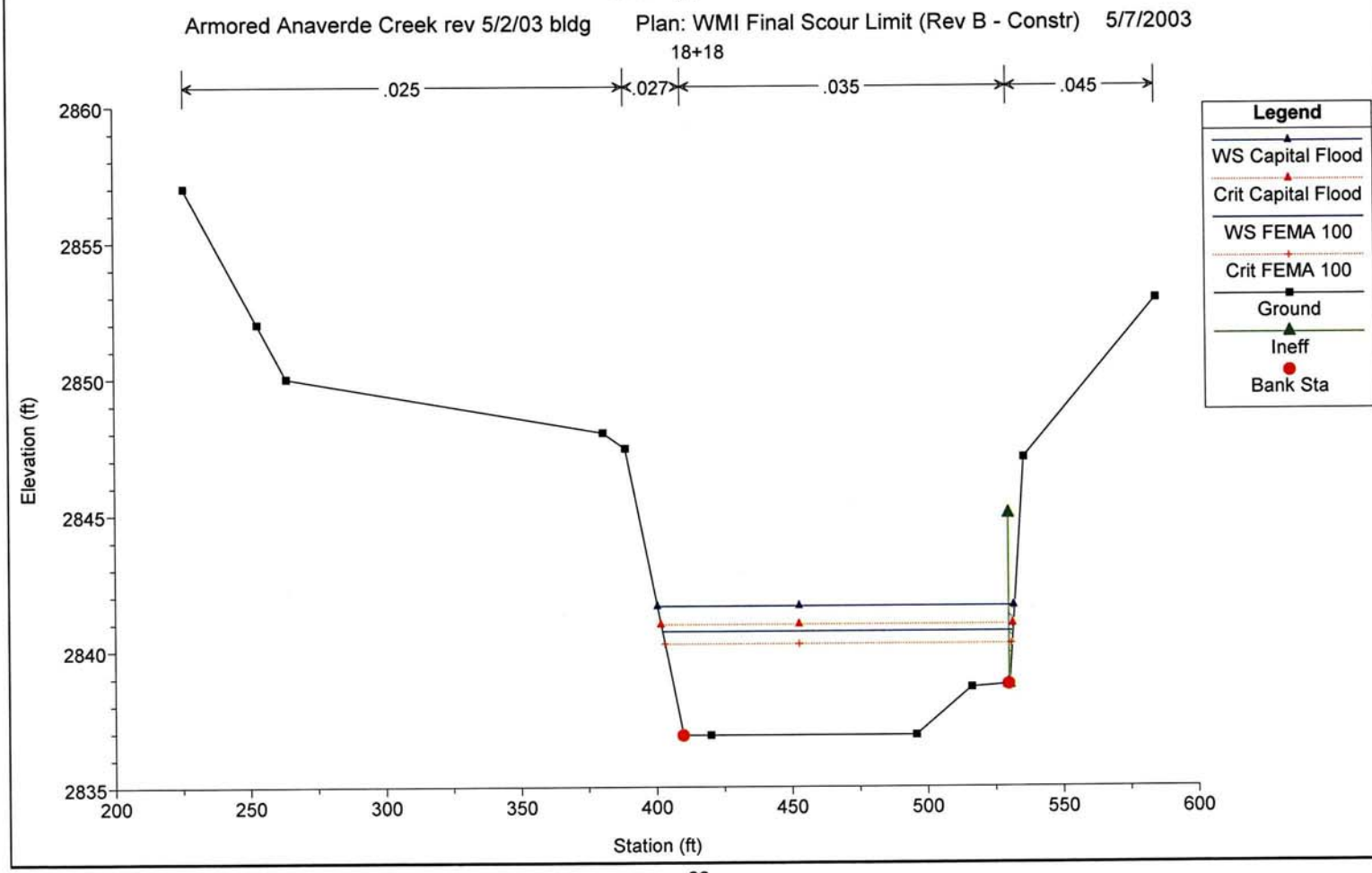
21+57 FILL (Construction mod.)

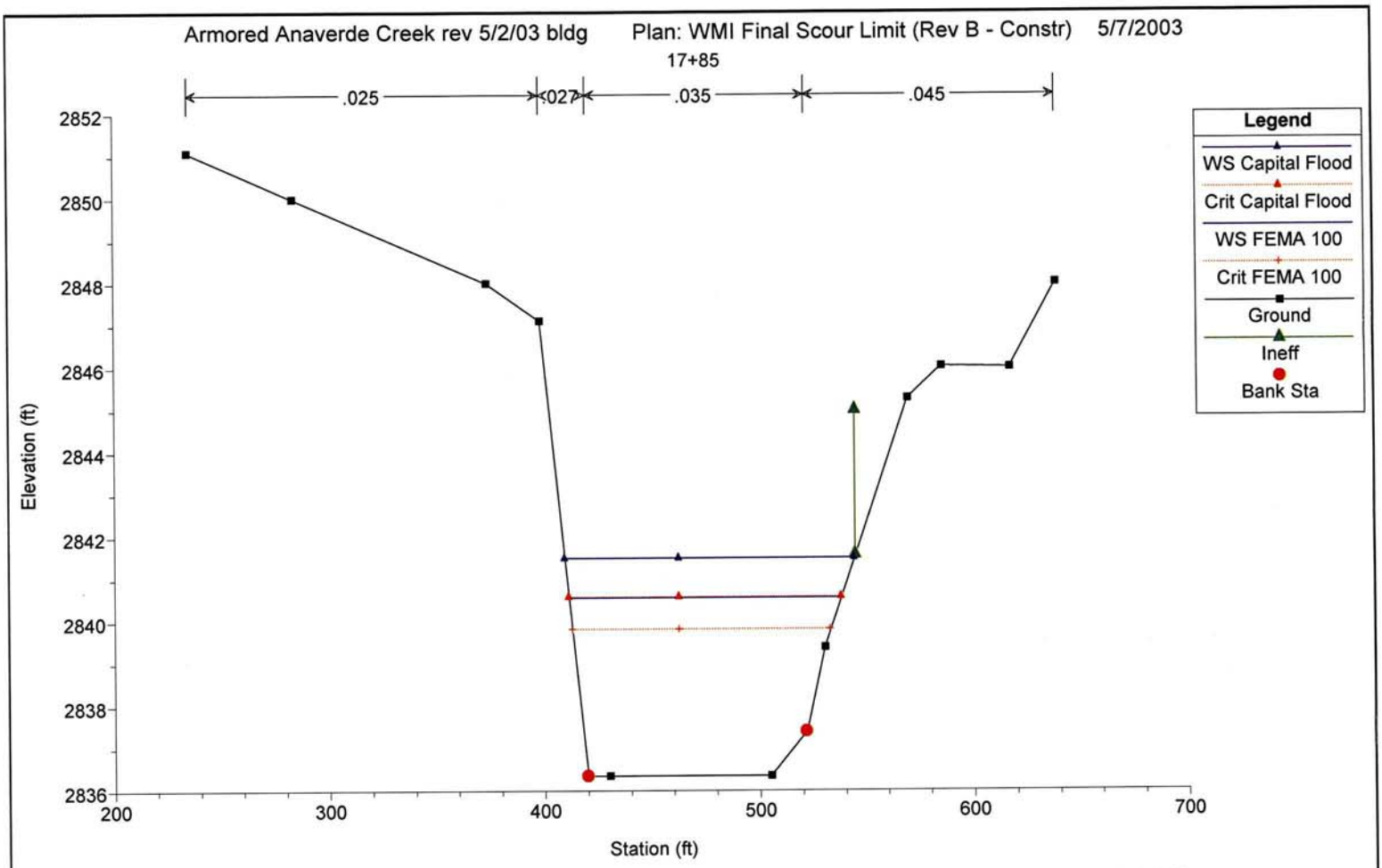


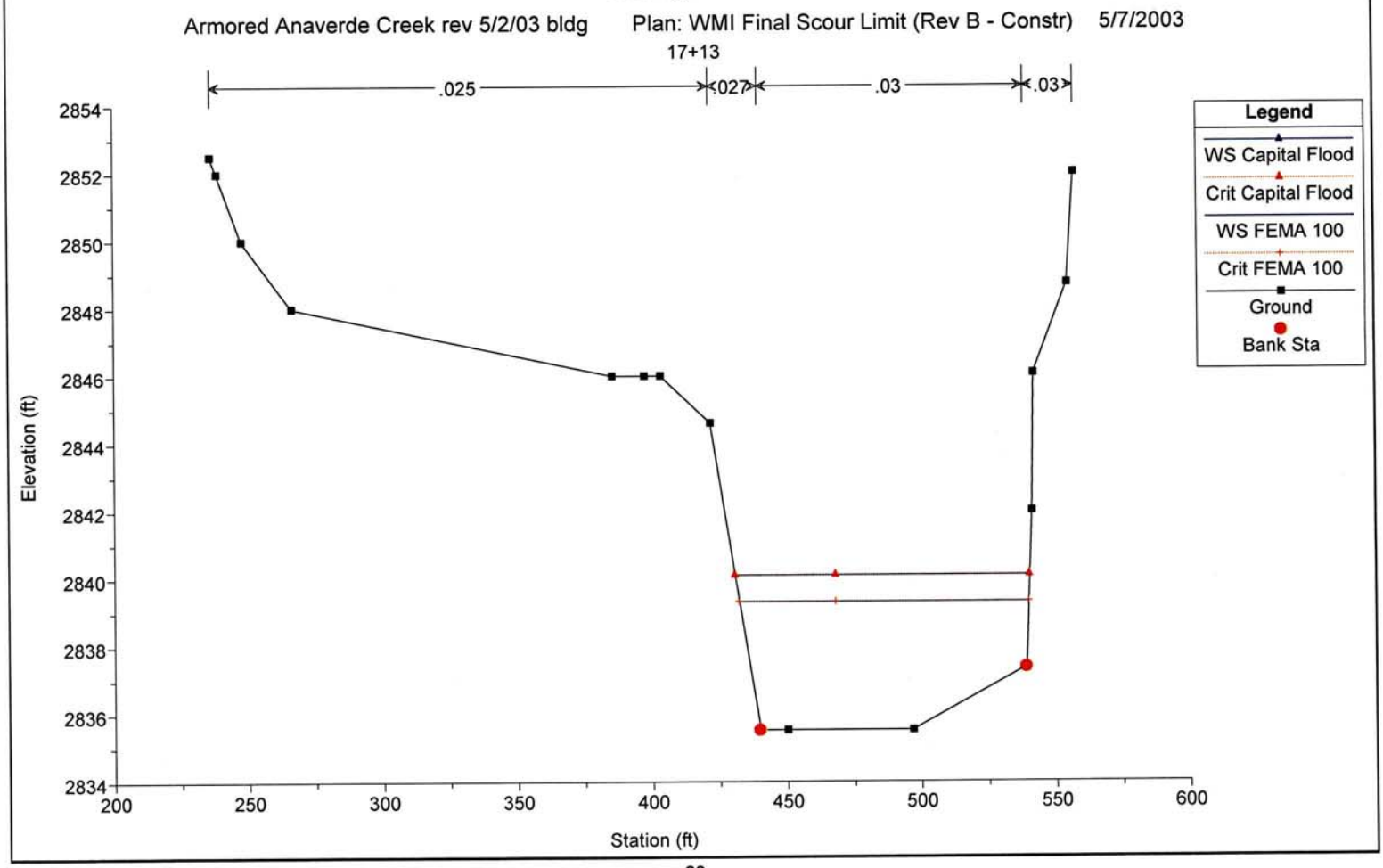

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
20+51 FILL (Construction mod.)
.03
.027
.035
.06
.11
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

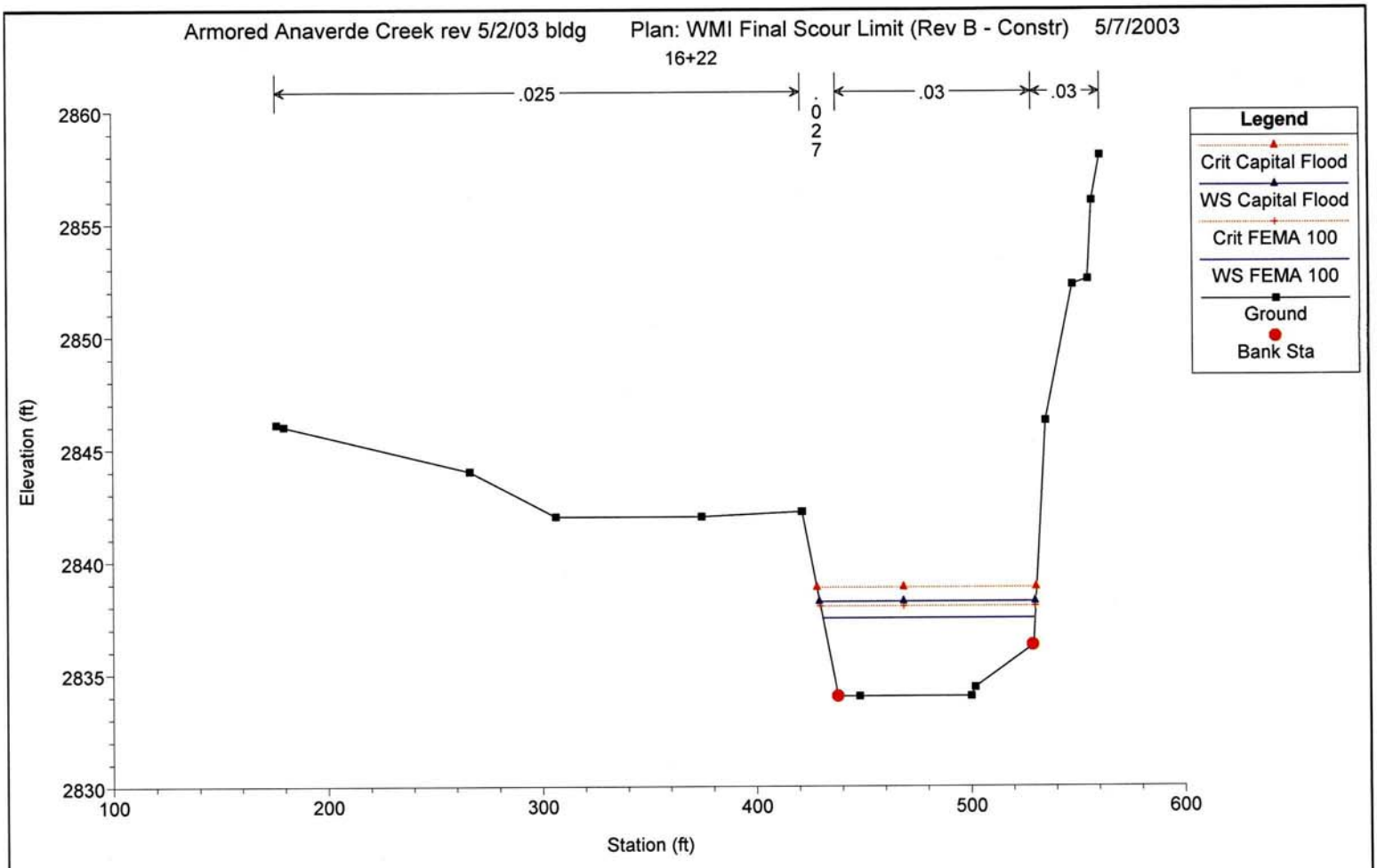

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
19+50 FILL
.025
.027
.035
.035
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

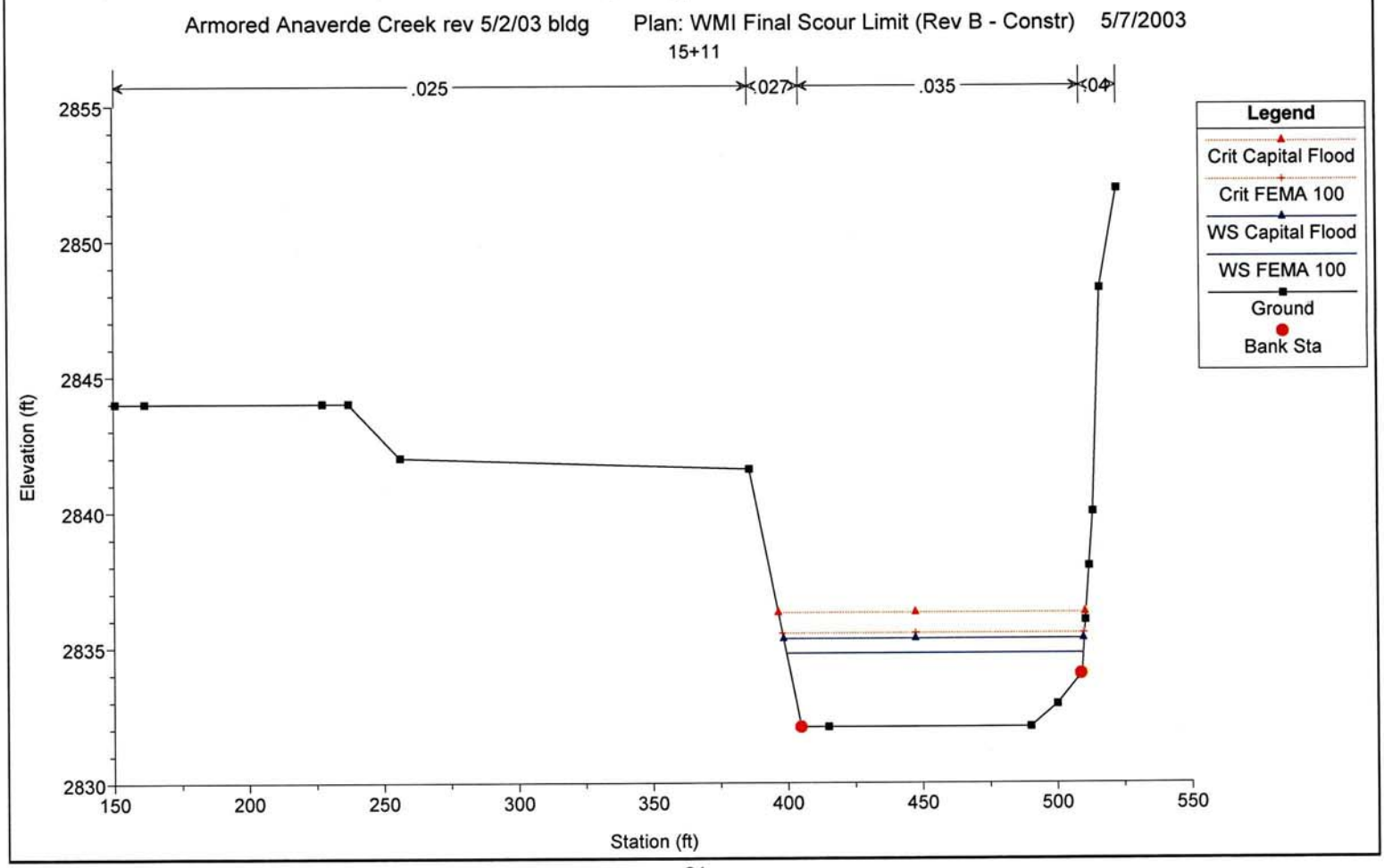

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
18+53
.025
.027
.035
.045
Legend
WS Capital Flood
Crit Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2865
2860
2855
2850
2845
2840
2835
200
250
300
350
400
450
500
550
600

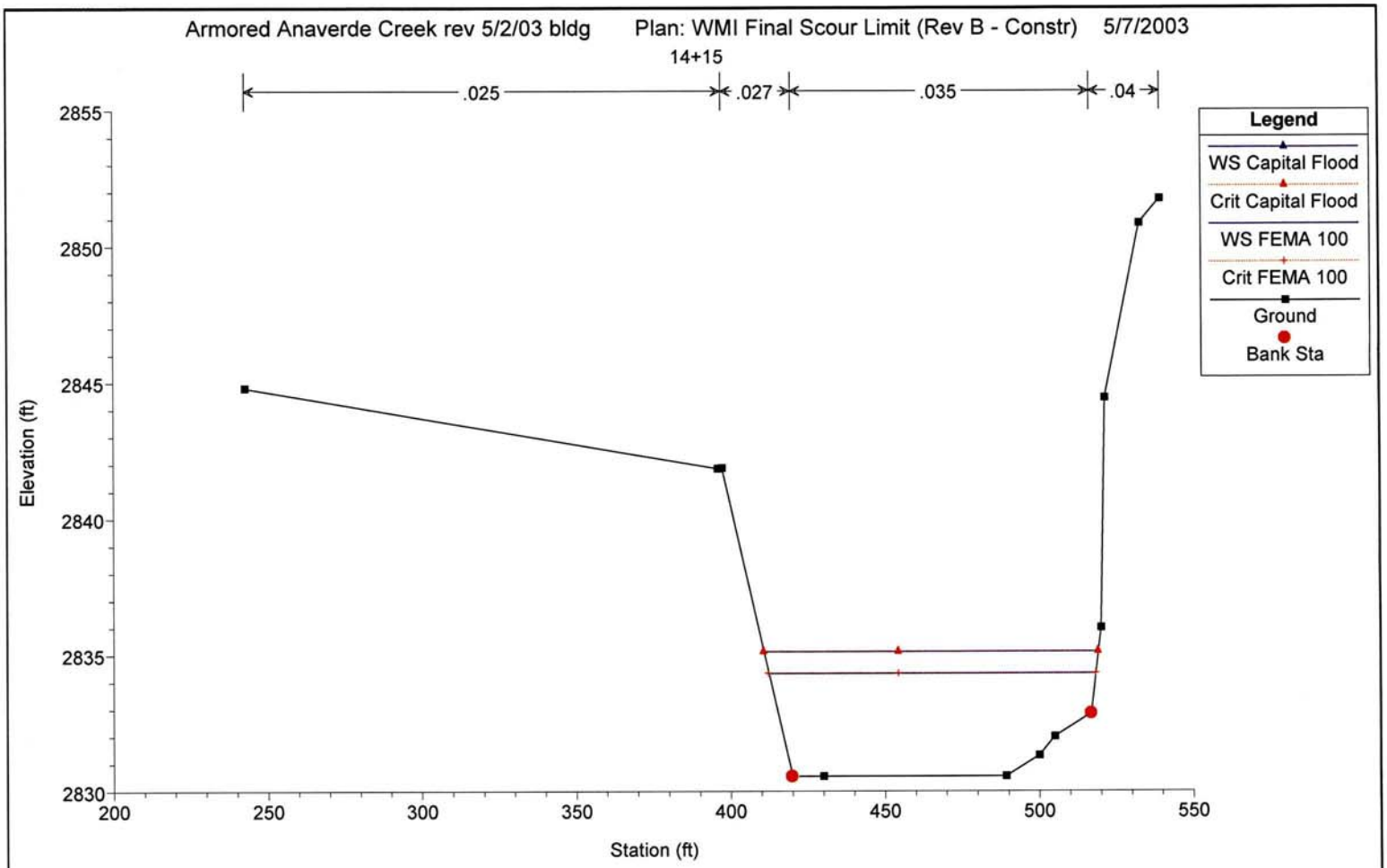

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
18+18
.025
.027
.035
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
2860
2855
2850
2845
2840
2835
200
250
300
350
400
450
500
550
600

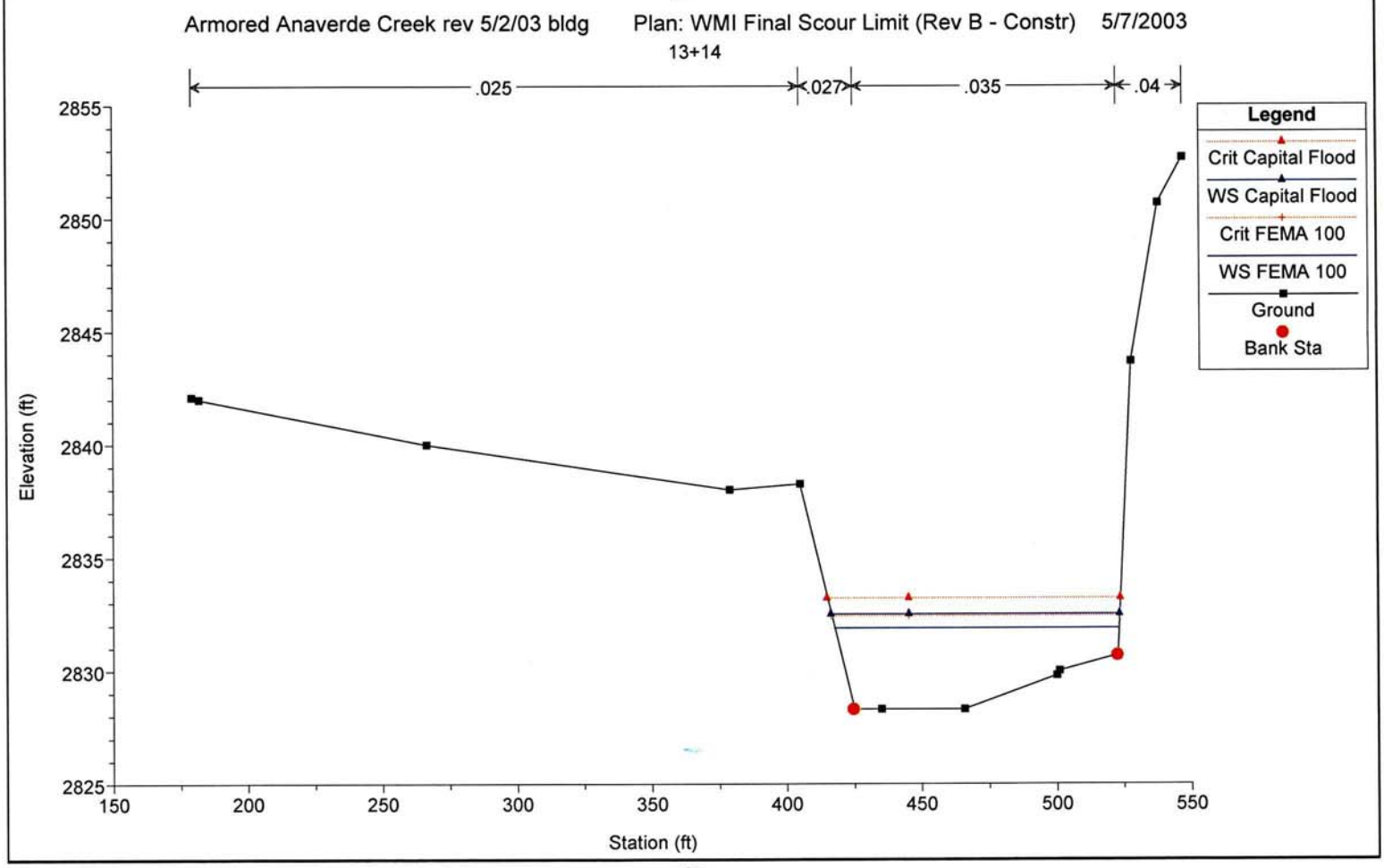

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
17+85
.025
.027
.035
.045
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

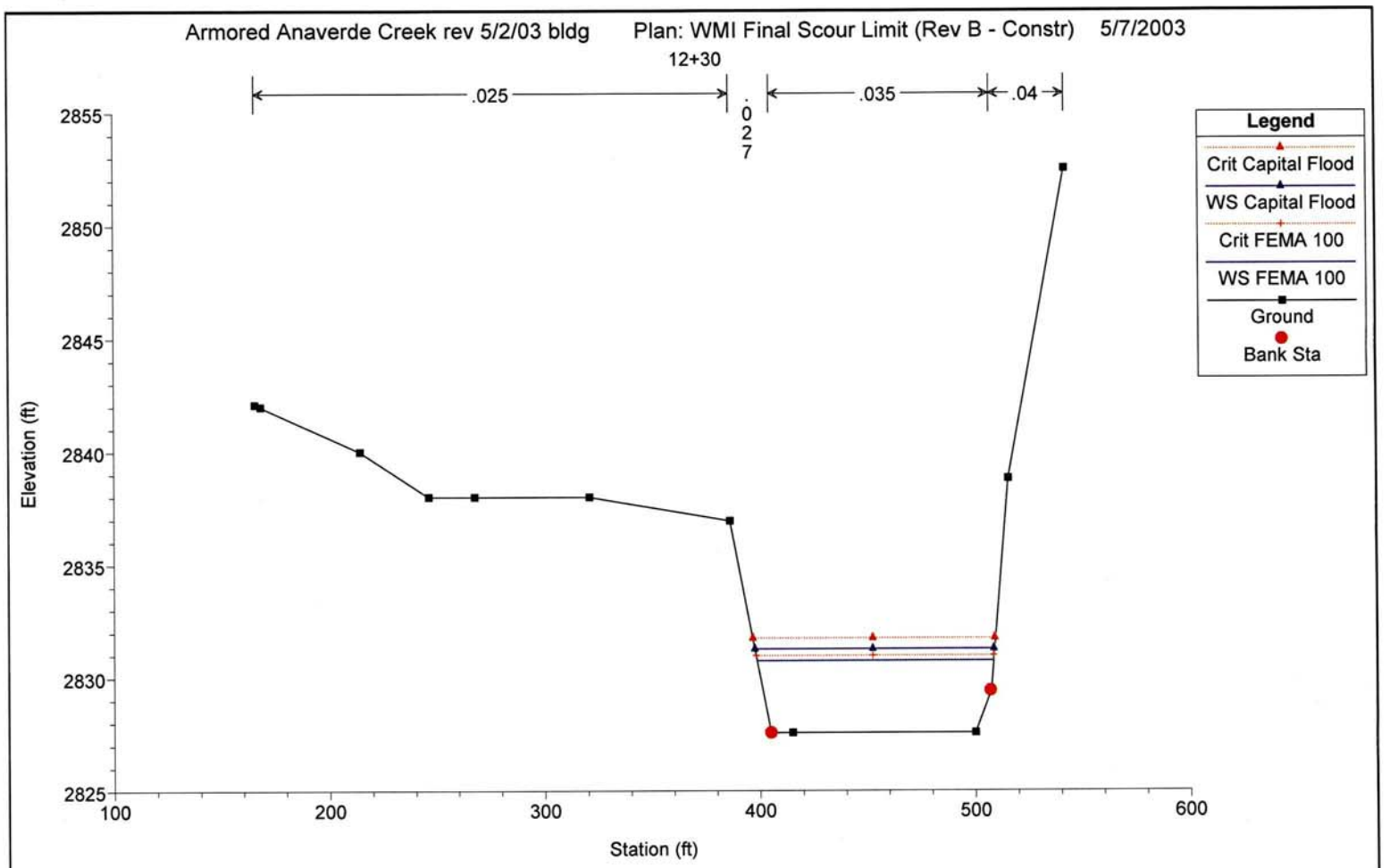

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
17+13
.025
.027
.03
.03
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

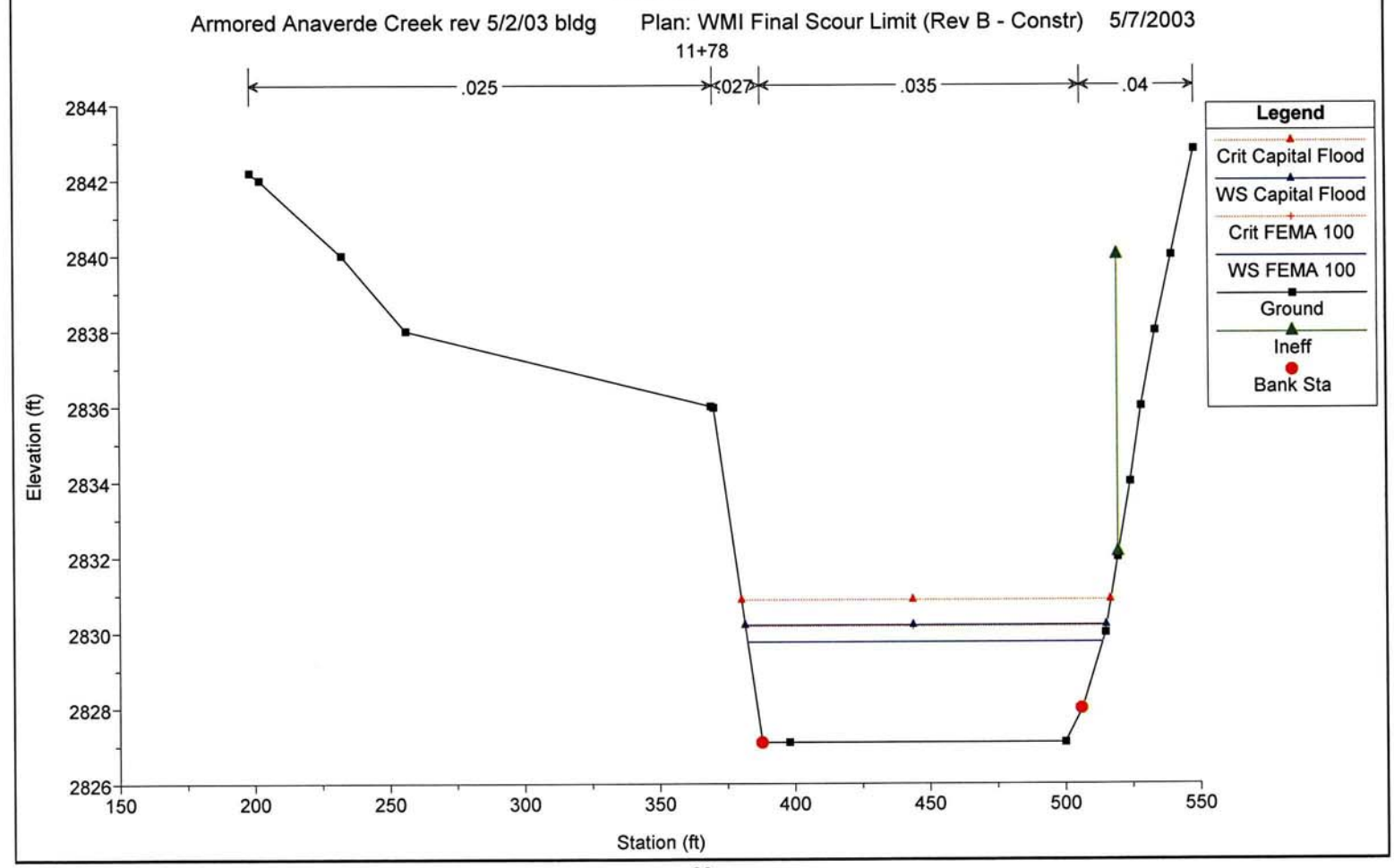

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
16+22
.025
.027
.03
.03
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2860
2855
2850
2845
2840
2835
2830
100
200
300
400
500
600

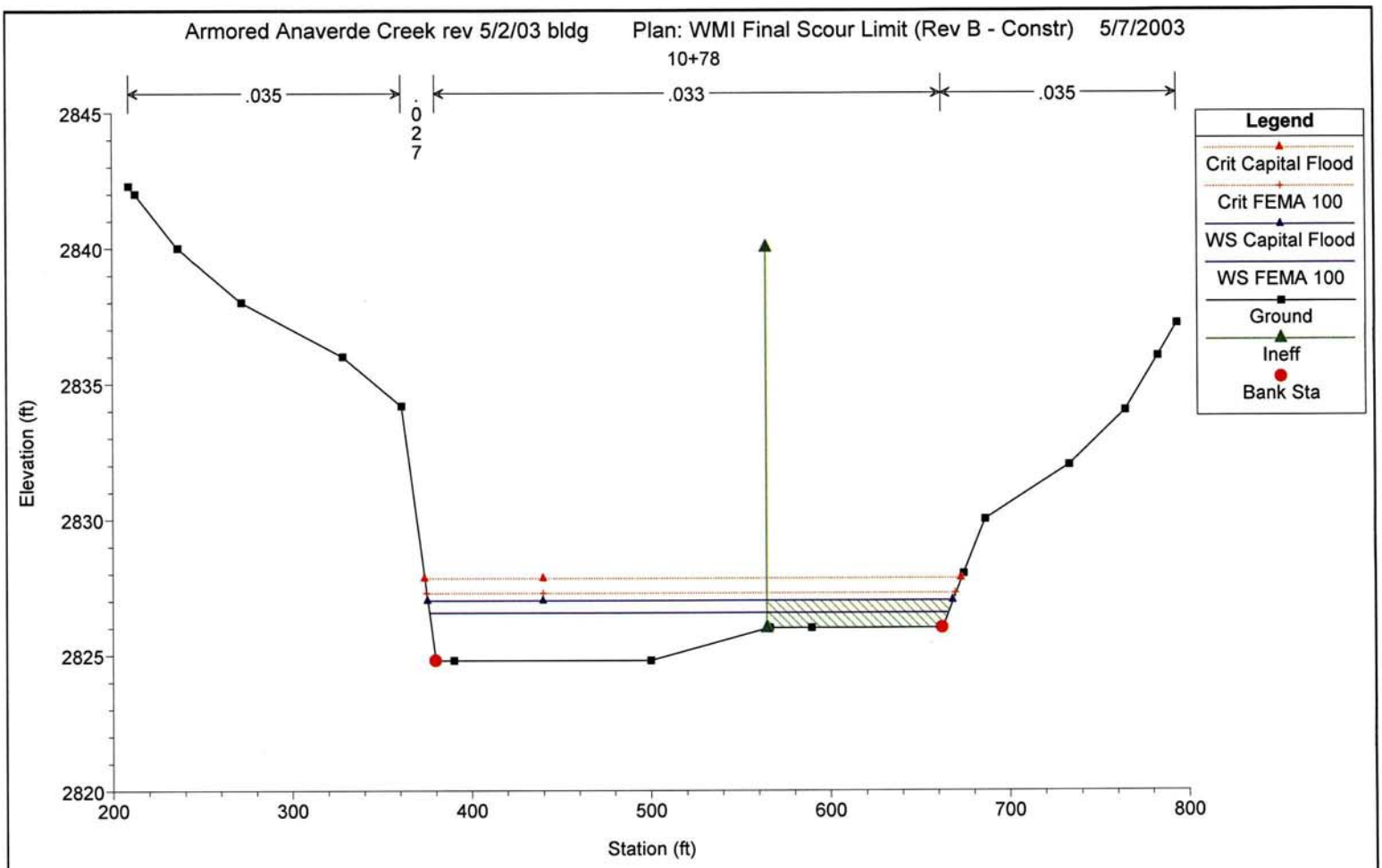

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
15+11
.025
.027
.035
.04
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)
2855
2850
2845
2840
2835
2830
150
200
250
300
350
400
450
500
550

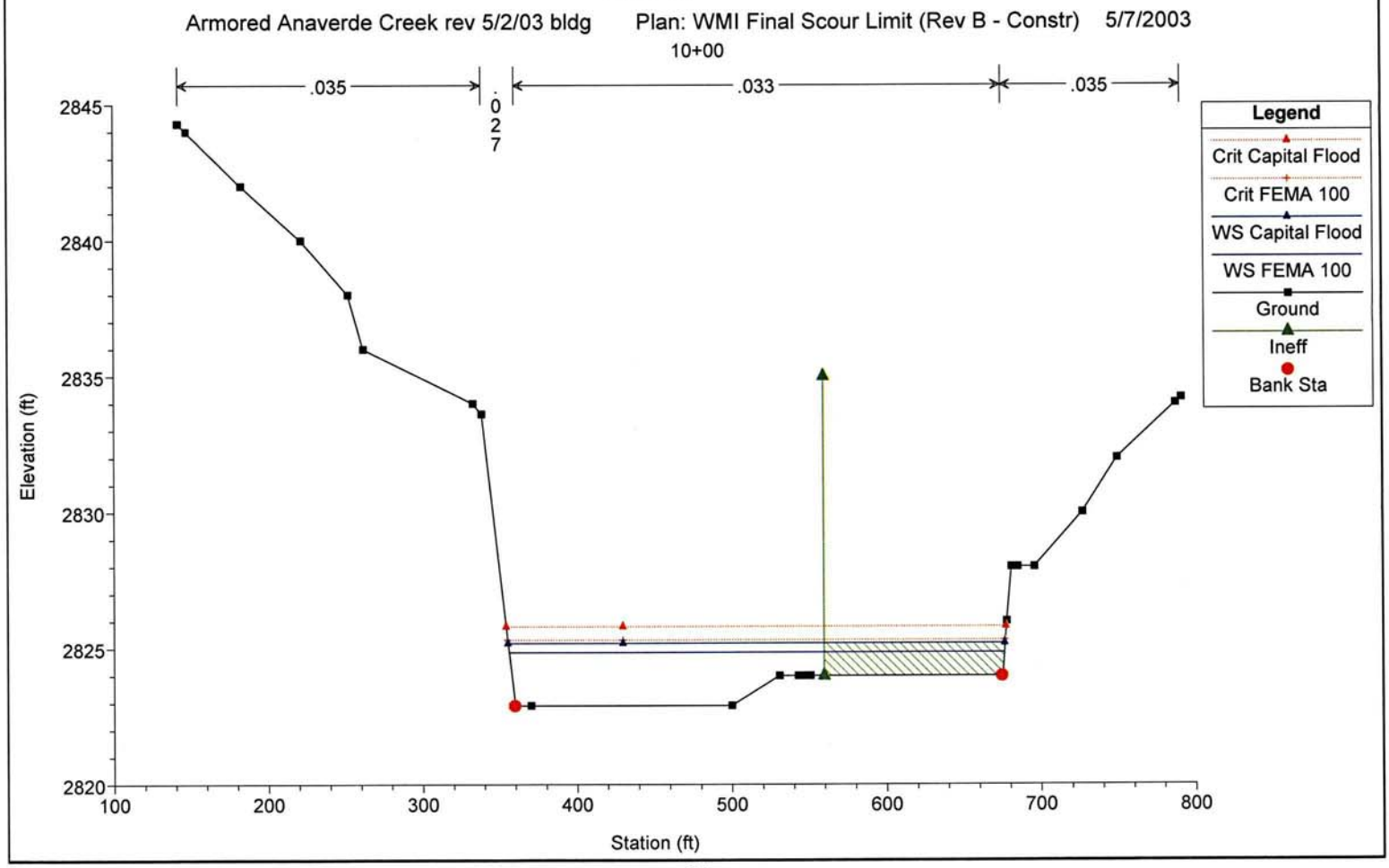

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
14+15
.025
.027
.035
.04
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)

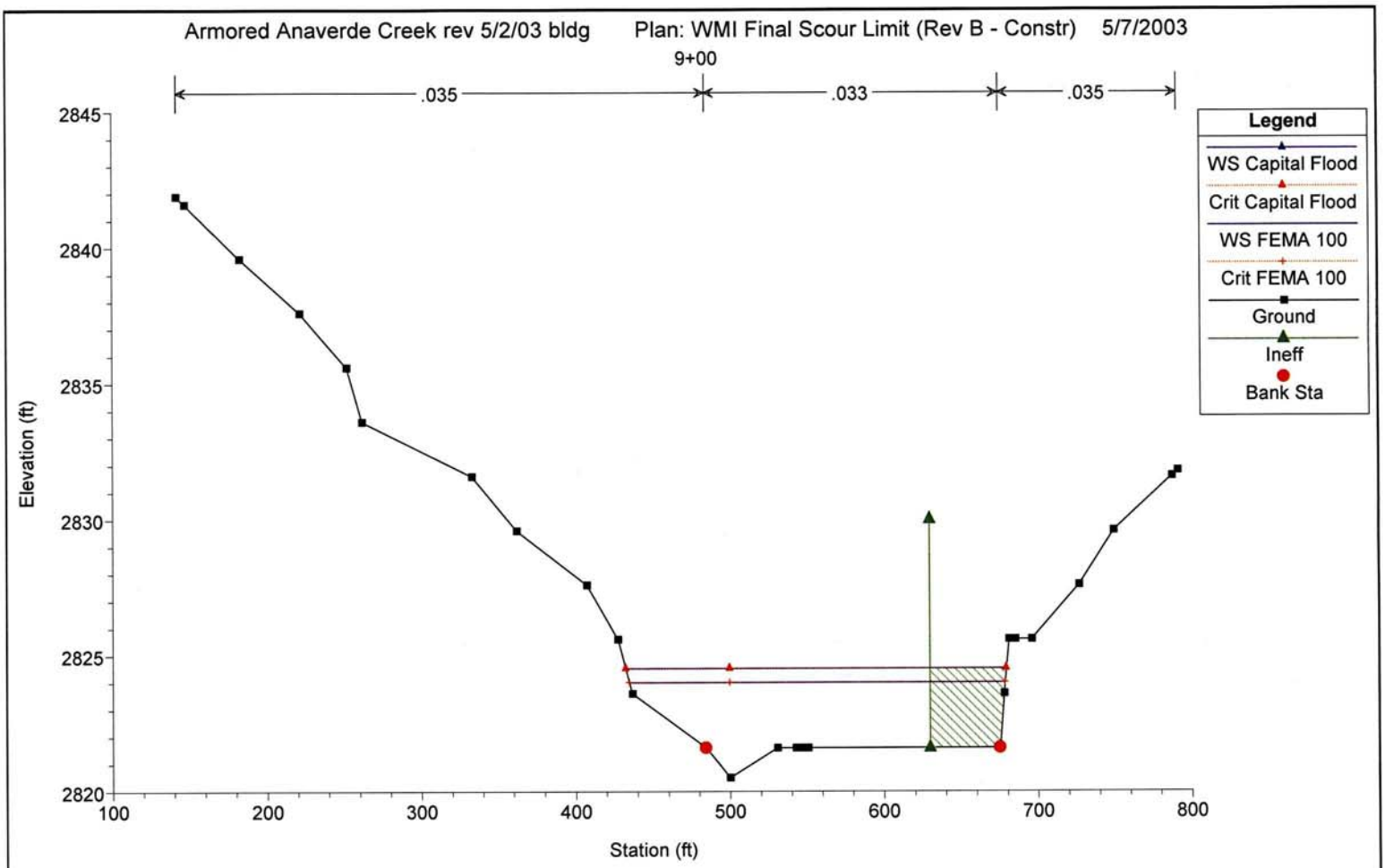

Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
13+14
.025
.027
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
12+30
.025
.027
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
11+78
.025
.027
.035
.04
Legend
Crit Capital Flood
WS Capital Flood
Crit FEMA 100
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
10+78
.035
.027
.033
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
10+00
.035
.027
.033
.035
Legend
Crit Capital Flood
Crit FEMA 100
WS Capital Flood
WS FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Armored Anaverde Creek rev 5/2/03 bldg
Plan: WMI Final Scour Limit (Rev B - Constr)
5/7/2003
9+00
.035
.033
.035
Legend
WS Capital Flood
Crit Capital Flood
WS FEMA 100
Crit FEMA 100
Ground
Ineff
Bank Sta
Elevation (ft)
2845
2840
2835
2830
2825
2820
100
200
300
400
500
600
700
800
Station (ft)

APPENDIX F

ANAVERDE CREEK
SCOUR LIMIT FLOOD CALCULATION BRIEF

Subject	Antelope Valley	Made by	TAC	Job	003-1971
HEC-RAS Modeling for		Checked by	TLB	Date	2/22/01
Armored Anaverde Crk.		Approved by	SGS 6/04	Sheet	1 of 1

OBJECTIVE:
Determine the flood elevations and velocities for the capital and 100-year flood events for Anaverde Creek adjacent to the Antelope Valley Public Landfill near City of Palmdale, California assuming an armored layer on the north bank.

METHOD:
HEC-RAS computer software (Ref. 1) was used to determine flood elevations and channel velocities in this "Scour Limit" model. Geometry data for the model was determined by modifying channel geometry used in the "Existing Condition" model with the HEC-RAS channel modification utility. Peak flows for the capital flood event were determined using model output from the Anaverde Creek Basin Hydrology Study (Ref. 2). Peak flows for the 100-year flood event were obtained from the FEMA Flood Insurance Study for City of Palmdale (Ref.3). Boundary conditions for the model were calculated using normal depth.

ASSUMPTIONS:
- Channel geometries and obstructions in this "Scour Limit" model are identical to the "Existing Condition" model except for:
    1. armored north banks from stations 10+00 to 36+41 and 37+49 to 43+60,
    2. armored layer is either gabions or grouted riprap laid at a 2H:1V slope (see Figure 6),
    3. fill was added to the north bank to increase elevation between stations 19+50 and 22+17,
    4. ineffective flow areas on the north bank in armored areas were removed.
- All material between the existing channel and the scour protection barrier was assumed to be eroded away;
- The south bank will not erode due to existing "rubble" armoring and well established vegetation;
- Interpolated cross sections from the "Existing Condition" model remain between stations 36+98 and 37+49, 11+78 and 10+78, and 10+78 and 10+00;
- Expansion and contraction coefficients (EC and CC) for the cross sections are identical to that in the "Existing Condition" model;
- Peak flows for the Captial and 100-year floods are presented in the "Existing Condition" model calculation summary.

Manning's roughness coefficients for the HEC-RAS model were selected based on field observations (Field Photos are presented in Figures 3, 4, and 5). The following coefficients were used:

Description	Manning's Number
Natural Stream - clean, straight	0.025
Natural Stream - stones/weeds, straight	0.030
Natural Stream - stones/weeds, winding	0.033 - 0.035
Natural Stream - cobbles/some boulders, winding	0.040 - 0.045
Very weedy to heavy timber and underbrush	0.060 - 0.080
Straight, dense willows/trees	0.110
Scoured channel between existing channel and armored layer	0.030 - 0.035
Armored Gabion/Grouted Riprap (bank only)*	0.027

* The Mannings n for gabions or grouted riprap would have a range encompassing 0.027. The exact value is not critical to the model as it only applies to the North bank of the channel.

CALCULATIONS:

HEC-RAS Summary table for the "Scour Limit" model is included as Appendix D, River Long Section, and Cross Section Plots are included as Appendix E.

A summary of flood elevation and velocity changes as compared to the "Existing Condition" model are shown in the Tables A and B:

Table A

Max./Min. Parameter between River Sta. 43+60 and 10+00	Existing Condition Model	River Sta.	Scour Limit Model	River Sta.
Capital Flood max. velocity (ft/s)	18.6	30+88	20.1	36+41
Capital Flood min. velocity (ft/s)	3.2	37+89	2.7	37+89
FEMA Flood max. velocity (ft/s)	21.2	29+98	18.3	36+41
FEMA Flood min. velocity (ft/s)	2.6	37+89	2.1	37+89

Table B

Parameter by River Station (43+60 to 10+00) (comparison from "Existing Condition" to "Scour Limit" model)	Change in Water Surface Elev.		Change in Channel Velocity	
	Difference (ft)	River Sta.	Difference (ft/s)	River Sta.
Capital Flood max. decrease	10.53	29+08	13.0	40+96
Capital Flood max. increase	1.37	40+96	15.4	36+41
Capital Flood average decrease	4.11	*all*	1.0	*all*
FEMA Flood max. decrease	8.69	33+85	12.2	40+96
FEMA Flood max. increase	1.29[1]	40+96	12.8	36+41
FEMA Flood average decrease	3.35	*all*	1.5	*all*

Note: [1] The FEMA Flood level increase is not a result of the project but reflects changes in stream channel geometry due to scour.

CONCLUSIONS/RESULTS:

A comparison of "Existing Condition" and "Scour Limit" flood model results indicates an overall improvement in both flood elevations (i.e. decrease) and flood velocities (also generally decreasing). However, there are some locations where either the flood elevation or flood velocity increase. The slight increases in flood elevation relative to the existing conditions can be explained by hydraulic principles requiring additional head to account for increased downstream energy loss in subcritical flow. The energy loss at a contraction (e.g. Sta. 46+92) is proportional to the velocity head ($v^2/2g$) which is greater in the "Scour Limit" model due the new wider channel causing less of a backwater effect. The large increases in velocity are due to the new wider channels causing less of a backwater condition (i.e. lower velocity), thereby increasing the flow velocity at specific locations (e.g. Sta. 36+41).

It is highly unlikely that channel velocities less than eight to ten ft/s could be achieved with any reasonable channel improvement design. The flood velocities at river station 9+00 (east of study limit and presumed historic channel section) are about eight and nine ft/s (for the FEMA and Capital Floods, respectively). This section of Anaverde Creek has well established native vegetation indicating it should have a relatively stable geometry over time even with flood flows.

REFERENCES:

1) U.S. Army Corps of Engineers. 1998. *HEC-RAS River Analysis System, Version 2.2* [software package]. Hydrologic Engineering Center.

2) *Anaverde Creek Basin Hydrology Study*, AKM Consulting Engineers. 1995.

3) *FEMA Flood Insurance Study for City of Palmdale, California, Los Angeles County*. 1998. Community number 060144.

Appendix D-2

Excerpts (Text, Figure 2 & Table 5) from
Semi-Annual Groundwater Monitoring Report, Year 2004
SCS Engineers
July 2004

Excerpts (Text, Figure 2 & Table 5) from

SEMI-ANNUAL GROUNDWATER MONITORING REPORT

Year 2004

Antelope Valley Recycling and Disposal Facility I
Palmdale, California

Prepared For:

Waste Management
8950 Redwood Highway
Novato, California 94945

Prepared By:

SCS ENGINEERS

SCS Engineers
3711 Long Beach Boulevard, 9th Floor
Long Beach, California 90807
562.426.9544

July 2004
File Number 01201024.00

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Scope and Purpose 1
1.2 Site Description and Background 1
1.3 Hydrogeologic Setting 3

2.0 FIELD PROGRAM, MONITORING RESULTS, AND DISCUSSION 5
2.1 Visual Inspection Program 5
2.2 Monitoring Network and Groundwater Elevation Measurements 5
2.2.1 Monitoring Network 5
2.2.2 Groundwater Elevation Measurements 5
2.3 Groundwater Gradient and Flow Velocity 6
2.4 Groundwater Sampling and Analytical Program 7
2.4.1 Field Program 7
2.4.2 Laboratory Analysis and Monitoring Parameters 7
2.5 Groundwater Analytical Program Results 8
2.5.1 First Quarter 2004 8
2.5.2 Second Quarter 2004 8
2.6 Surface Water Sampling, Monitoring and Results 8
2.7 Unsaturated Zone Sampling, Monitoring, and Results 8

3.0 LABORATORY AND FIELD QUALITY ASSURANCE AND QUALITY CONTROL 10
3.1 Trip and field Blanks 10
3.2 Holding Times and Temperture 10
3.3 Sample Surrogate Recoveries 10
3.4 Method Blanks 10
3.5 Laboratory Control Spikes 11
3.6 Initial Calibration, Continuing Calibration, and Internal Machine Standards 12

4.0 EVALUATION OF GROUNDWATER ANALYTICAL RESULTS 13
4.1 Wells MW-1 through MW-5 13
4.2 Well MW-6 14
4.3 History of ODR Findings and Groundwater Well Network Assessment 15

5.0 WASTE DISPOSAL INFORMATION 17
5.1 Volume of Waste Disposed 17
5.2 Volume of Landfill Used 17
5.3 Load Checking Program 17
5.4 Leachate Generation 17

TABLE ON CONTENTS (Continued)

5.5 Estimated On-site Water Use 18
5.6 Treated Auto Shredder Waste 18

6.0 CONCLUSIONS 19

7.0 REFERENCES 20

LIST OF FIGURES, TABLES AND APPENDICES

FIGURES

1. Location Map of Antelope Valley Recycling and Disposal Facility, Palmdale, CA
2. Facility Site Plan with Monitoring Locations, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
3. Groundwater Elevations and Contour Map, March 2004, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
4. Groundwater Elevations and Flow Direction, May 2004, Antelope Valley Recycling and Disposal Facility, Palmdale, CA

TABLES

1. Groundwater Monitoring Well Network and Well Construction, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
2. Groundwater Elevation Data, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
3. Background Monitoring Parameters, Well MW-6, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
4. Detection Monitoring Parameters, Wells MW-1 through MW-5, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
5. Groundwater Analytical Results, Wells MW-1 through MW-6, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
6. Groundwater Analytical Results, Well MW-6, Antelope Valley Recycling and Disposal Facility, Palmdale, CA
7. Vadose Sample Data, Antelope Valley Recycling and Disposal Facility, Palmdale, CA

APPENDICES

A. Field Sampling Forms
B. Groundwater Analytical Laboratory Reports and Chain-of-Custody Records
C. Vapor Analytical Laboratory Reports and Chain-of-Custody Records
D. DUMPStat Reports

1.0 INTRODUCTION

1.1 SCOPE AND PURPOSE

This semi-annual report details the results of groundwater monitoring for the first and second quarters of 2004 at the Antelope Valley Recycling and Disposal Facility I (AVRDF I) in Palmdale, California (Figure 1). The reported quarterly monitoring events were completed during March and May 2004. This report also summarizes the waste disposal information for the first and second quarters of 2004.

Sampling activities are being conducted to satisfy requirements of California Regional Water Quality Control Board (RWQCB) – Lahontan Region's Waste Discharge Requirement (WDR) Order Numbers 6-95-119 and 6-95-119A (WDID No. 6B190335001). Objectives of these activities are to evaluate the performance of facility design and operation and to identify potential threats to human health and the environment.

The Antelope Valley Recycling and Disposal facility operates under Solid Waste Facility permit 19-AA-009. The monitoring and reporting program presented herein fulfills the requirements outlined in Title 27 of the California Code of Regulations. For the purposes of this report, wells MW-1, MW-2a, and MW-3 are being monitored for detection purposes, whereas, well MW-6, installed in January 2003, is being sampled for collection of background groundwater monitoring data. Wells MW-4 and MW-5 are upgradient from the existing landfill area and downgradient of the future expansion area. These wells continue to be sampled to enhance the facilities detection monitoring database.

The groundwater monitoring program at the AVRDF I incorporates permanent monitoring elements to provide environmental protection during and after landfill development. All fieldwork, sampling methodologies, data evaluation, data quality assurance and control (QA/QC) and chemical analysis were conducted in accordance with the WDR and the site permit. Major site features (including the groundwater monitoring wells, creek monitoring stations, and vapor probes) are presented on Figure 2.

1.2 SITE DESCRIPTION AND BACKGROUND

AVRDF I is a Class III municipal solid waste landfill and operates under permits issued from the RWQCB, California Integrated Waste Management Board, County of Los Angeles, and Antelope Valley Air Pollution Control District. AVRDF I consists of Phases I, II, III, and IV. Phases I through III have been completed, and at this time Phase IV is currently accepting waste. Phase IV is a lined cell, of which the limits are shown on Figure 2. Landfill II (Phase V) is proposed and has not been constructed.

The AVRDF I landfill is an existing Subtitle D facility. The facility consists of a 65-acre parcel, of which 57 acres are currently permitted for waste disposal. The landfill has operated for over 35 years. Arklin Brothers Enterprises operated the landfill from the middle of the 1970's through May 1999, when USA Waste of California purchased the site.

The landfill facility currently receives 22,500 to 32,800 tons per month of municipal solid waste and construction/demolition debris. Waste solids generated during the treatment of water at the East Kern Water District are placed within the lined cell of Phase IV as shown on Figure 2.

A detection monitoring program was initiated at the active AVRDF I per the requirements of Article 5, Chapter 15, Title 23, California Code of Regulations, and Title 40, Code of Federal Regulations, Parts 257 and 258 (Subtitle D).

In 1986, as part of a Solid Waste Assessment Test (SWAT) study, three 4.5-inch diameter stainless steel groundwater monitoring wells (MW-1, MW-2, and MW-3) and six 4-inch diameter schedule 80 polyvinyl chloride (PVC) piezometers (two piezometers in the vicinity of each well) were installed at AVRDF I. One additional groundwater monitoring well (JHK-1), and three lysimeters (L-1, L-2, and L-3) were installed in November 1988 (Kleinfelder, 1989). The well JHK-1 was installed to monitor an intermittent perched groundwater-bearing zone that appeared to be present at the interface between the alluvial deposits and the underlying gypsiferous claystone member of the Anaverde Formation. The Anaverde Formation at the contact appeared to be deeply weathered. The perched zone yields groundwater samples occasionally.

Anaverde Creek, which is located immediately south of AVRDF I, is also monitored as part of the WDR. Anaverde Creek only flows during precipitation events or as a result of melting snow. Storms typically occur during the winter and spring. The creek is dry during the summer and fall. Surface water sampling points, S-1 and S-2, are located in upstream and downstream positions, respectively, relative to the limits of the landfill.

At the request of the RWQCB, four soil vapor probes (V-1B, V-2, V-3B and V-4) were installed at AVRDF I in November 1998 to replace the above-noted lysimeters (L-1, L-2, and L-3) in the monitoring program. In a letter dated March 5, 2003, RWQCB provided approval to abandon these lysimeters. As of the date of this report the lysimeters have not been abandoned. Probes V-1B and V-2 are nested in a single boring located near the southeast corner of the existing landfill. Probe V-1B is completed to a depth of 20 feet below ground surface; probe V-2 is completed to a depth of 40 feet below ground surface. Probes V-3B and V-4 are also nested in a single boring located near the southwest corner of the existing landfill. Probe V-3B is completed to a depth of 20 feet below ground surface; probe V-4 is completed to a depth of 40 feet below ground surface. Vadose zone vapor samples are taken from probes during each quarterly sampling event. This will continue until such time as it is determined that soil vapor is not impacting groundwater and then soil vapor sampling will be reduced to semi-annual monitoring.

In January and February 2000, Waste Management (WM) installed two monitoring wells, MW-4 and MW-5 upgradient of AVRDF I to collect additional background water quality data. The wells are located downgradient of the planned expansion area, Landfill II (Phase V), and will be utilized as detection monitoring wells for Landfill II per the RWQCB's Waste Discharge Requirements (WDRs) Order Nos. 6-95-119 and 6-95-119A (WDID No. 6B199402002). Starting in October 2000, MW-4 and MW-5 have been included in the ongoing quarterly groundwater monitoring program for the AVRDF I.

Following an evaluation of the AVRDF I groundwater monitoring network (SCS, November 2002), WM and RWQCB determined that an additional groundwater monitoring well, located near the southeast corner of AVRDF I, would enhance the assessment of water quality beneath AVRDF I. Well MW-6 was installed outside the southeast portion of the AVRDF I landfill in January 2003. Groundwater monitoring for MW-6 was initiated in February 2003 and will continue on a quarterly basis.

During the routine first quarter 2003 monitoring event, volatile organic compounds (VOCs) were detected in the downgradient monitoring well MW-3. Additional samples collected in March and May 2003 confirmed the presence of benzene in MW-3 above the laboratory reporting limits. Based on this information, pursuant to Section 20420(k)(7) Title 27 of the California Code of Regulations, SCS conducted an Optional Demonstration Report (ODR) to identify the source of the apparent release. The ODR, dated July 2003, concluded that the benzene and other aromatic hydrocarbons detected in MW-3 are common petroleum fuel constituents. The detection of these VOCs, without the other typical indications of a release from a landfill, suggested a hydrocarbon source other than the waste management unit, likely the former UST operation on the Property. On June 3, 2003, LACDPW referred this case to the RWQCB for further action.

The RWQCB letter dated, July 30 2003, recommended that MW-3 continue to be part of the quarterly monitoring for AVRDF I and noted that the impacts by petroleum hydrocarbons, such as benzene, are being investigated under the Underground Storage Tank program.

A landfill gas (LFG) extraction and flare system began operation at the site in January 2004. Thirteen new LFG extraction wells were installed and put online in January 2004. In addition, fifteen probes at eight locations monitor the perimeter of the landfill.

1.3 HYDROGEOLOGIC SETTING

AVRDF I is located in the City of Palmdale in the northeast quarter of Section 33, Township 6 North, Range 12 West, San Bernardino baseline and meridian. Surface elevation of the property is approximately 3,000 feet above mean sea level (msl). The nearest surface water is Anaverde Creek, along the southern border of the AVRDF I. Surface flow direction is to the south toward Anaverde Creek (United States Geological Survey, 1958, photorevised 1974).

AVRDF I is located in a structurally isolated tectonic block between the Little Rock fault to the north, and the San Andreas fault zone to the south. Groundwater in this small subbasin appears to be isolated from the larger Lancaster Basin north of the Little Rock fault (Kleinfelder, 1991). Three members of the late Miocene-age Anaverde Formation have been mapped in the area of AVRDF I; the gypsiferous claystone member beneath the southern portion of the AVRDF I, and the buff-colored arkosic and red-colored arkosic members beneath the northern portion of AVRDF I. Recent-age alluvial deposits composed of a gravel, sand, and silt mixture that is associated with Anaverde Creek, extend from the creek northward beneath the southern portions of AVRDF I. The alluvial deposits overlie the claystone member of the Anaverde Formation throughout the AVRDF I site (Buena Engineers, Inc., 1985).

Groundwater in the immediate vicinity of AVRDF I has been interpreted to occur within the upper claystone member of the Anaverde Formation and within the overlying alluvial deposits. After review of site geology and calculations from slug tests, Golder Associates (February 13, 2001) concluded that groundwater appears to also occur in perched zones in alluvium or in the base of the alluvium near the contact with the claystone. Based upon measured differences in groundwater elevations and geochemistry, this water-bearing zone appears to be hydraulically and geochemically separate from water bearing zones north of the Little Rock Fault and south of the San Andreas Fault.

Within the AVRDF I, groundwater is thought to generally flow south and subparallel to the San Andreas fault when in close proximity to the fault. South of the San Andreas fault zone, groundwater appears to flow to the northeast from the Sierra Pelona Mountains toward the Anaverde Valley. Groundwater movement within the Anaverde Valley shifts to the southeast under the influence of the San Andreas fault zone, which acts as a groundwater barrier.

2.0 FIELD PROGRAM, MONITORING RESULTS, AND DISCUSSION

2.1 VISUAL INSPECTION PROGRAM

The visual inspection program was implemented by WM personnel at AVRDF I to ensure that a potential release is detected at the earliest possible time. The visual inspection program includes physical examination of any stresses in biological communities, unexplained changes in soil characteristics, visible signs of leachate migration (i.e., leachate seeps), and any other change to the environment due to the waste management unit. None of these types of physical indications were reported at the facility during this monitoring period.

2.2 MONITORING NETWORK AND GROUNDWATER ELEVATION MEASUREMENTS

2.2.1 Monitoring Network

As presented in Table 1, the groundwater monitoring well network at AVRDF I consists of seven wells completed within the alluvium at the contact with the underlying Anaverde Formation, at locations upgradient and downgradient of AVRDF I. The locations of the seven groundwater monitoring wells (MW-1, MW-2a, MW-3, MW-4, MW-5, MW-6, and JHK-1*)* are shown in Figure 2. Well completion details are summarized in Table 1. The monitoring well network targets the first encountered groundwater. There were no changes to the groundwater network during the first and second quarters of 2004. Wells MW-1 through MW-6 were sampled during the first and second quarters of 2004. Well JHK-1 was dry during both of these events.

Two surface water sampling stations are located upstream (S-1) and downstream (S-2) of the landfill on Anaverde Creek. Quarterly sampling of S-2 is required under the current WDR/MRP. Sampling station S-1 is sampled if a concentration limit for a monitoring parameter is exceeded at sample station S-2, which is also resampled if this occurs. There were no changes in the surface water sampling program during this monitoring period. No surface water samples were collected from the Anaverde Creek during the first and second quarters of 2004.

Pore or unsaturated sampling is required on a quarterly basis under the current WDR. As discussed earlier, the current vadose points V-1B, V-2, V-3B, and V-4 replaced the lysimeter points (L-1, L-2, and L-3) in November 1998. There were no changes in the unsaturated zone sampling during the first and second quarter 2004 monitoring period. The four probes were sampled during the first and second quarters of 2004.

2.2.2 Groundwater Elevation Measurements

Prior to initiation of groundwater purging and sampling activities at each well location, the depth to water and water level elevation (feet above mean sea level) were recorded to the nearest hundredth of a foot. Water table elevation data obtained from six of the seven groundwater wells in the monitoring network were utilized for the preparation of groundwater contour maps and to

determine the groundwater flow direction and gradient at the site. Monitoring well JHK-1 was dry during the first and second quarters of 2004.

Water elevation data were collected on March 3, 2004 and May 18, 2004 with a Solinst water level indicator. The wellhead reference elevation (top of casing elevation), depth to groundwater, and calculated water level elevations are presented in Table 2.

The groundwater flow direction and gradient beneath the site were calculated based on linear interpolation between the monitoring well locations. Using the groundwater elevation data obtained during each quarterly monitoring event, groundwater flow beneath the AVRDF I was calculated to be predominantly towards the south-southeast, which is consistent with past monitoring events. With the addition of well MW-6 water level information, groundwater flow direction is interpreted to be more southerly than easterly in the area where water flows under ARVDF I. Groundwater elevation data for March 2004 and May 2004 have been plotted and contoured in Figures 3 and 4.

2.3 GROUNDWATER GRADIENT AND FLOW VELOCITY

The average horizontal groundwater velocity in the alluvium and claystone of the Anaverde Formation, the target water-bearing zone downgradient of the landfill, was estimated using the following equation:

$$\mathbf{v = (K_h i)/n_e}$$

Where:

- v = average groundwater velocity,
- K_h = aquifer horizontal hydraulic conductivity,
- i = average hydraulic gradient (vertical change in groundwater elevation/ corresponding horizontal distance), and
- n_e = effective aquifer porosity.

The calculation utilizes an average hydraulic conductivity value of 2.35 feet per day (8.3×10^{-4} cm/sec, average of values from Golder, February 2001, converted to feet per day); an effective porosity of 37.5 percent (average of sand and clay porosity, Health, 1998); and an average hydraulic gradient of 0.082 feet per foot as estimated from Figures 3 and 4. Based on these calculations, the average groundwater velocity reported at the site is approximately 0.51 feet per day or 186 feet per year.

2.4 GROUNDWATER SAMPLING AND ANALYTICAL PROGRAM

2.4.1 Field Program

Field sampling activities for the seven groundwater monitoring wells at AVRDF I were conducted on March 3, 2004 and May 18, 2004. Monitoring well purging and sampling activities were implemented in general accordance with the field procedures described in the WM *Groundwater, Leachate, and Surface Water Sampling Standard* dated June 2001. Necessary field or laboratory modification to the standard is documented accordingly.

Groundwater monitoring wells were purged and sampled using dedicated QED bladder pumps installed in each well. Prior to all sample collection activities, temperature, conductivity, turbidity, and pH were measured using field instruments. Field sampling data sheets for the first and second quarters of 2004, which document well equipment information, field parameter measurements, groundwater purge volumes, and field comments, are provided in Appendix A.

2.4.2 Laboratory Analysis and Monitoring Parameters

As described in SCS's Well Completion Report dated April 2003, AVRDF I is currently in the process of collecting background water quality information in well MW-6 in order to approximate the true range of ambient concentrations of targeted compounds in the groundwater system being monitored. Once adequate background data have been collected for all the program wells, site-specific concentration limits will be established and chemical comparisons will be made to these limits during each subsequent monitoring event. For the first and second quarters of 2004, groundwater samples for well MW-6 were analyzed for the parameters at the reporting limits presented in Table 3.

In accordance with the WDR, samples collected from wells MW-1, MW-2a, MW-3, MW-4 and MW-5 during the first and second quarters of 2004 were analyzed for the detection monitoring parameters at the reporting limits presented on Table 4. As noted earlier, no samples were collected from well JHK-1 since it was dry during both monitoring events.

No samples were filtered during the first and second quarters of 2004. All samples were field preserved with the appropriate preservative at the time of sample collection.

Water samples collected at the site were submitted to Severn Trent Laboratories (STL) in Arvada, Colorado for chemical analysis. Laboratory reports that specify reporting limits are included in Appendix B. Chain-of-custody and sampling form documentation have also been included with the laboratory reports.

2.5 GROUNDWATER ANALYTICAL PROGRAM RESULTS

The analytical results are summarized in Tables 5 and 6. No tables for JHK-1 are included since this well has been dry.

2.5.1 First Quarter 2004

During the first quarter 2004, no volatile organic compounds (VOCs) were detected above the reporting limit in wells MW-1, MW-2a, MW-3, MW-4, MW-5, and MW-6 (Table 5). One VOC species was detected at a concentration less than the reporting limit but greater than the method detection limit in each of MW-1, MW-2, and MW-3. Acetone was detected in the samples collected from MW-1 and MW-2a, and benzene was detected in the sample collected from MW-3. A single detection of a VOC below its respective reporting limit does not require a resampling event.

2.5.2 Second Quarter 2004

During the second quarter 2004 monitoring event, no VOCs were detected above the reporting limit in wells MW-1, MW-2a, MW-3, MW-4, MW-5, and MW-6 (Table 5). One or two VOCs were detected at a concentration below the reporting limit but above the method detection limit in each of wells MW-2a, MW-3, MW-4, MW-5, and MW-6. Methylene chloride was detected in these five wells; however, methylene chloride was also detected in the trip, and field blanks associated with these samples, which suggests a field or laboratory contaminant. Benzene was also detected below its respective reporting limit in MW-3. As noted earlier, MW-3 continues to be sampled for landfill assessment purposes (RWQCB letter, July 30, 2003) although petroleum related constituents such as benzene associated with former upgradient underground storage tanks have been detected. Single detections of unexplained VOCs below their respective reporting limits do not require resampling.

2.6 SURFACE WATER SAMPLING, MONITORING AND RESULTS

To monitor for potential impacts from the AVRDF I to Anaverde Creek, quarterly surface water monitoring at two sampling points on Anaverde Creek is conducted. Within the creek, sampling point S-1 monitors flow upstream of the AVRDF I and sampling point S-2 monitors the Anaverde Creek at the downstream end of the AVRDF I (Figure 2).

During the first and second quarters of 2004, no water samples were collected from sampling points S-1 or S-2 in the Anaverde Creek due to lack of surface flow.

2.7 UNSATURATED ZONE SAMPLING, MONITORING, AND RESULTS

As noted earlier, unsaturated zone sampling has occurred since May 1999 at soil vapor probes V-1B, V-2, V-3B, and V-4. The vadose well locations are shown on Figure 2. The probes have been included in the quarterly sampling program.

Vadose zone soil vapor samples were collected from each probe in February and May 2004. Vapor samples were collected directly from the four sample probes into Summa canisters.

Vapor samples collected at the site were submitted to STL in Santa Ana, California for chemical analysis. Sample analyses included analysis of fixed gases using ASTM D1946D, and volatile organic compounds using EPA Method TO-14A. Laboratory reports that detail laboratory specific reporting limits and chain-of-custody documents are included in Appendix C.

Analytical results for vapor samples are summarized in Table 7. Methane was not detected above the reporting limits in any of the samples for the first and second quarters of 2004. However, methane was detected at trace levels (between the method detection limit and the reporting limit) of 0.00045 and 0.00021 percent (volume by volume) in the second quarter samples from probes V-1B and V-2.

For first and second quarters of 2004, one or more of the following non-methane organic compounds (NMOC) were detected above the reporting limit in one or more of the vapor probes: dichlorodifluoromethane, chloromethane, 1,2-dichloro-1,1,2,2-tetrafluoroethane, trichlorofluoromethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,1,1-trichloroethane, and tetrachloroethene. The reported concentrations ranged between 1.1 and 72 parts per billion by volume (ppbv). Several other NMOCs were detected in concentrations below the reporting limits. The estimated concentrations of these are shown on Table 7. This list of constituents and concentrations are similar to past events.

3.0 LABORATORY AND FIELD QUALITY ASSURANCE AND QUALITY CONTROL

STL reports for groundwater samples during the first and second quarter 2004 each contain a Quality Control Summary. The following highlights some of the information presented in these summaries. For more detail, please review the appropriate portions of the laboratory reports.

3.1 TRIP AND FIELD BLANKS

Trip and field blank samples were submitted to STL along with the primary water samples for chemical analysis for VOCs using EPA Method 8260B. VOCs were not detected in the trip blank sample associated with the first quarter sampling event. No VOCs were detected in the field blank collected on March 3, 2004 near well MW-1.

Methylene chloride was detected at a concentration below the reporting limit in the trip blank associated with the second quarter 2004 sample from well MW-6. STL states that since methylene chloride was also detected at a similar concentration in the MW-6 sample, the possibility of laboratory or field contamination is suggested. Methylene chloride was detected at a concentration below the reporting limit in the field blank collected on May 18, 2004 near well MW-1.

3.2 HOLDING TIMES AND TEMPERTURE

All samples for the first and second quarter 2004 monitoring events were reportedly analyzed within the required holding times as determined by the analytical method.

Samples collected during this monitoring period arrived at STL with temperatures measured between 2.7 and 5.2 degrees Celsius.

3.3 SAMPLE SURROGATE RECOVERIES

Surrogate recoveries for EPA Method 8260B in the first and second quarters 2004 were within acceptable ranges for all samples.

3.4 METHOD BLANKS

During the first quarter 2004, STL reported that the method blanks associated with one or more of the well samples contained detections of beryllium (Method 200.7) and total dissolved solids (Method 160.1) at levels below the project established reporting limits and chloride (Method 325.3) and sulfate (Method 375.4) at levels above the project established reporting limits.

During the second quarter 2004, STL reported that the method blanks associated with all six wells contained detections of sulfate (Method 375.4) at levels below the project established reporting limits and total calcium (Method 200.7) and chloride (Method 325.3) at levels above the project established reporting limits.

For selected lots, although calcium, chloride, and/or sulfate were detected above the project reporting limit, the constituents were detected below STL's standard reporting limits. STL reported that no corrective action was taken for any values in method blanks that are below the requested reporting limits and/or less than the standard STL reporting limit. STL also noted that the sample concentrations reported above the project established reporting limits but below STL's standard reporting limit may result in false positive/false negative results, less accurate quantitation and potential misidentification at the lower concentrations. STL also states that the concentrations of total calcium and chloride in all wells during the second quarter 2004 were greater than ten times the results of the method blanks.

All other laboratory method blanks processed for the first and second quarter 2004 monitoring events were within established control limits.

3.5 LABORATORY CONTROL SPIKES

During the first quarter 2004 sampling event, sample MW-1 was selected to fulfill laboratory batch quality control requirements for Method 375.4. Analysis of the matrix spike/matrix spike duplicate provided recovery of sulfate below the lower control limits. STL stated that this recovery indicates the possible presence of matrix interference.

During the second quarter 2004 sampling event, sample MW-6 was selected to fulfill laboratory batch quality control requirements for Method 200.7. Analysis of the matrix spike/matrix spike duplicate provided recoveries of total barium, beryllium, and cadmium below the lower control limits and total iron, potassium, silver, arsenic, copper, antimony, and selenium above the upper control limits. STL stated that this recovery indicates the possible presence of matrix interference.

For the second quarter of 2004, STL reported that percent recoveries of matrix spike/matrix spike duplicate and/or relative percent difference were not calculated for total calcium, magnesium, manganese, and sodium (Method 200.7) because the sample concentrations were greater than four times the spike amount.

For the first and second quarter 2004 samples, the matrix spike/matrix spike duplicate performed on unrelated samples (not site samples but analyzed in same sample batch) exhibited a recovery outside control limits for total iron, calcium, and potassium (Method 200.7), total organic carbon (Method 415.1), and/or sulfate (Method 375.4). STL stated that, because the corresponding laboratory control and method blank samples were within control limits, the anomaly may be due to matrix interference and no corrective action was taken.

For the first and second quarters of 2004, STL reported that due to the result concentration exceeding the calibration range the matrix spike/matrix spike duplicate results for sulfate (Method 375.4) are estimated.

All other matrix spike and/or matrix spike duplicates for first and second quarter 2004 analyses were within established control limits.

3.6 INITIAL CALIBRATION, CONTINUING CALIBRATION, AND INTERNAL MACHINE STANDARDS

For first quarter 2004 sample collected from MW-6 the continuing calibration verification samples were above control limits for cadmium. However, STL states that since the data are considered to be biased high and cadmium was not detected in the sample from MW-6, corrective action was deemed unnecessary.

For second quarter 2004 samples the continuing calibration blank for total calcium exhibited levels above the project established reporting limit but below STL's standard reporting limits; therefore, no corrective action was taken for this anomaly. STL also noted that the sample concentrations reported above the project established reporting limits but below STL's standard reporting limit may result in false positive/false negative results, less accurate quantitation and potential misidentification at the lower concentrations. In addition, STL stated that the total calcium results of the associated samples were greater than ten times the result of the continuing calibration blank.

Based on review of STL documents, all other initial calibration, continuing calibration, and internal machine standards were within acceptable ranges during the first and second quarter 2004 monitoring events.

4.0 EVALUATION OF GROUNDWATER ANALYTICAL RESULTS

4.1 WELLS MW-1 THROUGH MW-5

The statistical program used to analyze inorganic parameters in monitoring wells MW-1 through MW-5 at AVRDF I is DUMPStat. The results of the statistical analysis are included in Appendix D.

AVRDF I is approved for the utilization of intra-well comparisons as the statistical evaluation method for inorganic analyses. The intra-well approach compares each new measurement of an individual well to its own historical background dataset for a given constituent. The resulting statistical analysis produces a control limit to which each new measurement is compared. In addition, the cumulative sum (CUSUM) of each successive monitoring result is incorporated into the statistical analysis, which provides for detection of increasing trends. Trends are identified even if the actual results are below the control limit (i.e., the statistical trigger level). Control limits and chemical comparisons for the quarterly monitoring parameters as well as details on the statistical methodology are presented in Appendix D.

It is standard practice to periodically update the background dataset using this methodology. In a letter to the RWQCB dated November 11, 2003, SCS requested permission to update the background dataset used for statistical evaluation of the groundwater monitoring well water quality at the AVRDF I. A response letter from the RWQCB dated November 24, 2003, approved the proposal to update the background data through June 2003.

Statistical analysis did not identify any indications of statistical increases for the first quarter 2004. However, during second quarter 2004 statistical analysis, employing CUSUM control charts, initial indications of statistical increases for calcium, iron, manganese, potassium, sodium, and total dissolved solids in well MW-3 were identified. It should be noted that for these constituents, the actual concentrations were below their standardized mean control limits. Data quality review (DQR) was requested from STL, and on July 1, 2004 STL confirmed the analytical results for these constituents in well MW-3. The RWQCB was notified of these findings by phone on July 2, 2004.

In a letter dated, July 8, 2004, WM notified the RWQCB of these inorganic compound statistical increases. As noted in the letter, the current CUSUM statistical increases have similar ranges to the previous verified statistical increases that were discussed in detail in the Optional Demonstration Report (ODR) prepared by SCS (December 2001) and subsequent follow-up letters (WM, March 5, 2002, June 17, 2002, September 9, 2002, December 18, 2002, April 18, 2003; SCS, July 2004). The ODR concluded that these statistical increases were the result of natural temporal variability. This document also noted that the suite of constituents whose concentrations increased likely reflect mobilization of the ions from naturally occurring evaporite minerals. As a consequence of these findings, SCS and WM recommended no additional assessment.

Inorganic compound concentrations were similar to historical background concentrations for the first and second quarter 2004.

As requested in the November 24, 2003 RWQCB letter, comparisons are made between the MRP listed concentration limits and the current concentrations of five constituents (total dissolved solids, sulfate, chloride, nitrate as nitrogen, and pH) for wells MW-1, MW-2A, and MW-3. No first or second quarter 2004 results for wells MW-1, MW-2a, and MW-3 were above the MRP listed concentrations. Graphical presentation of MRP concentrations versus parameter concentrations for MW-1, MW-2A, and MW-3 are provided at the end of each of the quarterly statistical reports (Appendix D). Similar concentration limits for MW-4 and MW-5 will be calculated, and submitted to the RWQCB for approval, prior to waste filling activities start in the expansion areas and when the background data set is complete for well MW-6.

As noted earlier, one or more trace (less than the reporting limit) concentrations of VOCs were detected in groundwater monitoring well samples during the first and second quarters of 2004. Detections of methylene chloride were attributed to laboratory or field cross-contamination because of detection in trip, field, and/or method blank analytical results.
Under non-statistical evaluation of VOC data, the remaining single unexplained VOC detection is below the reporting limits and does not require notification or resampling activities.

4.2 WELL MW-6

At the present time, statistical analyses are not performed for groundwater chemistry at monitoring well MW-6 at AVRDF I. Once a sufficient background database has been established for the facility, an intrawell statistical comparison methodology, (prediction limits/control charts) will be used for data evaluation by the site. The requisite statistical analysis will be performed once a minimum of eight data points have been collected for this well. To date, six rounds of groundwater monitoring have been completed.

For the current monitoring event, each constituent was evaluated by visual inspection for any trends. In addition, results are inspected for anomalously high concentrations and volatile organic compound detections. That is, inorganic parameters are assessed qualitatively for significant anomalies, data outliers, and the potential presence of significantly increasing trends. VOCs are assessed based on detections relative to the reporting limits.

No VOCs were detected in the first quarter 2004 samples from MW-6. For second quarter 2004, one VOC was detected in the sample collected from MW-6. Methylene chloride was detected at a concentration below the reporting limit but above the method detection limit. Since methylene chloride was also detected in the associated trip blank, it is attributed to field or laboratory contamination.

None of the monitoring parameter concentrations in this well appeared to be anomalous, and no trends in the monitoring parameters were identified. For well MW-6 monitoring parameters, concentrations versus time graphs are provided in Appendix D.

4.3 HISTORY OF ODR FINDINGS AND GROUNDWATER WELL NETWORK ASSESSMENT

Between third quarter 2001 and fourth quarter 2002, initial indications of statistical increase were found for calcium, chloride, iron, manganese, potassium, sodium, specific conductance, sulfate, and total dissolved solids in well MW-3 and magnesium in MW-2A had been identified. These statistical increases were addressed in the Optional Demonstration Report (ODR) prepared by SCS (December 2001) and subsequent notification letters by WM (March 5, 2002, June 17, 2002, September 9, 2002, and December 18, 2002). The ODR concluded that these statistical increases were the result of natural temporal variability and/or reflective of a "narrow" background dataset. These documents also noted that the suite of constituents involved suggest mobilization of the ions from naturally occurring evaporite minerals. For a more detailed discussion of previous resampling events, initial indications of statistical increases, and the ODR findings please review Section 4 of the semi-annual/annual report dated January 2003.

In response to the WM letter dated September 9, 2002, the RWQCB (in a letter dated October 21, 2002) concurred with these findings, however they also requested additional information. The RWQCB stated, "monitoring well MW-3 and MW-2A might not be monitoring the actual "downgradient" groundwater from beneath the landfill." The RWQCB letter, among other things, requested recommendations for possible modifications to the AVRDF I groundwater monitoring network.

At the request of WM, SCS prepared and submitted a report titled "*Evaluation of Groundwater Monitoring Network, Antelope Valley Recycling and Disposal Facility, Palmdale, California*" to the RWQCB in November 2002. This report examined and summarized the geological and hydrogeological setting at AVRDF, evaluated the monitoring system – particularly in regard to well MW-3 – and proposed an additional groundwater monitoring well, designated MW-6, be drilled near the southeast corner of the current landfill. In a letter dated December 9, 2002, the RWQCB concurred with the findings, but requested that WM attempt to locate the proposed well MW-6 further north than proposed along the east side of the landfill.

As presented in the SCS report titled "*Well Completion Report, MW-6, Antelope Valley Recycling and Disposal Facility*" dated April 2003, well MW-6 was installed in January 2003 and based on new water level information, monitoring wells MW-1 through MW-6 effectively monitor for potential changes to water quality as water flows under AVRDF I (Figures 3 and 4). The RWQCB in a letter dated April 21, 2003 concurred with these findings.

In SCS letter dated April 18, 2003 and the SCS July 2003 semi-annual report, WM and SCS informed the RWQCB of the above-noted verified statistical increases using intra-well statistical analysis, employing CUSUM control charts, for the first and second quarters 2003 groundwater monitoring events. Statistical increases for calcium, chloride, iron, manganese, potassium, sodium, specific conductance, sulfate, and total dissolved solids in well MW-3 and magnesium in MW-2A were again identified and are discussed in detail above. It should be noted that for several of these constituents, the actual concentrations were below their standardized mean control limits.

As noted earlier, SCS and WM requested permission and was provided authorization to update the statistical background data set to include data through June 2003. No statistical increases were observed during the third or fourth quarter 2003.

5.0 WASTE DISPOSAL INFORMATION

This section summarizes waste discharge activities at AVRDF I during the first and second quarters of 2004. The information presented below was provided by WM personnel and satisfies the waste discharge requirements of the facility's Monitoring and Reporting Program (No. 95-119, WDID No. 6B190335001, dated November 9, 1995) issued by the RWQCB.

5.1 VOLUME OF WASTE DISPOSED

During the first and second of 2004, AVRDF I accepted approximately 176,000 tons of municipal solid waste for disposal.

5.2 VOLUME OF LANDFILL USED

With the receipt of 176,000 tons of refuse for the first and second quarters of 2004, using the and aerial topography elevation data collected on November 18, 2003, AVRDF estimates that approximately 62 percent of the landfill has been used. The remaining operation life of AVRDF I is estimated at 3 years 10 months based on a refuse density of 1,400-pounds/cubic yard.

5.3 LOAD CHECKING PROGRAM

The load checking data sheets are maintained on file at the site and list the household hazardous wastes detected at AVRDF I during the first and second quarters of 2004. According to AVRDF representatives, appropriate employees of the landfill are trained in the identification of wastes that are unacceptable for disposal at this facility. The training program consists of initial hire training and at least annual training thereafter. During the first and second quarters of 2004, the following items were identified and disposed offsite in accordance with the required procedures:

Description	Estimated Quantity
Paint	99 gallons
Waste Oil	14 gallons
Batteries	23 units
Cathode Ray Tubes	110 units

5.4 LEACHATE GENERATION

During the first and second quarters of 2004, no detectable leachate was identified in the Leachate Recovery and Collection System for AVRDF I.

5.5 ESTIMATED ON-SITE WATER USE

AVRDF estimates approximately 9,984,000 gallons of water (non-leachate) were used at the landfill during the first and second quarters of 2004 for dust suppression and irrigation.

5.6 TREATED AUTO SHREDDER WASTE

No treated auto shredder waste was accepted at the AVRDF I during the first and second quarters of 2004.

6.0 CONCLUSIONS

VOCs were not detected in groundwater samples above reporting limits in wells MW-1, MW-2a, MW-3, MW-4, MW-5, and MW-6 during the first and second quarters of 2004 groundwater monitoring.

Initial statistical increases of calcium, iron, manganese, potassium, sodium, and total dissolved solids were identified during the second quarter of 2004 in well MW-3. In a letter dated, July 8, 2004, WM notified the RWQCB of these inorganic compound statistical increases. As noted in the letter, the current CUSUM statistical increases have similar ranges of concentrations as the previous verified statistical increases that were discussed in detail in the ODR prepared by SCS (December 2001) and subsequent letters (WM, March 5, 2002, June 17, 2002, September 9, 2002, December 18, 2002, April 18, 2003; SCS, July 2003). The ODR concluded that these statistical increases were the result of natural temporal variability. The ODR also noted that the suite of constituents whose concentrations increased likely reflect mobilization of ions from naturally occurring evaporite minerals. As a consequence of this document, SCS and WM recommended no additional assessment.

7.0 REFERENCES

Buena Engineers, Inc. 1985. Preliminary Geotechnical Engineering Report, Proposed Class III Sanitary Landfill Site, Anaverde Valley, Palmdale, Los Angeles County, California.

California Regional Water Quality Control Board, Lahontan Region, January 30, 2002. Comments on the Optional Demonstration Report, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, March 14, 2002. Comments on the Notification of an Initial Statistical Indication, First Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, July 5, 2002. Comments on the Notification of an Initial Statistical Indication, Second Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, October 21, 2002. Comments on the Notification of an Initial Statistical Indication, Third Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, December 9, 2002. Comments on the Technical Report: Evaluation of Groundwater Monitoring Network, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, April 21, 2003. Comments on Well Completion Report Well MW-6, Antelope Valley Recycling and Disposal Facility, Palmdale, Los Angeles County.

California Regional Water Quality Control Board, Lahontan Region, November 24, 2003. Proposal to Update Statistical Background Data for Groundwater Monitoring, Antelope Valley Public Landfill No. 1, Palmdale, Los Angeles County.

GC Environmental, Inc., December 2000. Annual Groundwater Monitoring Report, Antelope Valley Public Landfill, December 2000, Waste Discharge Requirements Order Nos. 6-95-119, 6-95-119AI, WDID No. 6B199402002.

Gibbons, Robert D., Ltd. 2000. DUMPStat 2.1.6 Statistical Groundwater Monitoring Software.

Golder Associates, February 13, 2001. Monitoring and Reporting Program, Antelope Valley Public Landfill, Palmdale, California.

Heath, R.C., 1987. Basic Ground-Water Hydrology, United States Geological Survey, Water-Supply Paper, No. 2220.

Kleinfelder, Inc. 1989. Summary of Field Activities, Palmdale Disposal Landfill, Palmdale, California.

Kleinfelder, Inc. 1991. Preliminary Hydrogeologic and Surface Water Hydrologic Assessment, Palmdale Waste Disposal Facility, Palmdale, California.

SCS Engineers, July 2001. Semi-Annual Groundwater Monitoring Report, Year 2001, 1st and 2nd Quarters, Antelope Valley Recycling and Disposal Facility, I Palmdale, California

SCS Engineers, December 2001. Optional Demonstration Report, Antelope Valley Recycling and Disposal Facility, Palmdale, California.

SCS Engineers, January 2002. Semi-Annual/Annual Groundwater Monitoring Report, Year 2001, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, July 2002. Semi-Annual Groundwater Monitoring Report, Year 2002, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, November 2002. Evaluation of Groundwater Monitoring Network, Antelope Valley Recycling and Disposal Facility, Palmdale, California.

SCS Engineers, January 2003. Semi-Annual/Annual Groundwater Monitoring Report, Year 2002, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, April 2003. Well Completion Report, Well MW-6, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, April 18, 2003. Notification of Detection of Volatile Organic Compound and Statistical Exceedences, First Quarter 2003 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California (WDID No. 6B190335001).

SCS Engineers, July 2003. Semi-Annual Groundwater Monitoring Report, Year 2003, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, July 2003. Option Demonstration Report For Benzene in Well MW-3, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

SCS Engineers, November 11, 2003. Request for Permission to Update Statistical Background Dataset, Antelope Valley Recycling and Disposal Facility, Palmdale, California.

SCS Engineers, January 2004. Semi-Annual/Annual Groundwater Monitoring Report, Year 2003, Antelope Valley Recycling and Disposal Facility I, Palmdale, California.

Waste Management, Spring 2001. Waste Management Groundwater, Surface Water, and Leachate Sampling Standard. Revision 9.2.

Waste Management, July 3, 2001. Data Quality Assurance/Quality Control Standard.

Waste Management, March 5, 2002. Notification of an Initial Statistical Indication, First Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California.

Waste Management, June 17, 2002. Notification of an Initial Statistical Indication, Second Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California.

Waste Management, September 9, 2002. Notification of an Initial Statistical Indication, Third Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California.

Waste Management, December 18, 2002. Notification of an Initial Statistical Indication, Fourth Quarter 2002 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California

Waste Management, December 23, 2002. Submittal of Project Schedule for Installation of Proposed Groundwater Monitoring Well MW6, Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility (AVRDF), Palmdale, California

Waste Management, July 8, 2004. Notification of Initial Statistical Increases, Second Quarter 2004 Groundwater Monitoring, Antelope Valley Recycling and Disposal Facility, Palmdale, California.

U.S. Geological Survey, 1958. Ritter Ridge, California SW ¼ Lancaster 15 degree Quadrangle, Photorevised 1974.

TABLE 5.
GROUNDWATER ANALYTICAL RESULTS, WELLS MW-1 through MW-6
ANTELOPE VALLEY RECYCLING AND DISPOSAL FACILITY, PALMDALE, CA

Sample Location	Sample Date	GENERAL CHEMISTRY																	VOLATILE ORGANIC COMPOUNDS**								
		Specific Conductance	pH	Total Dissolved Solids	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Total Organic Carbon 1	Total Organic Carbon 2	Calcium (Total)	Iron (Total)	Magnesium (Total)	Manganese (Total)	Potassium (Total)	Sodium (Total)	Chloride	Sulfate	Nitrate, Nitrogen	Acetone	Benzene	Ethylbenzene	Carbon Disulfide	Chloromethane	1,1 Dichloroethane	Methylene Chloride	Toluene	Xylenes
		µmhos/cm	no units	mg/L															µg/L								
MW-1	1/18/01*	3,240	7.3	2,990	<2	198	198	<3	<3	468	<0.1	66.3	<0.05	3.0	257	92	1,650 CQ	10	<20	<1	<1	<1	<2	<1	<10	<1	<2
	4/18/2001	3,240	7.1	3,110	<2	212	212	1.8 A	1.8 A	522	0.02 A	75.1	0.0040 A	3.4	289	84.2	2,130 Q	10.4	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	7/17/2001	2,970	7.2	3,380	<2	210	210	1.3 A	1.3 A	524	<0.1	81.3	0.014 A	5.9	291	80.5 Q	1,950 Q	8.2 Q	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	10/23/2001	3,140 C	7.1	3,170	<2	205	205	1.4 A	0.97 A	519	0.023 AC	77.6	0.063	4.0	293	102 Q	1,690 CQ	9.3 Q	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	1/23/2002	3,260 C	7.1	3,210	<2	207	207 C	1.7 A	1.5 A	519	0.073 AC	82.2	0.0463	3.9	292	74.5	1,770 Q	7.1	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	4/26/2002	3,210 C	7.0	3,220	<2	210	210	1.3 AC	1.5 AC	506	<0.1	87.4	0.056 L	4.0	300	72.6	1,940 Q	7.9	--	<0.5	<0.51	--	<5	<0.5	<5	<0.5	<2
	7/30/2002	3,000 C	7.1	3,280	<2	211	211	1.8 AC	1.8 AC	501	<0.1	84.5	0.042 A	4.2	291	73.9	1,900 Q	8.0	--	<0.5	<0.51	--	<5	<0.5	<5	<0.5	<2
	10/29/2002	3,100 C	7.3	3,200 C	<2	210	210	1.6 AC	1.6 AC	520	<0.1	84	0.049 A	4.2	290	81 Q	1,900 Q	7.7	--	<0.5	<0.6	--	<5	<0.5	<5	<0.5	<2
	2/18/2003	3,000C	7.1	3,200	<2	200	200	0.71 A	<3	520 C	<0.1	79	0.042 A	3.3	280C	81 Q	1,700 Q	5.8	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/15/2003	2,600 C	7.2	3,200	<2	210	210	1.7 AC	1.4 AC	530	<0.1	83	0.047 A	3.7	300	95 C	1,900 CQ	6.1	<10	<1	<1	<1	<2	0.3 A	0.22 AT	<1	<2
	9/9/2003	3,100 C	7.3	3,000 Q	<2	200	200	0.49 A	0.43 A	500 C	<0.1	64	0.034 A	2.3	260	96 C	1,900 CQ	6.2	<10	<1	<1	<1	<2	<1	<1	<1	<2
	11/7/2003	2,600	7.2	3,000 Q	<2	190	190	0.74 A	1.2 A	500	<0.1	61	0.023 A	2.7	260	100 C	1,700 CQ	5.3	<10	<1	<1	<1	<2	<1	0.45 ACTF	<1	<2
	3/3/2004	3,500	7.2	3,100 C	<2	200	200	0.77 A	<3	520	<0.1	66	0.025 A	2.9	260	93 C	1,800 CQ	4.9	2.6 A	<1	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	3,300	7.3	3,000	<2	190	190	0.56 A	0.56 A	550 C	<0.1	65	0.023 A	3.0	270	96 C	1,900 CQ	5.0	<10	<1	<1	<1	<2	<1	<1	<1	<2
MW-2a	1/19/01*	9,710	7.3	7,740 Q	<2	198	198	0.71 A	0.65 A	619	0.041 A	364	0.428	11.2	1,520	2,420 Q	1,960 CQ	3.1	<20	<1	<1	<1	<2	<1	<10	<1	<2
	4/18/2001	13,500	7.0	9,800 Q	<2	198	198	1.1 A	1.4 A	683	0.14	407	0.43	10.6	1,600	4,040 Q	1,610 Q	2.3	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	7/17/2001	9,990	7.1	8,770 Q	<2	205	205	0.90 A	0.88 A	659	0.045 A	367	0.25	10.8	1,490	3,140 Q	2,080 Q	0.73	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	10/23/2001	10,800 C	7.0	8,710 Q	<2	212	212	0.87 A	0.90 A	676	0.092 AC	378	0.26	11.3	1,610	3,120 Q	2,540 CQ	0.76	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	1/23/2002	10,400	7.0	8,430 Q	<2	220	220 C	1.2 A	1.2 A	682	0.11 C	355	0.48	12.5	1,620	2,940 Q	2,080 Q	0.04 A	--	<0.5	<0.5	--	<5	<0.5	<5	<0.5	<2
	5/14/2002	11,200 C	7.0	8,460 Q	<2	207	207	1.6 A	1.7 A	721 C	0.54	396	0.64	11.6	1,690	3,570 Q	2,380 Q	0.65	--	<0.5	<0.51	--	<5	<0.5	<5	<0.5	<2
	7/30/2002	9,680 C	7.0	7,750 Q	<2	207	207	1.1 AC	0.95 AC	670	0.11	421	0.14	10.6	1,480	2,980 Q	2,150 Q	0.79	--	<0.5	<0.51	--	<5	<0.5	<5	<0.5	<2
	10/29/2002	9,700 C	7.1	8,100 CQ	<2	200	200	1.4 AC	1.3 AC	720	0.14	440	0.027 A	9.3	1,400	3,100 Q	2,000 Q	0.76	--	<0.5	<0.6	--	<5	<0.5	<5	<0.5	<2
	2/18/2003	10,000 C	7.0	8,100 C	<2	200	200	0.54 A	0.73 A	810 C	0.14	470	0.28	12.0	1,800 C	3,400 Q	2,100 Q	0.77	<10	<1	<1	0.32 A	<2	<1	<1	<1	<2
	3/27/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.6 A	<1	<1	<1	<2	<1	0.36 ACT	<1	<2
	5/19/2003	7,400 C	7.0	8,600 Q	<2	200	200	1.2 AC	1.3 AC	810	0.080 A	450	0.16	11	1,700	3,200 CQ	2,300 CQ	0.75	2.7 AT	<1	<1	<1	<2	<1	1.7 AT	<1	<2
	9/9/2003	11,000 C	7.1	9,100 Q	<2	200	200	0.80 A	0.70 A	690	0.094 A	400	0.21	12	1,600	3,200 CQ	2,500 CQ	1.0	<10	<1	<1	<1	<2	<1	<1	<1	<2
	11/7/2003	6,600	7.2	7,700 Q	<2	200	200	1.0 A	0.93 A	610	0.037 A	390	0.11	9.2	1,400	2,800 CQ	1,800 CQ	4.7	<10	<1	<1	<1	<2	<1	0.37 ACTF	<1	<2
	3/3/2004	12,000	7.2	8,400 CQ	<2	190	190	0.66 A	0.69 A	720	0.068 A	420	0.16	10	1,500	3,300 CQ	2,300 CQ	2.9	2.9 A	<1	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	13,000	7.1	8,700	<2	190	190	0.80 A	0.82 A	790 C	0.55 A	450	0.18	13	1,800	3,500 CQ	2,300 CQ	2.3	<10	<1	<1	<1	<2	<1	0.31 AF	<1	<2
MW-3	1/22/01*	4,940	7.3	3,830	<2	304	304	1.3 A	1.3 A	293	2.84	249	0.074	2.72	577	815 Q	1,370 CQ	9.8	<20	<1	<1	<1	<2	<1	<10	<1	<2
	4/18/2001	5,270	7.0	4,080 Q	<2	301	301	1.7 A	1.5 A	311	3.9	251	0.1	2.5	581	914 Q	1,330 Q	12.8	--	<0.5	<0.5	--	<5	<1	<5	<0.5	<2
	7/18/2001	7,560	6.9	6,900 Q	<2	254	254	1.5 A	1.6 A	587	17.3	220	0.67	9.5	1,210	1,520 Q	2,420 Q	0.013 A	--	<0.5	<0.5	--	<5	<1	0.93 AT	<0.5	<2
	10/23/2001	8,480 C	6.7	7,020 Q	<2	263	263	1.5 A	1.5 A	595	10.8 C	238	0.57	9.0	1,380	1,810 Q	2,230 CQ	0.035 A	--	<0.5	<0.5	--	<5	<1	<5	<0.5	<2
	1/23/2002	8,530 C	6.7	7,320 Q	<2	257	257 C	1.9 A	2.0 A	589	17.7	225	0.72	9.4	1,400	1,850 Q	2,510 Q	0.077 A	--	<0.5	<0.5	--	<5	<1	<5	<0.5	<2
	4/26/2002	7,090 C	6.8	6,120 Q	<2	258	258	1.6 AC	1.7 AC	563	17.2	241	0.51 L	7.7	1,060	1,360 Q	2,300 Q	0.11 A	--	<0.5	<0.51	--	<5	<1	<5	<0.5	<2
	7/30/2002	8,570 C	6.6	7,390 Q	<2	234	234	1.6 AC	1.6 AC	597	39.5	233	0.94	10.5	1,500	2,020 Q	2,740 Q	<0.50	--	<0.5	<0.51	--	<5	<1	<5	<0.5	<2
	10/29/2002	8,900 C	6.6	7,400 CQ	<2	220	220	1.9 AC	2.0 AC	620	59	240	1.2	10	1,600	2,100 Q	2,900 Q	0.026 A	--	0.39 A	<0.6	--	<5	<1	<5	<0.5	<2
	2/18/2003	8,400 C	6.4	7,300 Q	<2	140	140	1.4 A	1.5 A	680 C	160	250	2.4	11	1,600C	2,300 Q	2,400Q	0.061 A	<10	5.2	0.58 A	0.51 A	<2	<1	<1	1.1	0.97 A
	3/27/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<10	2	<1	<1	<2	<1	0.37 ACT	<1	<2
	5/19/2003	5,900 C	6.6	7,200 Q	<2	260	260	1.7 AC	1.8 AC	700	45	260	1.3	10	1,500	2,000 CQ	2,600 CQ	<0.5	<10	1.1	<1	<1	<2	<1	3 T	<1	<2
	9/15/2003	7,700	6.6	7,500 CQ	<2	260	260	1.6 A	1.7 A	630	43	250	1.0	9.6	1,400C	1,900 CQ	2,600 CQ	<0.5	<10	0.47 A	<1	<1	<2	<1	0.22 AC	<1	<2
	11/7/2003	5,700	6.7	6,900 Q	<2	250	250	1.7 A	1.6 A	610	41	250	0.89	8.8	1,200	1,800 CQ	2,500 CQ	0.036 A	<10	0.45 A	<1	0.79 A ^	<2	<1	0.35 ACTF	<1	<2
	3/3/2004	9,700	6.7	7,400 CQ	<2	230	230	1.3 A	1.3 A	630	75	240	1.5	11	1,400	1,900 CQ	2,900 CQ	0.064 A	<10	0.54 A	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	10,000	6.6	7,500	<2	230	230	1.3 A	1.6 A	650 C	100	240	1.7	11	1,600	2,000 CQ	2,800 CQ	0.043 A	<10	0.63 A	<1	<1	<2	<1	0.39 AF	<1	<2

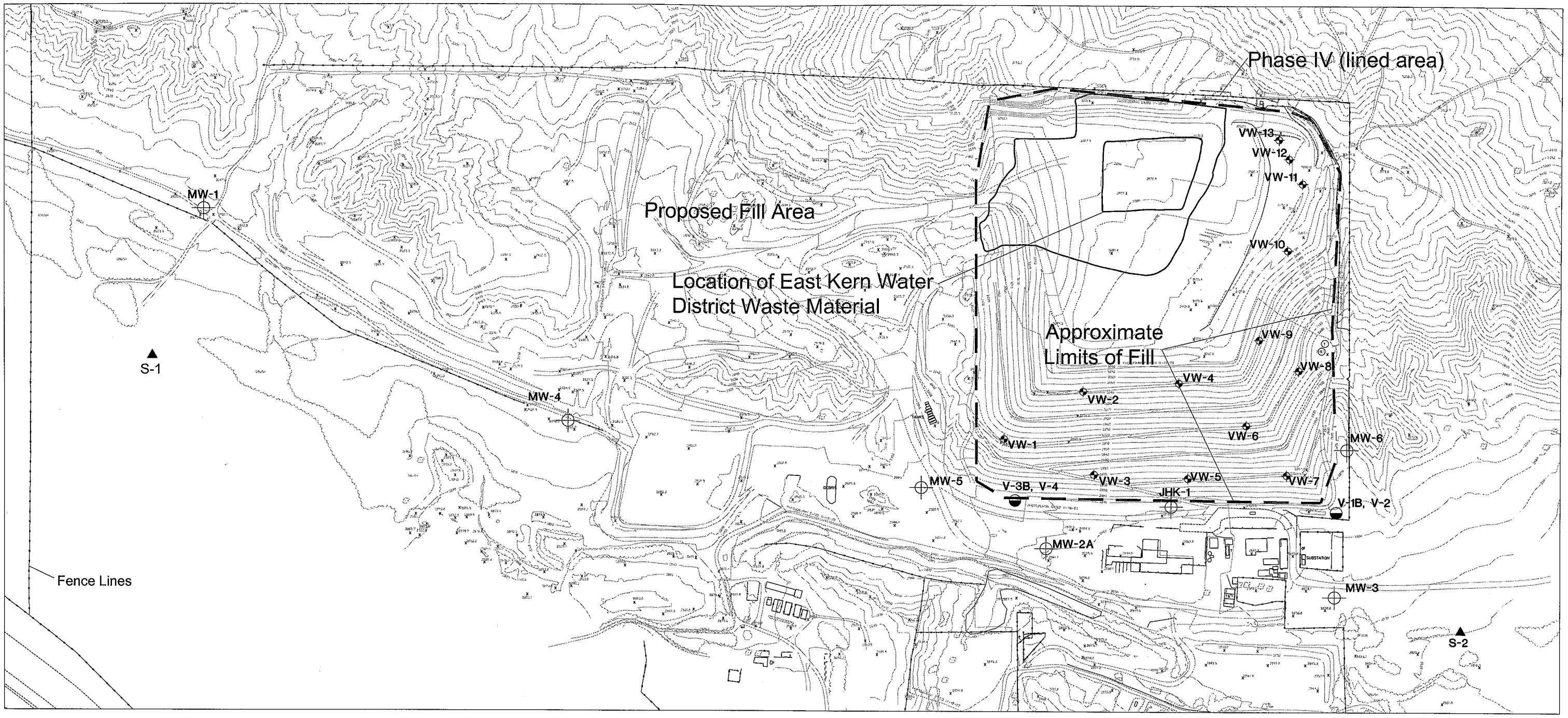
TABLE 5.
GROUNDWATER ANALYTICAL RESULTS, WELLS MW-1 through MW-6
ANTELOPE VALLEY RECYCLING AND DISPOSAL FACILITY, PALMDALE, CA

Sample Location	Sample Date	GENERAL CHEMISTRY																	VOLATILE ORGANIC COMPOUNDS**								
		Specific Conductance	pH	Total Dissolved Solids	Carbonate Alkalinity	Bicarbonate Alkalinity	Total Alkalinity	Total Organic Carbon 1	Total Organic Carbon 2	Calcium (Total)	Iron (Total)	Magnesium (Total)	Manganese (Total)	Potassium (Total)	Sodium (Total)	Chloride	Sulfate	Nitrate, Nitrogen	Acetone	Benzene	Ethylbenzene	Carbon Disulfide	Chloromethane	1,1 Dichloroethane	Methylene Chloride	Toluene	Xylenes
		µmhos/cm	no units	mg/L															µg/L								
MW-4	1/22/01*	2,480	7.5	1,820	<2	228	228	0.56 A	<3	162	0.067 A	137	0.163	2.05	222	340 Q	596 CQ	5.4	<10	<1	<1	<1	<2	<1	<1	<1	<2
	4/18/2001	1,700	7.3	1,230	<2	235	235	<3	<3	109	0.028 A	87.8	0.278	1.4 B	173	133 Q	445 Q	5.6	<10	<1	<1	<1	<2	<1	<1	<1	<2
	7/17/2001	2,200	7.4	1,980	<2	225	225	<3	<3	178	0.044 A	140	0.183	1.3 A	215	393 Q	720 Q	5.4	<10	<1	<1	<1	<2	<1	<1	<1	<2
	10/23/2001	2,710 C	7.3	2,060	<2	231	231	0.48 A	<3	196	0.031 AC	161	0.22	1.5 A	243	477 Q	648 CQ	6.8	<10	<1	<1	<1	<2	<1	<1	<1	<2
	1/23/2002	2,700 C	7.3	2,230	<2	227	227 C	0.73 A	0.65 A	202	0.015 A	161	0.254	1.7 A	238	493 Q	729 Q	5.9	<10	<1	<1	<1	<2	<1	<1	<1	<2
	4/24/2002	2,100 C	7.6	1,590	<2	232	232	0.59 A	0.97 A	141 C	<0.1	115	0.236	0.871 A	194	230 CQ	674 CQ	5.5	<10	<1	<1	<1	<2	<1	<1	<1	<2
	7/30/2002	2,250 C	7.2	2,550	<2	217	217	1.8 AC	1.4 AC	245	<0.1	204	0.064	2.26	270	597 Q	997 Q	6.1	<10	<1	<1	<1	<2	<1	<1	<1	<2
	10/29/2002	1,800 C	7.6	1,400 C	<2	230	230	0.97 AC	0.56 AC	120	0.013 A	99	0.25	1.7 A	180	200 Q	550 Q	5.8	<10	<1	<1	<1	<2	<1	<1	<1	<2
	2/18/2003	1,400C	7.4	1,100	<2	240	240	<3	<3	96 C	<0.1	76	0.11	1.5 A	160 C	99 Q	430 Q	4.0	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/15/2003	1,400 C	7.5	1,100	<2	230	230	0.34 AC	<3	96	<0.1	78	0.18	1.2 A	160	100 C	490 CQ	4.6	<10	<1	<1	<1	<2	<1	<1	<1	<2
	9/9/2003	2,000 C	7.5	1,500	<2	230	230	<3	<3	130 C	<0.1	100	0.099	1.6 A	190	210 CQ	630 CQ	5.3	<10	<1	<1	<1	1.1 A	<1	<1	<1	<2
	11/7/2003	1,500	7.5	1,300	<2	230	230	<3	<3	99	<0.1	80	0.23	1.4 A	160	120 C	480 CQ	5.4	5.4 A	<1	<1	<1	<2	<1	0.44 ACTF	<1	<2
	3/3/2004	1,700	7.6	1,200 C	<2	230	230	<3	<3	99	<0.1	80	0.20	1.2 A	160	120 CQ	510 CQ	4.3	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	1,900	7.5	1,300	<2	230	230	<3	<3	110 C	<0.1	93.0	0.37	1.2 A	180	160 CQ	580 CQ	5.9	<10	<1	<1	<1	<2	<1	0.23 AF	<1	<2
MW-5	1/19/01*	5,360	7.9	5,550	<2	233	233	<3	0.37 A	486	0.593	393	0.361	13.3	497	325 Q	2,930 CQ	7.9	2.5 A	<1	<1	<1	<2	<1	<1	<1	<2
	4/18/2001	5,510	7.0	5,510 Q	<2	241	241	0.62 A	0.61 A	463	0.071	370	0.334	13.0	485	340 Q	2,910 Q	7.7	<10	<1	<1	<1	<2	<1	<1	<1	<2
	7/17/2001	5,490	7.2	6,820 Q	<2	269	269	1.1 A	1.1 A	456	0.0437 A	358	1.8	17.3	816	331 Q	3,570 Q	0.69	<10	<1	<1	<1	<2	<1	<1	<1	<2
	10/23/2001	5,320 C	7.1	5,320 Q	<2	239	239	0.55 A	<3	514	0.0206 AC	408	0.19	13.9	555	378 Q	2,840 CQ	8.4 Q	<10	<1	<1	<1	<2	<1	<1	<1	<2
	1/23/2002	5,700 C	7.1	5,870 Q	<2	255	255 C	0.81 A	0.84 A	489	0.055 A	387	1.29	16.0	684	349 Q	3,060 Q	2.9	<10	<1	<1	<1	<2	<1	<1	<1	<2
	4/24/2002	6,000 C	7.1	6,450 Q	<2	271	271	1.1 A	1.1 A	508 C	0.0218 A	400	1.95	19.2	905	325 CQ	3,980 CQ	0.8	<10	<1	<1	<1	<2	<1	<1	<1	<2
	7/30/2002	5,900 C	7.1	6,400 Q	<2	310	310	2.2 AC	1.9 AC	448	0.023 A	362	2.03	18.1	914	355 Q	3,820 Q	0.62	<10	<1	<1	<1	<2	<1	<1	<1	<2
	10/29/2002	5,700 C	7.2	6,200 CQ	<2	280	280	1.5 AC	1.4 AC	470	0.015 A	370	2.20	17.0	880	350 Q	3,700 Q	1.0	<10	<1	<1	<1	<2	<1	<1	<1	<2
	2/18/2003	5,400 C	7.0	6,200 Q	<2	270	270	0.37 A	0.44 A	480 C	0.014 A	380	2.1	18.0	870C	350 Q	3,400 Q	1.1	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/15/2003	4,400 C	7.2	6,200 Q	<2	290	290	1.0 AC	1.1 AC	480	<0.1	380	2.0	18	880	350 CQ	3,700 CQ	1.4	<10	<1	<1	<1	<2	<1	<1	<1	<2
	9/9/2003	7,100 C	7.2	7,000 Q	<2	310	310	0.69 A	0.80 A	440	0.360	330	1.8	18	1,100	390 CQ	3,800 CQ	0.82	<10	<1	<1	<1	<2	<1	<1	<1	<2
	11/7/2003	4,100	7.1	5,300 Q	<2	250	250	0.64 A	0.54 A	480	<0.1	370	0.6	15	590	370 CQ	3,300 CQ	4.0	<10	<1	<1	<1	<2	<1	0.36 ACTF	<1	<2
	3/3/2004	6,500	7.2	6,100 CQ	<2	260	260	0.55 A	0.53 A	460	<0.1	350	1.8	17	740	350 CQ	2,500 CQ	1.5	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	6,400	7.2	5,900	<2	250	250	0.50 A	0.55 A	490 C	<0.1	380	1.3	18	750	370 CQ	3,400 CQ	3.6	<10	<1	<1	<1	<2	<1	0.32 AF	<1	<2
MW-6	2/28/2003	11,000 C	6.7	16,000 Q	<2	580	580	6.4	6.1	480 C	0.070 A	1,600	21	40	2,400 C	270 Q	10,000CQ	0.021 A	2.7 A	<1	<1	<1	<2	<1	0.43 ACT	<1	<2
	3/27/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<10	0.25 A	<1	<1	<2	<1	0.31 ACT	<1	<2
	5/19/2003	8,400 C	6.8	15,000 Q	<2	670	670	8.0 C	8.3 C	470	1.2	1,500	17	38	2,300	280 CQ	10,000CQ	<0.5	3.2 AT	<1	<1	<1	<2	<1	<1	<1	<2
	9/9/2003	13,000 C	6.8	16,000 Q	<2	680	680	6.8	6.4	450 C	3.9	1,500	20	30	2,200	240 CQ	11,000CQ	<0.5	3.0 A	<1	<1	<1	<2	<1	<1	<1	<2
	11/7/2003	8,000	6.7	13,000 Q	<2	680	680	6.3	6.5	410	2.5	1,400	18	26	2,000	200 CQ	9,800 CQ	0.11 A	<10	<1	<1	1.2^	<2	<1	0.37 ACTF	<1	<2
	3/3/2004	14,000	6.7	17,000 CQ	<2	670	670	6.1	6.2	410	2.1	1,400	17	26	2,000	190 CQ	7,000 CQ	0.028 A	<10	<1	<1	<1	<2	<1	<1	<1	<2
	5/18/2004	15,000	6.8	17,000 Q	<2	680	680	7.6	7.3	440 C	2.8	1,400	16	29	2,200	190 CQ	12,000 CQ	0.021 A	<10	<1	<1	<1	<2	<1	0.69 AT	<1	<2

Notes:
* = 5-year Constituent of Concern was completed in January 2001. See SCS report dated July 2001 for results.
* * = Only analytes detected in one or more wells are listed. For full list see laboratory analytical reports.
µg/l = micrograms per liter
mg/l = milligrams per liter
µmhos/cm = micromhos per centimeter
VOC = Volatile Organic Compounds

^ = Recent experiments have shown carbon disulfide present in rinseate of latex and nitrile gloves, hence the detection of carbon disulfide is likely due to lab or field cross-contamination. See Appendix C of SCS January 2004 semiannual-annual report.

-- = not analyzed
C = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
A = Estimated result. Result is less than reporting limit.
Q = Elevated reporting limit. The reporting limit is elevated due to high analyte levels.
T = Constituent detected in trip blank.
L = Serial dilution of a digestrate in the analytical batch indicates that physical and chemical interferences are present.
COL = Primary and confirmation columns exceeded 40% for this analyte. The lower of the two values is reported.



LEGEND

- Groundwater Monitoring Wells
- Vadose Zone Gas Probes
- Surface Water Sample Location (from WDR 95-119 Map)
- Landfill Gas Extraction Well

GRAPHIC SCALE

400 0 400

IN FEET

N

SOURCE: Modified From Database Provided By Analytical Photogrammetric Surveys, Inc.

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
3711 LONG BEACH BLVD., 9th FLOOR
LONG BEACH, CA 90807
PH. (562) 426-9544 FAX. (562) 427-0805

SHEET TITLE: Facility Site Map with Monitoring Locations					
PROJECT TITLE: Antelope Valley Recycling & Disposal Facility, Palmdale CA					
PROJ. NO. 01201024.00	DWN. BY: APH	ACAD FILE:	SCALE: 1" = 400'	DATE July 2004	Figure 2
DSN. BY: TQS	CHK. BY: TQS	APP. BY: KWG			

N:\CAD\2001\01201024.00 - Antelope Valley\Design\Antelope Valley (Topo 11-03).dwg - final.dwg Jul 13, 2004 - 1:7pm By: 2178aph

Appendix E-1

Palmdale Landfill Expansion Plan Supplemental Biological Assessment 2004 Survey Update, Frank Hovore and Associates August 9, 2004

FH & A

(661) 250 - 8311; 298 - 7579 fax; e-mail: fthovore@thevine.net
www.hovore.com

Frank Hovore & Associates
14734 Sundance Place
Santa Clarita, CA 91387-1542
09 August 2004

Palmdale Landfill Expansion Plan
Supplemental Biological Assessment
2004 Survey Update

Introduction

The operators of the Palmdale Landfill propose to expand the existing "Landfill I" use area to encompass additional acreage of undeveloped open space, situated immediately adjacent to the western margin of the present landfill access drive. Additional ancillary facilities are proposed to be situated along the southern margin of existing landfill area 1, above the channel of Anaverde Creek. Previous actions have been permitted by the County of Los Angeles, Army Corp of Engineers, and California Department of Fish & Game, based primarily upon a biological report submitted by S.G. Nelson (1991), and the more recent *Sec. 404 & Sec. 1603 jurisdictional delineation* (Dodson & Associates, 2001).

Since the Nelson report, there have been numerous changes to the regulatory statutes by which the significance of impacts to biological issues are determined, and many more species and vegetation formations have been accorded sensitive status. Therefore, FH&A biologists conducted focused surveys over the entire site during Fall, 2003 and Spring, 2004, intended to determine whether the site biota had changed measurably, and to re-evaluate the status of sensitive resources potentially affected by the project. Two additional areas were included in the 2004 surveys: a 200 foot wide future utility access corridor extending along the northern margin of the Landfill I property boundary; and a new alignment for the entry drive, passing from the intersection of Tierra Subida and Rayburn Road through the existing terminal ridgeline to the present entry roadway, then following a straightened alignment immediately north of the existing row of power poles to the landfill truck scales. The following information supplements and updates the survey results and conclusions of the 1991 report and the 2001 delineation report.

Areas and issues of concern included the general biota of the site, sensitive plant and animal species potentially occurring within the area proposed for expanded landfill use, and freshwater / riparian species which might be affected by encroachment or flood protection modifications to the channel of Anaverde Creek. The timing of the Spring surveys (20 April and 18 May, 2004) was intended to determine the identity of annual plant species on the site, and to coincide with the season of adult activity for sensitive riparian faunal elements. Species of concern included the following: California red-legged frog (known from Ritter Ranch), southwestern pond turtle (known from Anaverde

Creek), arroyo toad (known from Littlerock Creek), coast horned lizard (common in the site vicinity), desert tortoise (unlikely to occur near the landfill), western burrowing owl and other sensitive bird species, short-jointed beavertail cactus and Hoover's woolly-star (known from several other sites nearby).

Potential project effects to biological resources from the expansion program would include direct removal or alteration of surface features, including plants and sedentary wildlife species; relocation of mobile wildlife species into areas outside of the zone of direct effects; increased light, noise, traffic and other human presence impacts upon adjacent habitats; increased numbers of ravens, gulls and other scavengers within the vicinity of the landfill. Permitting for proposed activities would preclude deposition of fill or any harmful materials into the drainage courses, and all proposed landfill operations include debris and catchment basins to prevent direct runoff from the deposited materials into Anaverde Creek.

Physical characteristics of the site

Landforms within the proposed expansion footprint appear to not have been altered since the Nelson report, but portions of the area adjacent to the west margin of the existing landfill more recently have been graded and filled as part of on-going haul route use and drainage entrapment. The topography of the proposed expansion area has been altered marginally by roadways which encircle the site, and pass off-site to the north and south. The main interior portion proposed for continued landfill use encompasses a low pressure ridge along the San Andreas rift zone, delineated by the roads and Anaverde Creek channel to the south, and by a low pass to the north. The land along the project northern boundary rises toward the top of another, higher secondary terminal ridgeline, forming relatively steep slopes and dry arroyos, but without any definable watercourses or other significant erosional features. This ridgeline descends downward to the east, reaching grade level at the margin of Tierra Subida Roadway. Portions of the area proposed for the driveway realignment lie within the level, sandy foothill plains along the west margin of Tierra Subida, north of the toe of the terminal ridgeline.

Anaverde Creek lies adjacent to the site, but is separated from the proposed landfill use area by several dirt roadways or excavated basins with marginal roadway berms. This reach of the creek is narrow and rocky, with steeply incised banks, both sides of which have been filled or otherwise disturbed for much of its length. Although the creek channel shows signs of seasonal high-water flows, the persistent drought conditions of the past several decades likely have reduced the frequency with which it carries runoff, and there was no evidence of surface water between November, 2003 and May, 2004. As it passes eastward, the channel widens and becomes a dry wash to Tierra Subida Road, at which point it is intercepted within existing City park facilities on the east side of that roadway.

There are no caves, cliffs, rock outcroppings, or other significant geological features on the proposed expansion parcels or roadway alignment zones.

Vegetation formations and habitats

Dominant vegetation over most of the site is xeric California juniper scrub, intermixed with Joshua trees, but mostly very open, and thinly-spaced. Native woody shrub and sub-shrub species include goldenbush, foothill yucca, bladderpod, desert sage, prince's plume, California buckwheat, Acton encelia, horsebrush, cholla cactus, scarlet bugler and four-wing saltbush (along the roadsides). Annual species observed included trumpet buckwheat, spotted buckwheat, chia, suncups, gilia, comb-bur, fiddleneck, doveweed, snake broomweed, desert candle, goldfields, tidy-tips, small-flowered poppy, comb-bur, Turkish rugging, dense-flowered woollystar, many-flowered woollystar and lance-leaved live-forever.

The removal of existing Joshua trees from the proposed expansion zone has been evaluated within the prior project documentation, and conditions have not changed significantly since that report was accepted. As noted in Mitigation Measure #1, the City of Palmdale Desert Vegetation Ordinance #952 requires transplantation, or off-site dedication/preservation of compensatory habitat for the removals. Studies conducted in 1998 (FH&A, *Desert Vegetation Preservation Plan*) located appropriate off-site compensatory acreage for the potential loss of 103 acres of juniper and Joshua tree woodland in the proposed expansion area. The areas available for preservation of suitable acreage and density of habitat are situated immediately south of the present landfill operations, and as determined in 1998 include a greater number of specimen shrubs than would be required by the ordinance for the entire facility, including whatever acreages are computed for the additional 200 foot wide utility corridor and re-aligned entrance roadway, both of which will alter slopes and minor ridgelines.

Slopes above the proposed expansion site, where the utility corridor will be located, are similar in vegetation type to the remainder of the site, but have slightly greater density of shrub cover, and include chamise in the understory. The proposed roadway realignment zone cuts through the terminus of the ridgeline where it descends to Tierra Subida, and will remove slopes and bajadas that contain a dense formation of junipers, a few Joshua trees, cholla cactus, Great Basin sagebrush, broomweed, rabbitbrush, winterfat, desert needlegrass, Mormon tea, goldenbush, California and wand buckwheat, four-wing saltbush, and Russian thistle.

The bed of Anaverde Creek in the eastern one-third of the project reach is thinly-to-densely vegetated with mulefat, intermixed with mostly non-native herbaceous taxa (yellow sweetclover, wire lettuce, wild heliotrope), transitioning to arroyo willow and cottonwood formations where it passes the berm of the southernmost basin. The delineated areas of agency jurisdiction include 0.9 acres of "waters of the U.S.", per Army Corps of Engineers application of Section 404 of the Federal Clean Water Act, and 1.9 acres subject to permitting within 1600 sections of the California Fish & Game code (Dodson & Associates, 2001). Any work to be performed in connection with the expansion project within the jurisdictional areas will be constrained by provisions of the CDFG and ACOE permitting. The willow formation is dense and nearing maturity, then thins again somewhat to the west, where the creekbed is not constrained and widens to

form wiregrass and saltgrass flats, intermixed with Great Basin sagebrush, saltbush and rabbitbrush.

Wildlife use of the site

General wildlife use of the property is low to moderate for the habitat types present, noticeably reduced in diversity and abundance by the immediate presence of the active landfill, truck traffic, and basin construction/maintenance. There are several rift-zone ponds off-site, on private property southeast of the project site, presently used for fishing and other recreational activities. The presence of these ponds likely increases animal movement through and around the existing landfill site, but the lack of surface water within the reach of Anaverde Creek on and adjacent to the proposed and existing project areas reduces the value of that portion of the drainage as a habitat linkage.

Mammal species observed or detected from sign include coyote, gray fox, raccoon, desert black-tailed jackrabbit, Audubon cottontail, California ground squirrel, Botta pocket gopher, dusky-footed woodrat, and deer mouse. Fecal pellets of mule deer were found on the ridgeline north of the active landfill, within the 200 foot wide proposed utility corridor, but not within the proposed expansion area. An active coyote den was found on the lower face of the slope of the main terminal ridgeline where it approaches the margin of the access driveway, about 250 feet west of Tierra Subida.

The presence of the landfill attracts large numbers of common ravens and California gull to the site, and ravens were observed foraging over the entire property. Red-tailed hawk, Cooper's hawk, and American kestrel were observed flying over the off-site ponds and wetlands on the property south of the project area, and any or all of them may nest in cottonwood trees along Anaverde Creek. Barn owl and great horned owl were heard calling on the site during night surveys, and presumably both nest within the existing facilities on the site, or along Anaverde Creek.

Songbirds noted on the property included several non-resident migrants (white-crowned sparrow, savannah sparrow, Wilson's warbler, Nashville warbler), and a suite of xeric chaparral – desert species, including blue-gray gnatcatcher, desert horned lark, black-throated sparrow, northern mockingbird, bushtit, Bewick's wren, California towhee, and California quail. None of these species were common within the proposed expansion area or utility corridor, and the latter four species were conspicuously more abundant within xeric riparian and sagebrush/rabbitbrush formations in the Anaverde Creek basin immediately south and west of the project boundary. Desert riparian areas typically host a disproportionate number of bird species compared to the surrounding terrestrial habitats, but many desert bird species will nest in the riparian habitats and forage in upland scrub, or vice versa, requiring both habitat types for resident use of an area.

Because of the prevailing drought conditions in the western Antelope Valley, ground cover is thin or absent from much of the substrates on the site, greatly reducing the mass and quality of insect resources. The effect this has on reptiles is reductive,

lowering the number and species of lizards in particular. Lowered food sources naturally have a direct impact upon lizard populations, winnowing out the less fit individuals, and they also may lower the reproductive rate for one or more years. Few reptiles were noted on the site, mostly yucca night lizards (common under fallen Joshua tree trunks and dead bases of foothill yucca), side-blotched lizards and fence lizards, but also one San Diego alligator lizard and a few desert whiptail lizards (the latter only along the access roadway at the northern margin of the property). Snakes observed included San Diego gopher snake and coachwhip, both of which are relatively abundant on the slopes to the north of the expansion area.

Although not observed, southern Pacific rattlesnake, rosy boa, desert patch-nosed snake, night snake, and California kingsnake all would expected to occur within the site vicinity, particularly within or adjacent to the rift zone riparian habitat areas. The off-site ponds likely support two-striped garter snake and western pond turtle, both of which are known to occur elsewhere on Anaverde Creek.

No amphibians of any kind were observed within the expansion area, and none would be expected thereon, given the absence of surface water or riparian features on that portion of the site. Pacific chorus frog and western toad were observed within the riparian and wetland habitats along the western portion of the reach of Anaverde Creek passing along the southern margin of the property. Nocturnal surveys for amphibians, employing standardized protocols for arroyo toad and California red-legged frog, revealed no amphibians in the remainder of the reach, where it passes adjacent to existing facilities. This portion of the reach has been dry for at least the past 9 months, and does not appear to regularly sustain surface flows. Ponding and wetting along the western portion of the reach permits amphibian use, but surveys for vocalizing amphibians, and flashlight surveys of the creek and adjacent ponds yielded only the two species noted early, along with a calling bullfrog.

Invertebrates were not common on the proposed expansion site, commensurate with the drought conditions which have greatly reduced Spring annual growth, leaf production by woody perennials, and flowering rates and timing. None of the foothill yucca on the site were blooming during Spring surveys, despite the timing being optimal, but emergence holes in old floral stems indicated presence of yucca weevil, yucca longhorned beetle, metallic borers, and bogus yucca moth. Darkling beetles were uncommonly encountered in the uplands, but several specimens of *Eleodes* and *Phloeodes* were found in the more mesic scrub near the southern boundary of the overall site. Trapdoor spider burrows were sparse but present on several of the steeper slopes of the site, at the western end of the expansion area and within the proposed utility corridor, and California tarantula likely also occurs locally. Western black widow spiders were abundant under debris and within the entrances of unused rodent burrows.

Sensitive resources

Although the Spring 2004 blooming season was considerably retarded in terms of timing and vegetative productivity, the field surveys were sufficient to determine

presence/absence of the few sensitive plant species potentially occurring locally. None of the small stands of *Eriastrum* found on the site were the formerly-listed species, Hoover's woollystar, *E. hooveri* (recently posted by the USFWS as having been formally de-listed), all of the plants identified as being either many-flowered woolly-star (*E. densiflorum*), or sapphire woolly-star (*E. sapphirinum*), neither of which is of agency concern. The few specimens of beavertail cactus on the project site all clearly belong to the common nominate variety, *Opuntia b. basilaris*, lacking the shortened stems of the short-jointed morph *brachyclada*. None of the 80+ plant species found on the site are considered sensitive by any resource advocacy group or agency.

The riparian vegetation along Anaverde Creek forms small areas of scrub and woodland, which would be classified as southern willow scrub or southern willow – cottonwood woodland, both considered highest inventory priority formations by the California Department of Fish & Game's Natural Diversity Data Base.

No sensitive invertebrate species were found on the site. Shrubs of four-winged saltbush were inspected for presence of caterpillars or resting adult San Emigdio blue butterfly but none were found. No other agency-listed sensitive insect species would be expected to occur locally.

None of the species of amphibians or reptiles detected on the property are agency-sensitive. There is a possibility of western pond turtle, two-striped garter snake, and possibly also California red-legged frog occurring within the off-site ponds and wetlands along the rift zone south of the project boundary, but habitat values for these species are at best marginal within the reach of the creek immediately adjacent to the landfill boundary, and none would be present within the proposed expansion area or zone of indirect project effects. Habitat values along the reach of Anaverde Creek within the vicinity of the landfill property do not appear suitable for arroyo toad, and this species would not be expected within the zone of potential project effects.

It is likely that coast horned lizard occurs within the open flats of Anaverde Creek basin, between the off-site wetlands and the existing peripheral Landfill I area access road. The proposed landfill expansion would result in no direct project impacts to this area. Cryptic species, or taxa which normally occur in relatively low densities may be difficult to census, even during optimal conditions, but the likelihood of coast horned lizard occurring within the area of direct expansion impacts is lessened somewhat by the relatively more disturbed nature of the substrates and habitats. Likewise, there is a remote possibility of rosy boa occurring within the property boundaries, but records for this species are scarce, and it appears to be more commonly encountered in the San Gabriel range and rockier desert ranges to the north of the La Liebre system. We are not aware of any records of rosy boa from this sub-range.

Agency-listed sensitive raptor species potentially occurring within the landfill vicinity include a variety of hawk species (ferruginous, rough-legged, northern harrier, white-tailed kite, sharp-shinned, prairie falcon) which may forage seasonally or casually over the property, but none would be expected to nest or otherwise occur on the site in a

resource-dependent relationship. The substrates, slopes, and levels of disturbance render the project area unsuitable for nesting use by burrowing owls.

A number of wetland and marshland birds would be expected to frequent the ponds on the off-site portions of the Anaverde Creek basin, including several agency-sensitive egrets and herons, but none of these species would be likely to occur within the zone of project effects, and habitat values in the uplands are wholly unsuited to them.

Several sensitive songbird species were observed, or would be expected to occur within the project boundaries, including Costa's hummingbird, Nuttall's woodpecker, loggerhead shrike, California thrasher, black-chinned sparrow, Brewer's sparrow, and Lawrence's goldfinch. These are all considered CEQA-level sensitive taxa where they breed, and at there is a possibility of any of them nesting within the habitats of the overall property. Most would occur within the Anaverde Creek riparian areas and basin scrub habitats, but the shrike and thrasher would be equally likely to utilize xeric upland shrub formations. Neither of these species were observed during any of the surveys, and clearly they are not common on the site, if present at all. The Federal Migratory Bird Treat Act and California Fish & Game law require that project actions such as the initial grading or clearing of previously-unmodified land be timed to commence and be completed outside of the breeding season (approximately mid-April to mid-August at this elevation in the Antelope Valley). It is recognized that the expansion operations will be on-going over many years once they commence, and it is assumed that after the expansion activities have commenced there would be little likelihood of native species re-entering the zone of disturbance to breed, so the timing constraint applies only to the initial clearing phases of the project. This will avoid direct impacts to active nests, as required by law, but no doubt some territory loss and displacement will occur. Because no wildlife species of concern were observed on the site, the numbers of individuals potentially affected cannot be readily determined-- and there is a possibility that none would be affected—and so this potential residual impact cannot be considered CEQA-significant.

No sensitive mammals species presently are known to reside or regularly frequent the project site, but at least several sensitive species of bat (pallid, pale big-eared, *Myotis* spp.), would be expected to forage aerially over the site, particularly along the alignment of Anaverde Creek. Bats observed during field surveys at night included western pipistrelle, Mexican free-tailed bat, and an undetermined larger species, possibly big brown bat. The only species with a known roost in the site vicinity is the free-tailed bat, which maintains a colony in the walls of a pump station at nearby Palmdale Lake. The proposed landfill expansion should generate no significant adverse impacts to sensitive bat species.

Other sensitive mammals potentially occurring on the property include southern grasshopper mouse, American badger, and less-likely, ringtail. The first of these is relatively common in the western Antelope Valley and Santa Clara River basin, and could occur anywhere on the site, but tends to be nomadic, and usually is detected only by focused trapping. Such an effort would not be warranted, given that the species would be no more likely to occur within the project area than on the surrounding slopes and

within the creek basin habitats. Badger and ringtail, if present during foraging or home range movement, would most likely occur in the Anaverde Creek basin, and would not be adversely affected by the proposed landfill expansion.

Coyote is not a sensitive species, but is an important predator, at the top of the local food chain. The active den along the margin of the existing access roadway lies within the zone of potential grading effects, and if it is to be directly altered, an effort should be made to avoid direct harm to its occupants. If possible, excavation should be performed with care to insure that animals inside have the ability to escape.

The proposed landfill expansion would incrementally reduce upland xeric juniper scrub and chaparral vegetation formations within the property boundaries. Activities associated with the landfill would be expanded to a larger footprint, extending the peripheral effects (light, noise, movement) to a greater portion of the reach of Anaverde Creek adjacent to the property. These effects could incrementally lower the habitat values of that portion of the reach for the species presently utilizing the riparian areas therein. While this is not a condition which requires formal mitigation, facility design and management practices which reduce the intensity of lighting adjacent to habitat areas, direct security and activity lighting onto target areas, and not into the creek channel, would significantly lower the peripheral effects of the proposed expansion. Noise and other intrusions arising from project implementation would be approximately the same as existing levels, extended westward along the expansion perimeter.

On-site and adjacent wildlife movement, corridors and habitat linkages

Anaverde Creek and the overall rift zone, including the low ridgelines that parallel the fault alignment, are one of the major wildlife movement zones in southern California. Wildlife moving between the southern Sierra Nevada / Tehachapi ranges and the transverse ranges may pass along the rift zone, following the riparian corridors or moving across the open scrub habitats in the surrounding basins. Ridgelines may be followed by larger, more mobile species, but in recent years most taxa utilize the network of dirt roads connecting powerline towers and other installations, or follow the aqueduct margins.

The proposed landfill expansion will be aligned within the same upland area as the existing landfill and ancillary facilities, and will not measurably reduce the passage of wildlife through that portion of the Anaverde Creek corridor. The past and present installation includes intense night lighting along the creek margins, and the creek channel is confined to a narrow passage. It is probable that species moving along Anaverde Creek exit the channel and move through the open habitats to the south of the channel, re-entering east of the entry to the present landfill. Conditions of the permits to work within and adjacent to the channel prevent obstruction of passage along that alignment, and crossings remain open, Arizona-style.

Summary

The proposed landfill expansion would generate similar effects as currently occur as a result of the existing facility use and operation, extended further west along Anaverde Creek alignment, as permitted by previous agency agreements and CEQA document approvals. As determined in the original biota assessment (Nelson, 1991) xeric upland juniper scrub and chaparral vegetation formations will be removed or altered for the landfill and utility corridor. These impacts will be fully mitigated per provisions of the City of Palmdale Desert Vegetation Ordinance, within a Desert Vegetation Preservation Plan, situated on adjacent property, of sufficient acreage and juniper – Joshua tree specimens to compensate for habitat acreage lost to the landfill operations. Displacement effects may occur to agency-listed CEQA-sensitive songbird and small mammal species, but these impacts, while important locally, are not significant and adverse by the standards of CEQA or other applicable statutes. Actions which directly affect vegetation formations shall be initiated outside of the timing of the native bird nesting season (mid-April through mid-August) to avoid disturbing active nests, per provisions of the Migratory Bird Treaty Act and California Fish & Game Code. Anaverde Creek shall be protected against direct runoff, light, obstruction, and other intrusions, per Mitigation Condition #3 of the CEQA document, and current California Fish & Game and Army Corps of Engineers permitting.

R-5 ALIGNMENT PHOTOS

End of ridgeline where proposed alignment crosses; this grade will be cut approximately 100 feet up the slope.

View west from terminus of roadway alignment to scales

View south from margin of Tierra Subida opposite Rayburn road; the proposed alignment will go through the stand of Joshua trees immediately to the right of the pole line.

View east from near terminus of proposed realigned roadway; the alignment will be straight along the left (in photo) side of the poles.

404 and 1603
JURISDICTIONAL DELINEATION
for PALMDALE LANDFILL

Prepared for:

Waste Management, Inc.
1200 West City Ranch Road
Palmdale, California 93551

Prepared by:

LISA M. KEGARICE
Tom Dodson & Associates
2150 North Arrowhead Avenue
San Bernardino, California 92405

CERTIFICATION: I certify the statements furnished in this report and in the attached exhibits presents the data and information required for this delineation, and the facts, statements, and information presented are true and complete to the best of my knowledge.

Lisa M. Kegarice
Ecologist

RECEIVED
APR 10 2001
EDAW, INC., IRVINE, CA

March 2001

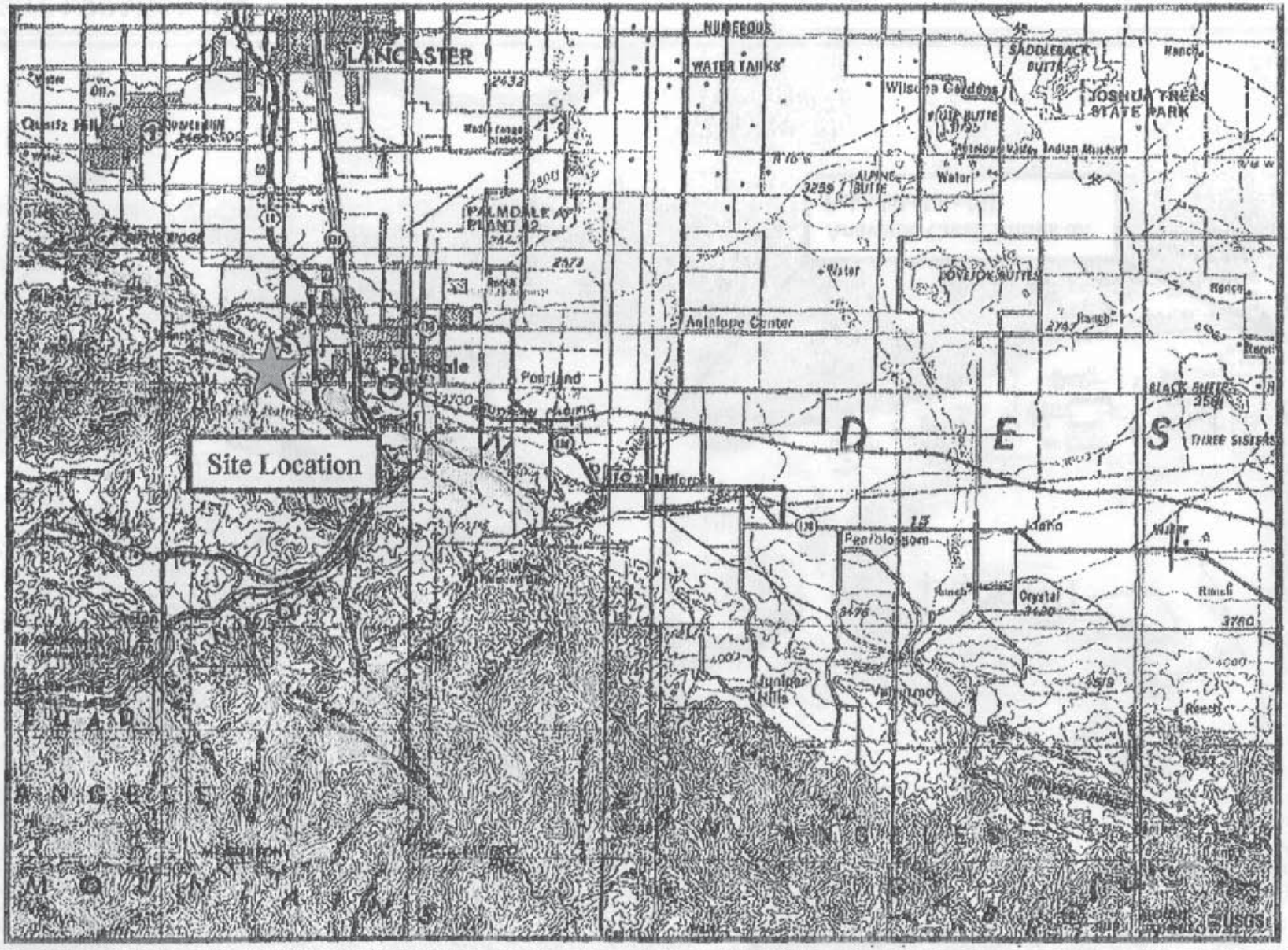
(Revised: April 9, 2001)

INTRODUCTION AND SUMMARY OF FINDINGS

The following is a Jurisdictional Wetland, Waters, and California Streambed Delineation for Waste Management on Palmdale Landfill located in Palmdale, California. The landfill property is situated west of Interstate 14 just outside of Palmdale, Los Angeles County, California (see Figures 1 and 2 for site location). Anaverde Creek traverses the southern boundary of the landfill property, and is the subject of this delineation. This report discusses the general background information, methodology used to determine the Jurisdictional Wetlands, Waters, Streambed, and a discussion of the rational for the delineated areas.

Anaverde Creek is an isolated water body, and light of the Supreme Court Decision regarding Solid Waste Association of Northern Cook Counties *vs.* United States Corps of Engineers (SWANCC) issued on January 9, 2001; the Supreme Court held that the Corps could not extend it jurisdiction to isolated waters or wetlands based solely upon the use of such waters by migratory water fowl. Because the channel originally deemed a "Water of the United States" by the Corps does not have any type of hydrological connection with another "Water of the United States" there by being isolated; it may no longer subject to Corps jurisdiction under Section 404. The ultimate decision regarding jurisdiction is the Corps' [personal communication with David Castanon, North Coast Section Chief, U.S. Army Corps of Engineers, Regulatory Branch (3-13-2001)]. They may exert jurisdiction on some segments of the Creek where endangered species are expected to occur.

The result of this delineation is approximately 0.9 acre of the channel may be "Waters of the United States", and 1.9 acres are subject to California Department of Fish and Game under Section 1600 of the Fish and Game Code. Figure 3 is a map of the project site with the areas that meet Streambed criteria indicated.

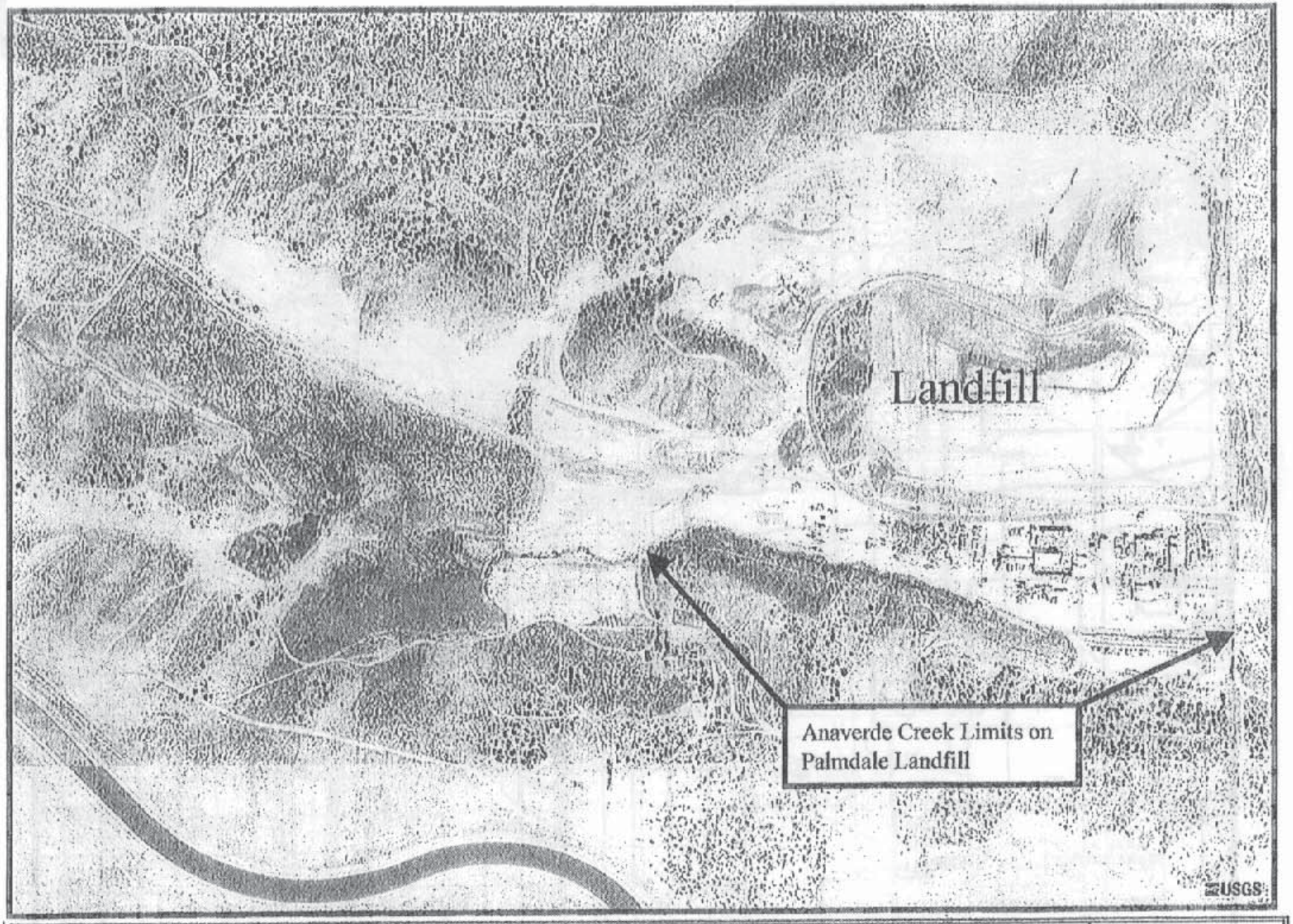


REGIONAL LOCATION MAP

Source: TierraServer.com

TOM DODSON & ASSOCIATES
Environmental Consultants

FIGURE 1



SITE LOCATION MAP

Source: TierraServer.com

TOM DODSON & ASSOCIATES
Environmental Consultants

FIGURE 2

METHODOLOGY

California Department of Fish and Game Section 1603

The California Department of Fish and Game takes jurisdiction over water flow areas, i.e., streams. These water flow areas are identified in the code as:

> "...natural flow or bed, channel or bank of any river stream of lake designated by the department in which there is at any time an existing fish aor wildlife resource or from which these resources derive benefit or will use material from the streambeds..."

> Although river is never defined in the Fish and Game Code; a river is defined by Webster as: "A natural stream of water larger than a creek and emptying into an ocean, lake or another river". Further Webster defines a stream as a small river.

In order to quantify the acreage of "Streambed" the channel was walked and survey stakes of the discernable bed or banks were taken at approximately 100-foot intervals. These stakes were then surveyed in and a map was prepared. The acreages were then calculated from the mapped areas.

U.S. Army Corps of Engineers "Waters of the United States", excluding wetlands

The limits of "waters of the United States", excluding wetland, are defined in 33 CFR 328.3(a) as those areas within the "ordinary high water mark" (OHWM). The OHWM is defined as:

> "...that line on the shore established by the fluctuations of the water and indicated by physical characteristics such as clear natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas."

In order to quantify the acreage of "Waters of the United States" the channel was walked and survey stakes of the discernable bed or banks were taken at approximately 100-foot intervals. These stakes were then surveyed in and a map was prepared. The acreages were then calculated from the mapped areas.

U.S. Army Corps of Engineers "Wetlands"

The conclusions in this determination and the subsequent delineation of the Jurisdictional Wetlands are based upon The U.S. Army Corps of Engineers' Wetland Delineation Manual, January 1987, Technical Report Y-87-1 (Manual). This Manual outlines a comprehensive approach based upon the presence of the following three parameters: wetland hydrology, hydrophytic vegetation, and hydric soils.

Wetland hydrology is present if the "sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation"(Manual). Hydrophytic vegetation is "the sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Manual). A positive hydrophytic vegetation indicator is present if the prevalence, characterized by the dominant species of a plant community or communities, of the vegetation is classified as hydrophytic vegetation. Dominant plant species are those that contribute more to the character of a plant community than other species present, as estimated or measured in terms of some ecological parameter (i.e., %cover, %density, etc.) Hydric soil is a "soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation.

Using this Manual, a wetland determination is made when under "normal circumstances" an area has all three parameters present. An area is not functioning under normal circumstances if a positive indicator for one of the three parameters could not be found due to effects of recent human activities. If a particular site has been recently disturbed by natural or human activities, it may not meet the criteria of "normal circumstances". If this occurs it would be classified as an "Atypical Situation" meaning one or more parameters are not reliable indicators.

To complete this Jurisdictional Wetland Delineation all three parameters were investigated, soils, hydrology and vegetation. The Manual describes inundation greater than one month to be a "very long duration", therefore areas that were ponded, or were saturated at the surface or within the root zone (usually 1-12 inches). The hydrophytic vegetation is characterized by plant species that have "demonstrated an ability to achieve maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season." (Reed)

The National List of Plant Species That Occur in Wetlands was used to determine the indicator status of the dominant species of a community. The wetland area was delineated by looking for vegetation boundaries in the field between communities dominated by Facultative Wetland Species - Obligate Wetland Species and those dominated by Facultative Upland - Upland species, and comparing the hydrological and soils data along the vegetation transition.

RESULTS

Jurisdictional Determination for Waters of the United States

Anaverde Creek channel was investigated in this jurisdictional determination. This channel traverses west to east along the southerly edge of the property. This channel is characterized by deeply eroded channel. This channel is characterized by deeply incised sides with the western half characterized by wetland habitat and ponded areas, and the eastern half by a dry wash sparsely vegetated by upland species.

Anaverde Creek is an isolated water body, and light of the Supreme Court Decision regarding Solid Waste Association of Northern Cook Counties *vs.* United States Corps of Engineers (SWANCC) issued on January 9, 2001; the Supreme Court held that the Corps could not extend it jurisdiction to isolated waters or wetlands based solely upon the use of such waters by migratory water fowl. Because the channel originally deemed a "Water of the United States" by the Corps does not have any type of hydrological connection with another "Water of the United States" there by being isolated; it may no longer subject to Corps jurisdiction under Section 404. The ultimate decision regarding jurisdiction is the Corps' [personal communication with David Castanon, North Coast Section Chief, U.S. Army Corps of Engineers, Regulatory Branch (3-13-2001)]. They may exert jurisdiction on some segments of the Creek where endangered species are expected to occur.

Due to the deeply incised channel walls, often the limits of the Streambed were synonymous with the "ordinary high water mark" identified as potential Corps of Engineers jurisdiction. This was true primarily for the upper half of the channel, however in the lower portion, the CDFG streambed limits extended beyond the Corps limits.

CONCLUSION

Wetlands were observed on the upper half of the channel as it traversed the property. The lower half of the property is characterized by dry wash and is largely unvegetaed.

The result of this delineation is approximately 0.9 acre of the channel may be "Waters of the United States", and 1.9 acres are subject to California Department of Fish and Game under Section 1600 of the Fish and Game Code.

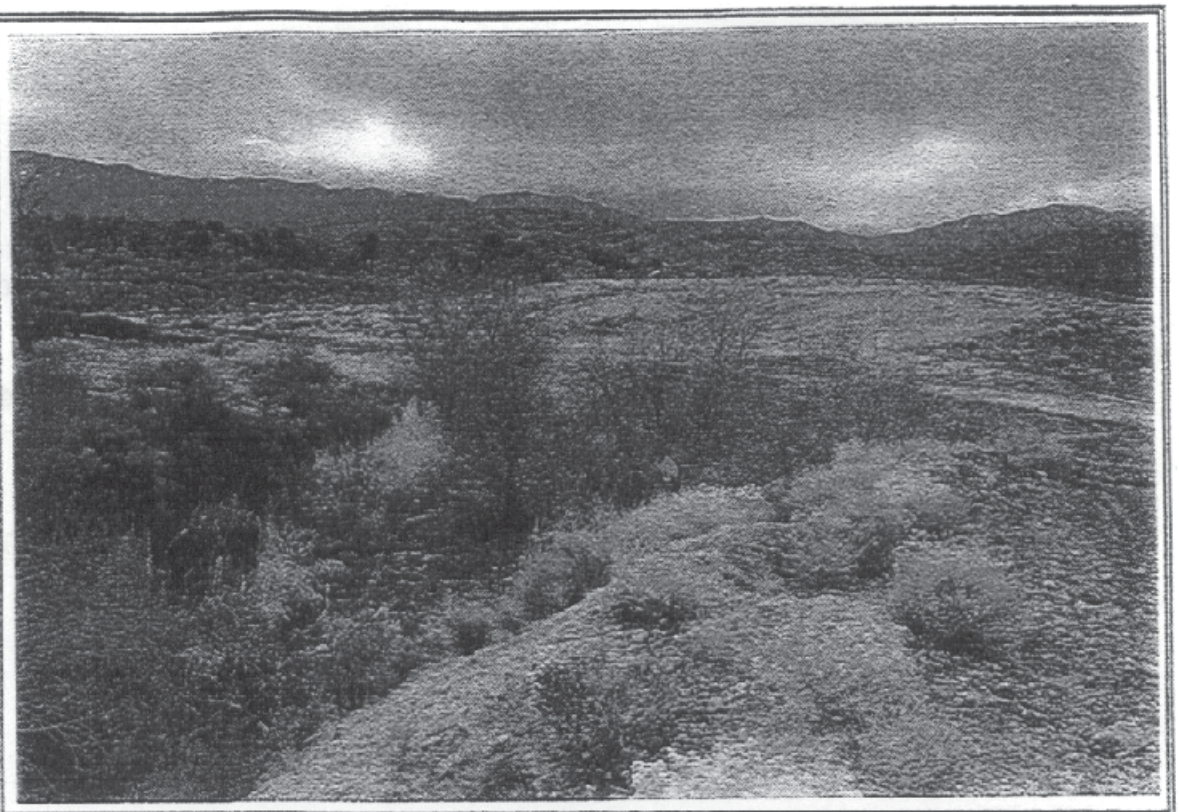


PHOTO 1: Ponded area on upper half

PHOTO 2: Riparian habitat on upper half

REFERENCES

Environmental Laboratory. 1987. "Corps of Engineers Wetland Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Hickman, J.C. Ed. 1993. The Jepson Manual. University of California Press. London, England. 150 pp.

Reed, P.B., Jr. 1988. National list of plant species that occur in wetlands: California (Region 0). U.S. Fish Wildlife Services Biological Rep. 88(26.10).

TABLE 1

PLANT INDICATOR STATUS CATEGORIES

INDICATOR CATEGORY	INDICATOR SYMBOL	DEFINITION
OBLIGATE WETLAND PLANTS	OBL	Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1%) in nonwetlands. Examples: *Spartina alterniflora, Taxodium distichum.*
FACULTATIVE WETLAND PLANTS	FACW	Plants that occur usually (estimated probability >67% to 99%) in wetlands, but also occur (estimated probability 1% to 33% in nonwetlands). Examples: *Fraxinus pennsylvanica, Cornus stolonifera.*
FACULTATIVE PLANTS	FAC	Plants with a similar likelihood (estimated probability 33% to 67%) of occurring both wetlands and nonwetlands. Examples: *Gleditsia triacanthos, Smilax rotundifolia.*
FACULTATIVE UPLAND PLANTS	FACU	Plants that occur sometimes (estimated probability 1% to <33%) in wetlands, but occur more often (estimated probability >67% to 99%) in nonwetlands. Examples: *Quercus rubra, Potentilla arguta.*
OBLIGATE UPLAND PLANTS	UPL	Plants that occur rarely (estimated probability <1%) in wetlands, but occur almost always (estimated probability >99%) in nonwetlands under natural conditions. Examples: *Pinus echinata, Bromus mollis.*

* Categories were originally developed and defined by the USFWS National Wetlands Inventory and subsequently modified by the National Plant List Panel. The three facultative categories are subdivided by (+) and (-) modifiers (see Appendix C, Section 1).

SPECIES LIST

Species	Indicator Status
ASTERACEAE	
Baccharis salicifolia	FACW-
Xanthium strumarium	FAC+
CYPERACEAE	
Caryx sp.	OBL
FABACEAE	
Lotus scoparius	---
JUNCACEAE	
Juncus sp	OBL
POACEAE	
Polypogon monspeliensis	FACW
SALICACEAE	
Salix sps.	FACW
SOLANACEAE	
Nicotiana glauca	---
TYPHACEAE	
Typha sp.	OBL

Appendix E-2

Desert Vegetation Preservation Plan
Frank Hovore and Associates
October 25, 1998

FH &A

(805) 250 - 8311; fax 298 - 7579; e-mail: fthovore@smartlink.net *Frank Hovore & Associates*

14734 Sundance Place
Santa Clarita, CA 91351-1542

25 October 1998

Desert Vegetation Preservation Plan
Antelope Valley Landfill,
City of Palmdale, Los Angeles County, CA

Introduction

The project applicant, Arklin Brothers Enterprises, proposes to expand the overall acreage of an existing landfill operation located on 306 acres in the southwestern portion of the City of Palmdale, at the terminus of City Ranch Road, north of Avenue S and west of Tierra Subida Road. The expansion will remove all natural features, including native desert vegetation, from 103 acres of ridges and slopes immediately adjacent to the western margin of the active fill zone. The applicant shall obtain a Native Desert Vegetation Removal permit from the City of Palmdale prior to commencing those activities which will result in the loss of native habitat on the 103 acre expansion parcel.

The City of Palmdale Native Desert Vegetation Ordinance (#952) regulates the removal and preservation of natural plant communities, primarily through direct protection, replacement or compensation for impacts to joshua trees (*Yucca brevifolia*) and California juniper shrubs (*Juniperus californicus*). The ordinance recognizes the value of these two species in supporting structural and floristic diversity, and requires that a minimum of 2 shrubs of either species per acre of loss be retained or otherwise preserved (including through transplantation) on-site. As a condition of project approval, the applicant shall identify and protect a total of 612 joshua trees or junipers outside the development footprint (2 specimen shrubs for each of the total 306 acres of land within the subject property boundaries).

In order to evaluate the relative value of the property proposed for the preserve, biologists from FH&A surveyed the entire 203 acre non-development area on 21 October 1998; a census of all joshua trees and California junipers on the property was conducted at this time (see below for results). Anna Mendiola, City of Palmdale Planning Department, was consulted at this time to determine the appropriate standard for counting trunks and stems of joshua trees growing in dense clusters. The method used recognized the practical difficulties of separating and transplanting stems and trunks with common root systems, and it was felt that the degree of distance necessary to consider an individual stem or trunk to be a separate entity was 3 feet. While such separation does not assume a separate root system (most closely-spaced joshua trees share a common root system), it does allow for removal and relocation in approximately 3-foot blocks. Dense clusters of trunks, then, were measured on 2 axes, and the number of transplantable blocks was figured for each group. Sprouts less than 12 - 18 inches in height generally were not counted as separate entities unless well-isolated from any other live specimen of the same species.

California junipers were counted as individual plants based upon root crown configuration, and all plants over 18 inches in height were considered viable specimens. Some individuals have been pruned and/or stunted by weather effects, grazing or mechanical injury, but where healthy foliage was present, these were counted.

The property was divided into 5 survey zones for ease of discussion, and each of these sub-areas was thoroughly inventoried by walking transects, counting individuals of each of the two target plant species. The survey team consisted to 2 highly-qualified biologists, F.T. Hovore and I.P. Swift, and a graduate student assistant, and employed standard field methodologies for censusing flora. Because of the very large number of specimens involved, the relative densities of occurrence, and fact that these plants are to be retained within a conservation area and not removed or transplanted, individual plants were not mapped or numbered. However, the survey zones were plotted on an aerial photograph of the site (accompanying this report).

Results of joshua tree and California juniper census

Area 1 encompasses a rectangular area of property immediately south of the landfill office complex and parking area; there is an equipment storage area adjacent to the surveyed parcel, and the entire area censused is fenced within a cattle enclosure. Grazing has removed most of the understory and destabilized the soil, so general habitat values are relatively low in this area. Area 1 contains 549 juniper shrubs and 15 joshua trees (combined total: 564). An additional 29 junipers lie outside the fenceline along the southwestern margin of the site, and 12 more are found outside the fenceline but within the equipment storage area.

Area 2 is a narrow strip of relatively undisturbed land between graded spreading grounds and the bison enclosure to the west. This area contains 269 junipers and 0 joshua trees.

Area 3 is a larger, but somewhat more-heavily disturbed section of land situated on the low hills around the gamebird rearing facilities in the center of the property. Although the central portion of this area is intensively utilized for ranching operations, the surrounding slopes contain relatively high diversity habitat. This area contains 378 juniper shrubs and 179 joshua trees (combined total: 557).

Area 4 is a small, roughly triangular parcel between the toe of the slope of the hill south of the gamebird rearing area and the bison enclosure; it is surrounded by dirt roads. Habitat values in this small area are relatively intact, and it contains 101 junipers and 3 joshua trees.

Area 5 is the largest portion of the site, but most of the habitat is open, rabbitbrush and sagebrush dominated desert scrub, lacking larger shrub or tree cover. Most of the joshua trees and juniper shrubs are located along the slopes of low ridgelines in this area, and because the overall parcel is largely undisturbed, habitat values are relatively high. The total number of junipers in this area is 261, and there are 134 joshua trees, 116 of which occur in a single, huge cluster (combined total: 395).

Shrub densities within the bison enclosure appear to be similar to those in areas 1 and 2, and so this portion of the property is presumed to contain perhaps 700 or more junipers and an undetermined number of joshua trees (at least 30 - 50); however, due to the difficulty of safely censusing in this area, it was not counted. Habitat values within the enclosure are similar to those within Area 1, which has been grazed by cattle.

The most suitable areas to be included within the vegetation preserve would be a combination of the westernmost portion of Area 3, all of Area 4, and Area 5 (outlined in red on the aerial photograph). This would contain well over 700 total California juniper shrubs and joshua trees, including the largest clusters of joshua trees. Desert woodland habitat values are generally higher in these areas than in other portions of the site, and this configuration would encompass an extensive stand of rabbitbrush - sagebrush as well.

Appendix F

Noise Impact Study, Giroux & Associates
September 17, 2004

NOISE IMPACT ANALYSIS

ANTELOPE VALLEY PUBLIC LANDFILL

PALMDALE, CALIFORNIA

Prepared for:

EDAW
Attn: Alia Hokuki
2737 Campus Drive
Irvine, California 92612

Date:

September 17, 2004

Project No.: P03-045

SCALES AND DEFINITIONS

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted sound. Sound is characterized by various parameters which describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of sound pressure ratioed to the faintest sound detectable by a keen human ear is called a decibel (dB).

Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale similar to the Richter scale used for earthquake magnitude is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting," written as dB(A). Any further reference to decibels in this report written as "dB" should be understood to be A-weighted values.

The predominant community noise rating scale used in California for land use compatibility assessment is the Community Noise Equivalent Level (CNEL). The CNEL reading represents the average of 24 hourly readings of equivalent levels, known as Leq, based on an A-weighted decibel with upward adjustments added to account for increased noise sensitivity in the evening and night periods. These adjustments are +5 dB(A) for the evening (7 p.m. to 10 p.m.), and +10 dB(A) for the night (10 p.m. to 7 a.m.). CNEL may be indicated by “dB(A)” or just “CNEL”.

The Leq is the sound level containing the same total energy over a given sample time period. The Leq can be thought of as the steady (average) sound level which, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period. Leq is typically computed over 1, 8, and 24-hour sample periods.

Another commonly used method is the day/night average level or Ldn. The Ldn is a measure of the 24-hour average noise level at a given location. It was adopted by the United Stated Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the Leq. The Ldn is calculated by averaging the Leqs for each hour of the day at a given location after penalizing the “sleeping hours” (defined as 10 p.m. to 7 a.m.), by a 10 dB(A) to account for the increased sensitivity of people to noises that occur at night. The maximum noise level recorded during a noise event is typically expressed as Lmax. The sound level exceeded over a specified time frame can be expressed as Ln (i.e., L90, L50, L10, etc.). L50 equals the level exceeded 50 percent of the time.

NOISE SENSITIVE RECEPTORS

The City of Palmdale has adopted the State guidelines for maximum exterior noise levels for noise sensitive land sues as a standard. Noise sensitive land uses include residential (single and multi-family dwellings, mobile home parks, dormitories, and similar uses); transient lodging

(including hotels, motels, and similar uses); hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; and public or private educational facilities, libraries, churches, and places of public assembly. The exterior living area of these uses includes single-family private yards, and multi-family patios or balconies that are greater than six feet in depth. The noise standards for these land uses are 65 dB(A) CNEL exterior and 45 dB(A) CNEL interior.

Residential development is located to the north of the site at Avenue Q8 and future residential development to the west of the site (City Ranch Specific Plan currently under construction). There is a sports complex (Pelona Vista) to the east of the site across from Tierra Subida Avenue. The remaining areas include vacant land planned for business/commercial uses.

STATE OF CALIFORNIA STANDARDS

An interior CNEL of 45 dB is mandated by the State of California Noise Insulation Standards (CCR, Title 24, Part 6, Section T25-28) for multiple family dwellings and hotel and motel rooms. In 1988, the State Building Standards Commission expanded that standard to include all habitable rooms in residential use, included single-family dwelling units. Since normal noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL allows the interior standard to be met without any specialized structural attenuation (dual paned windows, etc.). A noise level of 65 dB CNEL is also the level at which ambient noise begins to interfere with one's ability to carry on a normal conversation at a reasonable separation without raising one's voice. A noise exposure of 65 dB CNEL is thus typically the exterior noise land use compatibility guideline for new residential dwellings in California.

CITY OF PALMDALE NOISE STANDARDS

INTRODUCTION

Any noise standards for CEQA evaluations are based upon the applicable ordinances and standards of the regulating jurisdiction. For this project, City of Palmdale noise standards will be the impact evaluation guidelines.

GENERAL PLAN

City of Palmdale has adopted noise guidelines/standards in its General Plan Noise Element (refer to Table 1, below). CNEL-based standards are used to make land use decisions as to the suitability of a given site for its intended use. They apply to those noise sources not amenable to local control such as on road traffic, aircraft, trains, etc. For a landfill, there are no on site uses that would require detailed consideration of any CNEL-based exterior noise standards. Project-related noise issues would center more on noise from landfill operations possibly impacting off-site receivers rather than from site suitability to the ambient noise environment. Those noise sources that are not pre-empted from local control are typically regulated by the municipal code. The City of Palmdale, however, has not adopted numerical performance standards as part of the City's municipal code or a noise ordinance. The City's noise/land use standards are articulated

in the Noise Element of the General Plan. General plan standards are goals, and do not have the force of law. However, they are well suited as significance criteria for project environmental clearance.

The City of Palmdale General Plan Noise Element establishes noise impact thresholds for noise abatement and attenuation, in order to reduce potential health hazards associated with high noise levels. Noise standards are typically directed at controlling noise from both mobile and stationary sources and their intrusion onto adjacent properties. It should be noted that Federal and State Laws regulate noise from transportation sources on a CNEL basis (refer to Table 1, City of Palmdale Noise Standards). Although not specifically identified in Table 1, active sports parks are also noise generators, as well as being noise-sensitive receivers. Based upon the State's Model Noise Element, a less stringent noise standard of 70 dB CNEL would be appropriate for this use. The General Plan includes policies addressing the following issues:

- Land Use Compatibility;
- Restriction of hours of operation for construction equipment, power mowers, garbage collection, street sweeping, truck deliveries, leaf blowers and other noise activities within the hours of 6:30 a.m. and 8:00 p.m., unless the work is made in response to an emergency or special purpose; and
- Periodic investigation of noise sources throughout the City, with citations issued for the offender, in addition to investigations conducted due to such complaints.

Table 1
City of Palmdale Noise Guidelines/Standards

Land Use	Maximum Acceptable Exterior Noise Levels	Maximum Acceptable Interior Noise Levels	Scale
Residential:			
SFR	65	45	dBA CNEL
MFR	65	45	dBA CNEL
MHP	65	45	dBA CNEL
Commercial, including, but not limited to:			
Retail	A noise level which does not jeopardize health, safety, and welfare of visitors.	55	Leq(h)
Services		55	Leq(h)
Office		55	Leq(h)
Institutional, including, but not limited to:			
School	A noise level which does not jeopardize health, safety, and welfare of visitors.	45	Leq(h)
Hospitals		45	Leq(h)
Nursing Homes		45	Leq(h)
Industrial, including, but not limited to:			
Industrial Park	A noise level which does not jeopardize health, safety, and welfare of visitors.	65	Leq(h)
Business Park		65	Leq(h)
Quarry	Maximum 65 Leq(h) at the interface with residentially designated land.	N/A	N/A

Source: City of Palmdale, Palmdale General Plan, January 25, 1993.

MUNICIPAL CODE

The City of Palmdale Municipal Code has provisions for noise related to construction noise and nuisance noise, which states:

> Section 8.28.030, Prohibited Activities, limits construction or repair work, earth excavation, filling or moving, the use of air compressors, jack hammers, power-driven drills, riveting machines, diesel power truck, tractors or other earthmoving equipment, hand hammers on steel or iron, or other machines, tools, devices or equipment which makes loud noises to the disturbance of persons occupying sleeping quarters in a dwelling, apartment, hotel, mobile home or other place of residence between the hours of 6:30 a.m. to 8:00 p.m.

The Palmdale Municipal Code (Section 9.16.040), prohibits, "unnecessary noises or sounds which are physically annoying to persons of ordinary sensitiveness or which are so harsh or so prolonged or unnatural or unusual in their use, time, or place as to occasion physical discomfort to the inhabitants of any neighborhood." In the absence of numerical standards, defining "harsh, prolonged, unnatural or unusual," City of Palmdale Noise Element noise standards have been used as a guideline for defining excessive noise.

BASELINE NOISE LEVELS

Noise levels can be obtained by actual field measurements with a noise level monitor, or can be calculated by computer modeling. Field measurements are important in identifying peak noise levels and extraordinary acoustic features (building, walls, etc.) that may affect calculated noise levels. Computer models are most useful in predicting highway and airport noise levels.

Existing noise levels in the landfill vicinity derive from refuse trucks and from on-site heavy equipment. The variable terrain of the project site shields off-site receivers except during brief periods of direct line-of-sight. With terrain shielding and the buffering effects of distance, and with an absence of noise-sensitive uses closer than one-half mile to the landfill boundary, there are no noise issues associated with existing landfill operations. No noise complaints have been filed with the City of Palmdale or Los Angeles County associated with existing landfill operations. Any public noise perception of landfill operations is through the truck traffic generated by the facility. The permitted daily landfill intake (tonnage) capacity will not change.

Long-term (48+-hour) noise readings were conducted at two locations where project-related truck traffic may affect the local noise environment. Measurements were made from March 15 to the end of March 17, 2004. One recording digital sound level meter was placed near an existing residence at the northeast corner of Tierra Subiba and Rayburn at 60 feet from the Tierra Subiba centerline. A second meter was placed on a fence at the parking lot of the Pelona Vista Sports complex somewhat farther from roadway traffic. Results of the measurements are shown in Table 2.

Table 2

Noise Monitoring Summary (dBA)*

Parameter	Nearest Residence		Pelona Vista Sports Complex	
	3/16/04	**3/17/04**	**3/16/04**	**3/17/04**
24-hour CNEL	73	71	66	66
Max. 1-hour Leq	71	70	64	63
When (?)	19-20	18-19	06-07	05-06
2nd-High Hour	71	69	61	63
When (?)	20-21	06-08	12-13	05-06
3rd-High Hour	70	69	60	61
When (?)	06-07 17-19	16-18 -	18-20 -	04-05 19-20
Min. 1-hour Leq	56	55	53	53
When (?)	02-03	02-03	02-03	01-03
1-Sec. Max.	86	82	81	82
1-Sec. Min.	36	35	42	43

Source: Giroux & Associates, 2004.

* The measurement figures do not assume any sound attenuation factors such as masonry walls and intervening topography.

Near Tierra Subiba, existing "non-attenuated" noise levels at the property line of the closest homes are in excess of the 65 dBA CNEL City of Palmdale standard for residential uses. Usable outdoor space requires noise protection in any areas in close proximity to Tierra Subiba. These measurements were made near the curb and existing residential outdoor space is within acceptable levels when the attenuation factors (i.e., existing walls and greater setbacks) are taken into account. Based upon accepted noise industry standards, the attenuation effect of the existing masonry walls (which measures 7 feet in height from the curb) and additional setback, would be 9-10 dB less than the actual "non-attenuated" measurements in Table 2.

Existing noise levels in the sports park parking lot are less than the 70 dB CNEL standard considered acceptable by the State Model Noise Element for active sports parks. Additionally, the playfields have greater setback and are depressed from full roadway view. Based on the existing measurements, park playing areas are not considered noise impacted by surrounding on-street traffic.

NOISE IMPACTS

Two characteristic noise sources are typically identified with land use intensification such as that proposed for the Antelope Valley Public Landfill expansion project. Because there are only limited planned construction activities associated with the project, there are correspondingly limited construction noise impacts. Potential noise impacts are primarily operational-related.

Increased landfill activities, especially increases in heavy equipment, could create noise impacts near the project site. Unless such activities occur near noise-sensitive residential uses, impact potential is minimal. Upon implementation, gradual increases in the outbound and inbound haul trucks could cause an incremental increase in long-term, area-wide noise levels throughout the project area. Traffic noise impacts are generally analyzed both to insure that the project not adversely impact the acoustic environment of the surrounding community, as well as to insure that the project site is not exposed to an unacceptable level of noise resulting from the ambient noise environment acting upon the project. There are no project-siting constraints for a landfill, therefore the focus of the noise analysis will be upon the community.

Project-related noise impacts may derive from on-road traffic, as well as from on-site landfill operations. The relationship between traffic and noise is logarithmic. It takes a large change in volumes to produce only a small change in decibels. The incremental noise impact from the increased landfill traffic will most likely be masked by the baseline condition. The project-related area-wide traffic noise impact has also been incorporated into noise mitigation required for all residential and other noise sensitive development constructed adjacent to any of the circulation element and the general plan roadways. Project-related noise impacts would derive mainly from on-site noise sources possibly impacting the nearest adjacent residences, but there is a substantial source-receiver separation to dissipate such noise.

THRESHOLDS OF SIGNIFICANCE

According to the most current CEQA Appendix G guidelines, noise impacts are considered potentially significant if they cause:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise standard, or applicable standards of other agencies. Noise levels exceeding the City of Palmdale General Plan Noise Standards would be considered significant.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The term "substantial increase" is not defined by any responsible agency. The limits of perceptibility by ambient grade instrumentation (sound meters) or by humans in a laboratory environment is around 1.5 dB. Under ambient conditions, people generally do not perceive that noise has clearly changed until there is a 3 dB difference. A threshold of 3 dB is commonly used to define "substantial increase."

CONSTRUCTION NOISE IMPACTS

Several construction activities are associated with the proposed project that will be mostly located well away from the nearest residences. They include roadway paving, creek stabilization and armoring, and ancillary structures. The types of equipment needed to construct these improvements is typically smaller than the dozers, earthmovers and compactors that currently operate on the landfill. Existing landfill equipment operations do not create any significant noise impacts at any off-site receivers such that minor project construction will similarly not create a significant noise impact. Because such construction will not entail use impulsive equipment such as pile drivers, the City of Palmdale residential noise standard of 65 dB (CNEL) for exterior noise levels will similarly not be exceeded at the nearest residences.

The realignment of City Ranch Road to align with Rayburn Road will occur closer to existing residences, and could thus have an audible impact. The closest point of grading for the realignment will be approximately 250 feet from the nearest home. The peak equipment noise level during grading will be 90 dB at 50 feet from the source. The peak level will be reduced by -14 dB to 76 dB between the measurement reference point (50 feet) and the nearest residence (250 feet). The peak exterior noise levels observed during on-site measurements at the property line of the residence was 82-86 dB. Peak roadway realignment construction noise will be 6-10 dB lower than from existing roadway traffic noise. Thus, the roadway alignment construction noise would be less than the existing peak noise levels and would therefore be masked by the existing traffic noise. Additionally, the City's Municipal Code restricts construction activities during the evening, early morning, and Sundays, avoiding noise-generating activities during the sensitive night hours. This construction impact would not be considered significant due to the following: 1) the construction noise (which is considered a short-term impact) would be masked by existing

traffic noise, 2) the construction noise has restricted hours, and 3) Mitigation Measure 1 is proposed to be implemented.

ON-ROAD HAULING NOISE IMPACTS

Noise could increase as a result of project-related traffic and increases in hauling trucks. The anticipated daily landfill disposal rate increase is designed to accommodate the demand for increased refuse from the growing population and from other landfill closures in Los Angeles County. The same vehicles and haul trucks would be on local roads driving out of county, or possibly out of state, for the same landfill resources if they were not available locally.

Project-related traffic noise was calculated for existing and near-term scenarios based upon existing traffic volumes and near-term forecasts. Six roadway segments were analyzed for four different scenarios (Existing 1,372 TPD, Approved/Permitted Intake to 1,800 TPD, Proposed Expanded Intake to 3613 TPD, and Proposed Peak Intake of 5548 TPD). Existing scenarios were analyzed for 2004. Proposed maximum tonnages limits were assumed to be reached no earlier than 2007. The vehicle mixes (truck percentages) observed on local area roadways were used to calculate vehicle noise. Project-related noise impacts were weighted to account for the day/night truck distributions. Noise calculations are very sensitive to nocturnal trucks because a truck is twenty times noisier than a car, and each truck on the road before 7:00 a.m. counts as ten trucks in calculating CNEL. Each nocturnal truck is the "noise equivalent" of 200 daytime cars. Day/night truck noise was therefore calculated separately from the baseline to account for the increased sensitivity to nocturnal trucks within the total noise signature.

The results of the traffic noise impact analysis are shown in Table 3. The maximum increase in traffic noise compared to existing conditions is +1.8 dB along Rayburn Road east of the landfill entrance. This increase is due to a combination of expanded landfill truck traffic and cumulative growth. The individual noise contribution due to the project is small, and the cumulative increase of +1.8 dB does not exceed the adopted significance threshold. It should also be noted that because the proposed project is currently permitted by County approved CUP# 93041 to receive up to 1,800 net tons per day and up to 3,564 total gross tons per day, the 1.8 dB increase is presenting a "worst-case analysis." This increase compares the existing "average" tonnage intake (1,372) to the proposed future "peak" tonnage intake (5,548). Off-site traffic noise impacts are considered individually and cumulatively less-than-significant.

Any increase in truck traffic associated with peak activity days is primarily daytime traffic. The absence of any substantial nocturnal traffic increase creates only a very small noise difference between the peak versus the "normal" activity day. Maximum noise differences between the two scenarios are 0.1 dB. Such differences are indistinguishable.

Table 3

Traffic Noise Impact Analysis (dB CNEL)
(At 50 feet from roadway centerline)

Roadway/Segment	Existing/Approved		Future (2007)*	
	1,372 TPD Inflow	**1,800 TPD Inflow**	**3,613 TPD Inflow**	**5,548 TPD Inflow**
Tierra Subiba:				
N of Palmdale Blvd.	69.8	69.8	70.8	70.9
Palmdale-5th St. West	69.1	69.2	70.3	70.4
5th St. West-Rayburn	69.0	69.1	70.4	70.4
Rayburn-Site Entrance	67.1	67.4	-	-
Site Entrance-Ave. S	67.0	67.1	68.5	68.5
S of Ave. S	60.6	60.7	62.0	62.0
Elizabeth Lake/Palmdale:				
W of Tierra Subiba	70.5	70.5	71.4	71.4
5th Street West:				
Palmdale-Tierra Subiba	64.5	64.5	65.4	65.4
Rayburn Road:				
E of Terra Subiba	65.4	65.6	67.1	67.2
Avenue S:				
W of SR-14	67.0	67.1	68.4	68.4
E of SR-14	72.1	72.1	73.0	73.0

*Including effects of cumulative growth.
- = Site entrance is proposed to be relocated to Rayburn Road therefore, this segment of Tierra Subida would not exist in the future scenarios.

Source: FHWA-RD-77-108 (Calveno Mod.).

OPERATIONAL NOISE IMPACTS

Landfill operations noise impacts can occur as a result of on-site heavy equipment used in earthmoving activities and compaction processes, as well as on- and off-site on-road refuse haulers. Figure 1 shows the typical range of noise generation as a function of equipment used in landfill operations.

The earth-moving sources are seen to be the noisiest with equipment noise ranging up to about 90 dB(A) at 50 feet from the source. Measurements have shown, however, that the noise emission levels in Figure 1 tend to be more associated with periodic events under full load rather than chronic (hourly or longer) noise exposure. Short term noise generation thus tends to be on the higher end of the ranges shown in Figure 1, while longer term exposure is at the quieter end of the noise spectrum.

Point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance (due to the spreading of sound waves), or about 20 dB in 500 feet of propagation. The loudest earth-moving noise sources will therefore sometimes be temporarily detectable above the local background beyond 1,000 feet from any individual operations area. An extensive noise impact envelope requires a clear line of sight from source to receiver. Landfills have irregular terrain that changes over the life of the project. Terrain screening of heavy equipment reduces noise impacts to any nearby sensitive-source receivers.

Landfill equipment operates intermittently while excavating or hauling dirt, or while compacting refuse and cover soil. Equipment operates at full power for much less than 30 minutes per hour. The landfill is currently authorized to receive waste from 6:00 a.m. to 5:00 p.m. Heavy equipment operations may begin slightly before 6:00 a.m. to prepare the working face, and end after 5:00 p.m. to place final cover.

Based upon earthmoving and equipment noise measurements conducted at large construction sites and at the Cedar Hills Landfill in Kings County, Washington, the measured reference noise levels around landfills and/or large construction projects involving multiple pieces of equipment with varying duty cycles is around 80 dB Leq at 50 feet from the center most location of the noise generation activity. If this Leq measurement is converted to a CNEL measurement, it also results in 80 dB. This is based on the following assumptions. For 1.5 hours of nocturnal equipment operations and 10.5 hours of daytime noise generation, the weighted 24-hour CNEL is 80 dB (the nocturnal "penalty" in the CNEL calculation from operations from 5:30 a.m. to 7:00 a.m. is balanced by 12 hours of no operations).

Under direct line-of-sight assumptions, geometrical spreading over irregular ground and atmospheric absorption will reduce the reference level of 80 dB CNEL as follows:

Distance (feet)	**Level (dB CNEL)**	**Standard (General Plan)**
200	65	Residential exterior standard*
500	55	Residential interior standard with open windows

*Also meets residential interior standard with closed windows.

Based upon the locations of existing and future noise sensitive receptors (i.e., residential uses are well over 500 feet from the landfill operations), all noise standards will be met within the landfill boundary even under assumed direct line-of-sight conditions. With irregular terrain normally interrupting line-of-sight relationships, the margin of safety will be even greater.

Although the hours for the "receipt of refuse" are proposed to be expanded from 6:00 p.m. to 8:00 p.m. as part of this project, there are no changes proposed fore the "landfill operational hours" (as shown in the Project Components Summary in the appendix). Noise associated with the expanded receipt of refuse hours from 6:00 p.m. to 8:00 p.m. (i.e., traffic noise from delivery of refuse to scales) would fall well below the City of Palmdale Noise Standards, above. Therefore, no significant noise impacts associated with the increased receipt of refuse hours are anticipated.

The nearest noise-sensitive land uses are located well beyond 500 feet from the landfill. There are no sensitive receivers currently exposed to excessive heavy equipment noise exceeding City General Plan standards, and project implementation will not change that condition.

The proposed project operations would not exceed the City of Palmdale noise standards for anticipated site uses. However, because single-event noise may be intrusive even if standards are not exceeded, Mitigation Measure 2 is proposed to ensure noise levels remain at less than significant levels.

Figure 1
Typical Equipment Noise Generation Levels

CONCLUSION

CONSTRUCTION NOISE

Construction activity for the realignment of City Ranch Road (R5 access) shall be limited between the hours of 6:30 a.m. and 8:00 p.m., Monday through Saturday only and excluding legal holidays in compliance with the City's Municipal Code:

1. In conjunction with grading permit issuance for the realignment of City Ranch Road (R-5 access) and during grading and construction operations, the following mitigation measures shall be implemented for the project:

- All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers, to the satisfaction of the City's Public Works or Building Inspector.
- During construction of the new landfill access road, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers, to the extent practical, to the satisfaction of the City's Public Works or Building Inspector.
- During construction of the new landfill access road and to the satisfaction of the City's Public Works Inspector or Building Inspector, stockpiling and vehicle staging areas shall be located as far as practical from noise sensitive receptors during construction activities.

OPERATIONAL NOISE

The proposed project would not exceed the City of Palmdale General Plan Noise Element standards for anticipated site uses. However, because single-event noise may be intrusive even if standards are not exceeded, noise protection is recommended as follows:

1. Operational activities before 6:00 a.m. or after 8:00 p.m. should be restricted as follows:

    a. No refuse hauling or unloading activities.

    b. No heavy equipment operation within 1,000 feet of any residence under clear line-of-sight conditions.

Appendix G

Traffic Impact Analysis, Kunzman Associates
September 2005

CITY OF PALMDALE

ANTELOPE VALLEY LANDFILL EXPANSION

TRAFFIC IMPACT ANALYSIS (REVISED)

Prepared by:

Carl Ballard, and
William Kunzman, P.E.

William Kunzman

REGISTERED PROFESSIONAL ENGINEER
WILLIAM A. KUNZMAN
No. TR0056
TRAFFIC
STATE OF CALIFORNIA

September 17, 2004
(Revised September 20, 2005)

KUNZMAN ASSOCIATES
1111 Town & Country Road, Suite 34
Orange, CA 92868
Phone: (714) 973-8383
Fax: (714) 973-8383
Email: mail@traffic-engineer.com
Web: www.traffic-engineer.com

2051I

Table of Contents

1. Findings 2

Existing Traffic Conditions 2

Traffic Impacts 2

Recommendations 4

2. Congestion Management Program (CMP) Methodology 6

County Congestion Management Program (CMP) 6

Prescribed Methodology for A Traffic Impact Analysis (TIA) 7

Mitigation Measures 7

3. Project Description 9

Location 9

Proposed Development 9

4. Existing Traffic Conditions 13

Surrounding Street System 13

Existing Travel Lanes and Intersection Controls 14

Existing Average Daily Traffic (ADT) Volumes 14

Existing Volume to Capacity Ratios 14

Existing Intersection Capacity Utilization (ICU) 14

Existing City of Palmdale General Plan Circulation Element 15

Existing Traffic Signal Warrants 15

5. Project Traffic 28

Traffic Generation 28

Traffic Distribution and Assignment 29

Project-Related Traffic 29

6. Existing Plus Project Traffic Conditions 37

Existing Plus Project Average Daily Traffic (ADT) Volumes 37

Existing Plus Project Volume to Capacity Ratios 37

Existing Plus Project Intersection Capacity Utilization (ICU) 37

7. Year 2007 Traffic Conditions 43

Method of Projection 43

Year 2007 Average Daily Traffic (ADT) Volumes 43

Year 2007 Volume to Capacity Ratios 43

Year 2007 Intersection Capacity Utilization (ICU) 43

8. Circulation Recommendations 55

Site Access 55

Appendices

Appendix A **Glossary of Transportation Terms**

Appendix B **Traffic Count Worksheets**

Appendix C **Explanation and Calculation of Intersection Capacity Utilization (ICU)**

Appendix D **Traffic Signal Warrant Worksheets**

List of Tables

Table 1. (1a) Existing / Project Daily Traffic Generation Summary and (1b) Summary of Intersection Capacity Utilization (ICU) and Level of Service (LOS) 5
Table 2. City of Palmdale Roadway Capacities 16
Table 3. Existing Intersection Capacity Utilization (ICU) and Level of Service (LOS) 17
Table 4. Truck Traffic For Antelope Valley Landfill 30
Table 5. Traffic Schedule For Antelope Valley Landfill 31
Table 6. Project Traffic Generation 32
Table 7. Existing Plus Project Intersection Capacity Utilization (ICU) and Level of Service (LOS) 38
Table 8. Year 2007 Without Project Intersection Capacity Utilization (ICU) and Level of Service (LOS) 45
Table 9. Year 2007 With Project Intersection Capacity Utilization (ICU) and Level of Service (LOS) 46

List of Figures

Figure 1. Project Location Map 10
Figure 2. Landfill Parcels 11
Figure 3. Topographic Map 12
Figure 4. Existing Through Travel Lanes and Intersection Controls 18
Figure 5. Existing Average Daily Traffic (ADT) Volumes 19
Figure 6. Existing Volume to Capacity Ratios 20
Figure 7. Existing Morning Peak Hour Intersection Turning Movement Volumes 21
Figure 8. Existing Evening Peak Hour Intersection Turning Movement Volumes 22
Figure 9. City of Palmdale General Plan Circulation Element 23
Figure 10. General Plan Land Use Designations 24
Figure 11. Zoning Designations 25
Figure 12. Lot Numbers 26
Figure 13. Vacant and Occupied Lots 27
Figure 14. Project Traffic Distribution 33
Figure 15. Project Average Daily Traffic (ADT) Volumes 34
Figure 16. Project Morning Peak Hour Intersection Turning Movement Volumes 35
Figure 17. Project Evening Peak Hour Intersection Turning Movement Volumes 36
Figure 18. Existing Plus Project Average Daily Traffic (ADT) Volumes 39
Figure 19. Existing Plus Project Volume to Capacity Ratios 40
Figure 20. Existing Plus Project Morning Peak Hour Intersection Turning Movement Volumes 41
Figure 21. Existing Plus Project Evening Peak Hour Intersection Turning Movement Volumes 42
Figure 22. Year 2007 Without Project Average Daily Traffic (ADT) Volumes 47
Figure 23. Year 2007 With Project Average Daily Traffic (ADT) Volumes 48

Figure 24. Year 2007 Without Project Volume to Capacity Ratios 49
Figure 25. Year 2007 With Project Volume to Capacity Ratios 50
Figure 26. Year 2007 Without Project Morning Peak Hour Intersection Turning Movement Volumes 51
Figure 27. Year 2007 Without Project Evening Peak Hour Intersection Turning Movement Volumes 52
Figure 28. Year 2007 With Project Morning Peak Hour Intersection Turning Movement Volumes 53
Figure 29. Year 2007 With Project Evening Peak Hour Intersection Turning Movement Volumes 54
Figure 30. Proposed Realignment of City Ranch Road to be Opposite Rayburn Road at Tierra Subida Avenue 56
Figure 31. Proposed City Ranch Road Roadway Cross-Section 57

City of Palmdale

Antelope Valley Landfill Expansion

Traffic Impact Analysis (Revised)

This report contains the revised traffic impact analysis for the proposed Antelope Valley Landfill expansion. The current landfill is designated as landfill #1 and the expansion is designated landfill #2, which will operate as one landfill. For the purposes of this traffic analysis the expected increases in traffic of the landfill, including the expansion, has been analyzed. The landfill traffic (truck and employee traffic) to both landfill #1 and landfill #2 utilize the same entry road. The project site is located at the existing terminus of City Ranch Road, west of Tierra Subida Avenue in the Palmdale area of Los Angeles County.

The traffic report contains documentation of existing traffic conditions, traffic generated by the project, distribution of the project traffic to roads outside the project, and an analysis of future traffic conditions. Each of these topics is contained in a separate section of the report. The first section is "Findings", and subsequent sections expand upon the findings. In this way, information on any particular aspect of the study can be easily located by the reader.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to transportation engineering, a glossary of terms is provided in Appendix A.

1. Findings

This section summarizes the existing traffic conditions, project traffic impacts, and the proposed mitigation measures.

Existing Traffic Conditions

a. The existing landfill is currently accepting an average of 1,372 tons of material per day. The project site is currently generating approximately an average of 626 daily vehicle trips, 53 vehicles per hour during the morning peak hour and 60 vehicles per hour during the evening peak hour (see Table 6). However, the existing landfill also accepts concrete for recycling and/or materials used for daily cover or beneficial use, and when a major inflow of these materials occurs, then the daily tonnage can reach 3,800 tons per day. This peak inflow of concrete or daily cover material is sporadic and lasts for a few days.

b. Arterial roadways in the vicinity of the site are at present only partially improved.

c. The roadway links in the vicinity of the site currently operate within acceptable Levels of Service.

d. The intersections in the vicinity of the site currently operate at Level of Service B or better during the peak hours (see Table 1b).

e. Traffic signals appear to currently be warranted at the following study area intersections (see Appendix D):

Tierra Subida Avenue (NS) at:
- 5th Street West (EW)
- Rayburn Road (EW)
- Avenue S (EW) (Installation will be in 2005)

Traffic Impacts

a. For purposes of this analysis, it was assumed that the project site will increase operations to an average of 3,613 tons per day, and a peak of 5,548 tons per day. The project site is projected to generate an average of approximately 1,324 trips per day, 105 and 85 of which occur during the morning and evening peak hours, respectively. During peak inflow conditions when large quantities of concrete for recycling and/or materials used for alternative daily cover or beneficial use are received, the daily

volume reaches 1,594 trips per day, 124 and 96 of which occur during the morning and evening peak hours, respectively (see Tables 1a and 6).

b. The landfill expansion is projected to generate on average approximately 698 new daily vehicle trips, 52 new vehicles per hour will occur during the morning peak hour, and 25 new vehicles per hour will occur during the evening peak hour (see Tables 1a and 6). During peak inflow conditions when large quantities of concrete for recycling and/or materials used for alternative daily cover or beneficial use are received, up to 968 new daily vehicle trips, 71 new vehicles per hour will occur during the morning peak hour, and 36 new vehicles per hour will occur during the evening peak hour (see Tables 1a and 6).

c. The roadway links in the vicinity of the site are projected to continue to operate within acceptable Levels of Service for existing plus project traffic conditions for average as well as peak inflow of material conditions.

d. For existing plus project traffic conditions, the intersections in the vicinity of the site are projected to continue to operate at Level of Service B or better during the peak hours for average and peak inflow of material conditions (see Table 1b).

e. The project does not have a significant traffic impact using the County of Los Angeles Congestion Management Program criteria. That criteria is that a project has a significant traffic impact if any of the following is met:

> Project increases ICU by more than 1.0 percent and ICU is more than 90 percent after the project traffic is added.
>
> Project increases ICU by more than 2.0 percent and ICU is more than 80 percent after the project traffic is added.
>
> Project increases ICU by more than 4.0 percent and ICU is more than 70 percent after the project traffic is added.

f. The roadway links in the vicinity of the site are projected to operate within acceptable Levels of Service for Year 2007 without project traffic conditions, except for Tierra Subida Avenue between 5th Street West and Rayburn Road. This condition will remain until Tierra Subida is widened to its ultimate General Plan designation.

g. For year 2007 without project traffic conditions, the intersections in the vicinity of the site are projected to operate at Level of Service D or better during the peak hours (see Table 1b).

h. The roadway links in the vicinity of the site are projected to operate within acceptable Levels of Service for Year 2007 with project traffic conditions, except for Tierra Subida Avenue between 5th Street West and Rayburn Road. This condition will remain until Tierra Subida is widened to its ultimate General Plan designation.

i. For Year 2007 with project traffic conditions, the intersections in the vicinity of the site are projected to operate at Level of Service D or better during the peak hours for average and peak inflow of material traffic conditions (see Table 1b).

j. Because the project does not have a significant traffic impact when the project is added to existing traffic conditions, nor when it is added to 2007 traffic conditions, it will also not have a significant traffic impact at any other future point in time such as year 2025. This is because the project will never increase the ICU's shown in Table 1b by more than the amounts shown in Table 1b. However, the project should pay standard traffic impact fees to the City of Palmdale and receive credits for improvements consistent with the City's Traffic Impact Fee Ordinance.

k. The SR 14 Freeway receives a maximum of 10 percent of the project's traffic and that is south of Avenue S. For average inflow conditions, this is 70 vehicles per day, and for peak inflow conditions this is 97 vehicles per day. The SR 14 south of Avenue S has 70,000 vehicles per day per the latest available Caltrans counts, and the added vehicles represents a 0.14 percent increase which is insignificant. Per the Los Angeles Congestion Management Program (LACMP) section D.4, 150 added vehicles in the peak *hour* is a significant impact. The SR 14 currently has 6,000 vehicles in the peak hour. It has 55.9 percent in the peak hour peak direction, or 3,354 vehicles in one direction. One way capacity is 4,000 vehicles per hour per LACMP Appendix A, and it is operating at a volume to capacity ratio of 0.84. The operating speeds in the peak hour peak direction are above 45 miles per hour, which is a Level of Service C per the LACMP, Exhibit 5-1.

Recommendations

The following measures are recommended to mitigate the impact of the project on traffic circulation:

a. Site-specific circulation and access recommendations are depicted on Figures 30 and 31.

b. It is proposed that the waste management access road alignment will be along R-5 as a two lane roadway (60 foot right-of-way). R-5 will intersect Tierra Subida Avenue opposite Rayburn Road (see Figures 30 and 31).

c. As is the case for any roadway design, the City of Palmdale should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

Table 1a

Existing / Project Daily Traffic Generation Summary

Descriptor	Tons per Truck	Truck Loads In	Cars In	Trucks And Cars In	Total Trips (In + Out)
Average Existing Conditions (1,372 tons/day)	6.596	208	105	313	626
Proposed Average Condition (3,613 tons/day)	8.363	432	230	662	1324
Difference		224	125	349	698
Average Existing Conditions (1,372 tons/day)	6.596	208	105	313	626
Proposed Peak Condition (5,548 tons/day)	9.785	567	230	797	1594
Traffic Increase		359	125	484	968
Traffic Increase Local in Palmdale (Approximately 85 %)		286	125	411	823
Traffic Increase from Outside Palmdale (Approximately15 %)		71	0	71	142
Peak Permitted Condition (3,654 tons/day)	6.480	550	180	730	1460
Proposed Peak Condition (5,548 tons/day)	9.785	567	230	797	1594
Total Increase		17	50	67	134

Notes:

1. Details concerning the types of material hauled and the types of truck are contained in Table 4.

2. Details concerning the time of day the traffic occurs, including peak hours, are contained in Table 5.

3. A trip occurs when something is taken from point A to point B and something enters or exits the vehicle at point A or point B. When a vehicle enters the facility, deposits material, and leaves, that results in an "in trip" and an "out trip" (total of 2 trips).

4. Per Figure 19, 15 percent of the project traffic is assumed to come to Palmdale via the State Route 14 Freeway.

5. The anticipated number of transfer trucks coming to the facility from State Route 14 Freeway is 71 loads per day (per Table 6) for both the average and peak conditions. The 71 loads is 142 in plus out trips. The 142 in plus out trips is about 15 percent of the peak total traffic.

Table 1b

Summary of Intersection Capacity Utilization (ICU) and Level of Service (LOS)

Intersection	Scenario	Average Inflow of Material (3,613 tons per day) ICU-LOS[1] Morning	Average Inflow of Material (3,613 tons per day) ICU-LOS[1] Evening	Peak Inflow of Material (5,548 tons per day) ICU-LOS[1] Morning	Peak Inflow of Material (5,548 tons per day) ICU-LOS[1] Evening	Significant Impact[2] Average Inflow	Significant Impact[2] Peak Inflow
Tierra Subida Avenue (NS) at: Palmdale Boulevard (EW)	Existing	52.0-A	66.9-B	52.0-A	66.9-B		
	Existing Plus Project	52.2-A	67.1-B	52.3-A	67.2-B		
	Difference	+0.2	+0.2	+0.3	+0.3	NO	NO
	Year 2007 Without Project	66.2-B	86.3-D	66.2-B	86.3-D		
	Year 2007 With Project	66.5-B	86.6-D	66.5-B	86.6-B		
	Difference	+0.3	+0.2	+0.3	+0.3	NO	NO
Tierra Subida Avenue (NS) at: 5th Street West (EW)	Existing	39.9-A	48.9-A	39.9-A	48.9-A		
	Existing Plus Project	40.6-A	49.4-A	40.9-A	49.4-A		
	Difference	+0.7	+0.5	+1.0	+0.5	NO	NO
	Year 2007 Without Project	50.1-A	62.1-B	50.1-A	62.1-B		
	Year 2007 With Project	50.8-A	62.6-B	51.0-A	62.7-B		
	Difference	+0.7	+0.5	+0.9	+0.6	NO	NO
Tierra Subida Avenue (NS) at: Rayburn Road (EW)	Existing	51.3-A	63.4-B	51.3-A	63.4-B		
	Existing Plus Project	52.5-A	64.1-B	52.8-A	64.3-B		
	Difference	+1.2	+0.7	+1.5	+0.9	NO	NO
	Year 2007 Without Project	65.2-B	81.7-D	65.2-B	81.7-D		
	Year 2007 With Project	66.4-B	82.3-D	66.8-B	82.5-D		
	Difference	+1.2	+0.6	+1.6	+0.8	NO	NO
Tierra Subida Avenue (NS) at: City Ranch Road (EW)	Existing	27.1-A	42.7-A	27.1-A	42.7-A		
	Existing Plus Project	27.6-A	42.7-A	27.8-A	42.8-A		
	Difference	+0.5	+0.0	+0.7	+1.1	NO	NO
	Year 2007 Without Project	33.0-A	53.8-A	33.0-A	53.8-A		
	Year 2007 With Project	33.5-A	53.8-A	33.7-A	54.0-A		
	Difference	+0.5	+0.0	+0.7	+0.2	NO	NO
Tierra Subida Avenue (NS) at: Avenue S (EW)	Existing	40.5-A	55.9-A	40.5-A	55.9-A		
	Existing Plus Project	41.3-A	56.4-A	41.7-A	56.5-A		
	Difference	+0.8	+0.5	+1.2	+0.6	NO	NO
	Year 2007 Without Project	50.8-A	71.5-C	50.8-A	71.5-C		
	Year 2007 With Project	51.7-A	72.0-C	52.0-A	72.1-C		
	Difference	+0.9	+0.5	+1.2	+0.6	NO	NO
5th Street West (NS) at: Palmdale Boulevard (EW)	Existing	30.0-A	51.7-A	30.0-A	51.7-A		
	Existing Plus Project	30.0-A	51.7-A	30.2-A	51.7-A		
	Difference	+0.0	+0.0	+0.2	+0.0	NO	NO
	Year 2007 Without Project	36.7-A	65.9-B	36.7-A	65.9-B		
	Year 2007 With Project	36.8-A	65.9-B	36.9-A	65.9-B		
	Difference	+0.1	+0.0	+0.2	+0.0	NO	NO
SR-14 Freeway SB Ramps (NS) at: Palmdale Boulevard (EW)	Existing	36.6-A	67.3-B	36.6-A	67.3-B		
	Existing Plus Project	36.6-A	67.3-B	36.6-A	67.3-B		
	Difference	+0.0	+0.0	+0.0	+0.0	NO	NO
	Year 2007 Without Project	45.6-A	86.9-D	45.6-A	86.9-D		
	Year 2007 With Project	45.6-A	86.9-D	45.6-A	86.9-D		
	Difference	+0.0	+0.0	+0.0	+0.0	NO	NO
SR-14 Freeway SB Ramps (NS) at: Avenue S (EW)	Existing	46.1-A	48.9-A	46.1-A	48.9-A		
	Existing Plus Project	46.2-A	49.0-A	46.3-A	49.1-A		
	Difference	+0.1	+0.1	+0.2	+0.2	NO	NO
	Year 2007 Without Project	58.2-A	62.1-B	58.2-A	62.1-B		
	Year 2007 With Project	58.4-A	62.2-B	58.4-A	62.3-B		
	Difference	+0.2	+0.1	+0.2	+0.2	NO	NO
SR-14 Freeway NB Ramps (NS) at: Palmdale Boulevard (EW)	Existing	26.9-A	44.0-A	26.9-A	44.0-A		
	Existing Plus Project	26.9-A	44.0-A	26.9-A	44.0-A		
	Difference	+0.0	+0.0	+0.0	+0.0	NO	NO
	Year 2007 Without Project	32.6-A	55.7-A	32.6-A	55.7-A		
	Year 2007 With Project	32.6-A	55.7-A	32.6-A	55.7-A		
	Difference	+0.0	+0.0	+0.0	+0.0	NO	NO
SR-14 Freeway NB Ramps (NS) at: Avenue S (EW)	Existing	30.0-A	41.4-A	30.0-A	41.4-A		
	Existing Plus Project	30.4-A	41.5-A	30.4-A	41.6-A		
	Difference	+0.4	+0.1	+0.4	+0.2	NO	NO
	Year 2007 Without Project	36.8-A	52.1-A	36.8-A	52.1-A		
	Year 2007 With Project	37.1-A	52.2-A	37.2-A	52.3-A		
	Difference	+0.3	+0.1	+0.4	+0.2	NO	NO

[1] ICU-LOS = Intersection Capacity Utilization - Level of Service

[2] In the County of Los Angeles, the change in the ICU value is considered insignificant if the change in the ICU is less than 1 percent regardless of the ICU value, or if the change in the ICU value is less than 2 percent and the ICU with the project is less than 90 percent.

2. Congestion Management Program (CMP) Methodology

This section discusses the Los Angeles County Congestion Management Program (CMP). The purpose, prescribed methodology, and definition of a significant traffic impact are discussed.

County Congestion Management Program (CMP)

The CMP is a result of Proposition 111 which was a statewide initiative approved by the voters in June, 1990. The proposition allowed for a nine cent per gallon state gasoline tax increase over a five year period.

Proposition 111 explicitly stated that the new gas tax revenues were to be used to fix existing traffic problems and was not to be used to promote future development. For a city to get its share of the Proposition 111 gas tax, it has to follow certain procedures specified by the State Legislature. The legislation requires that a Traffic Impact Analysis (TIA) be prepared for new development. The TIA is prepared to monitor and fix traffic problems caused by new development.

The Legislature requires that adjacent jurisdictions use a standard methodology for conducting a TIA. To assure that adjacent jurisdictions use a standard methodology in preparing TIA's, one common procedure is that all cities within a county, and the county agency itself, adopt and use one standard methodology for conducting TIA's.

Although each county has developed standards for preparing TIA's, TIA requirements do vary in detail from one county to another, but not in overall intent or concept. The general approach selected by each county for conducting TIA's has common elements.

The general approach for conducting a TIA is that existing weekday peak hour traffic is counted and the percent of roadway capacity currently used is determined. Then growth in traffic is accounted for and added to existing traffic and the percent of roadway capacity used is again determined. Then the project traffic is added and the percent of roadway capacity used is again determined. If the new project adds traffic to an overcrowded facility, then the new project has to mitigate the traffic impact so that the facility operates at a level that is no worse than before the project traffic was added.

If the project size is below a certain minimum threshold level, then a project does not have to have a TIA prepared, once it is shown or agreed that the project is below the minimum threshold. If a project is bigger than the minimum threshold size, then a TIA is required.

Prescribed Methodology for A Traffic Impact Analysis (TIA)

The TIA must include all monitored intersections to which the project adds traffic above a certain minimum amount. In Los Angeles County, the monitored intersections are contained in Appendix A of the Congestion Management Program (CMP) for the County of Los Angeles. In the Appendix A referenced immediately above, no intersections are listed that are near the project. So from that point of view, no traffic analysis is required.

This traffic study analyzes all arterial intersections that are reasonably foreseen to receive traffic from this project, and analyze those intersections using the Intersection Capacity Utilization (ICU) methodology.

In Los Angeles County, the technique used to calculate ICU's is as follows. Lane capacity is 1600 vehicles per lane per hour of green time for through and turn lanes, except that a capacity of 2880 vehicles per lane per hour of green time is used for dual turn lanes. A total yellow clearance time of 10 percent is added.

If the intersection has to be analyzed for deficiencies, then mitigation is required if the existing traffic plus anticipated traffic growth plus project traffic does cause the ICU to go above a certain point. In Los Angeles County, mitigation is required if the ICU is worse than Level of Service E, which corresponds to an ICU of 100 percent or more.

In Los Angeles County, future traffic volumes are determined using growth rates that are applied to existing traffic volumes. The growth rates differ from one area of the County to another. According to the CMP, the expected growth rate for North County is 0.9 percent per year.

Although a 0.9 percent per year growth rate is recommended by the CMP, a "conservative" growth rate of 6.0 percent per year is used as a maximum likely estimate within this analysis. The reason 6.0 percent per year is used is because (1) it was used in our previous analysis, and (2) the historic growth rate along the SR-14 Freeway in the study area is approximately 3 percent. The SR-14 Freeway is referenced because it is a good barometer of growth in this portion of North County.

Mitigation Measures

If a project is large enough to require that a TIA be prepared, and if the project adds traffic to an intersection above a minimum threshold, and if the intersection is operating at above an acceptable level of operation, then the project must mitigate its traffic impact.

Traffic mitigation can be in many forms including adding lanes. Lanes can sometimes be obtained through restriping or elimination of parking, and sometimes require spot roadway widening.

3. Project Description

This section discusses the project's location, proposed development, and traffic characteristics of such a development. Figure 1 shows the project location map. Figures 2 and 3 illustrate the landfill parcels and topographic map, respectively.

Location

The project site is located at the existing terminus of City Ranch Road, west of Tierra Subida Avenue in the Palmdale area of Los Angeles County.

Proposed Development

Although the current landfill operation is permitted to receive up to 434 truckloads that correspond to roughly 1,400 tons per day, it is estimated that at this time approximately 1,372 tons of material are received each day on average. For purposes of this traffic study, it is assumed that the future operation will reach an average of 3,613 tons per day of deposited material.

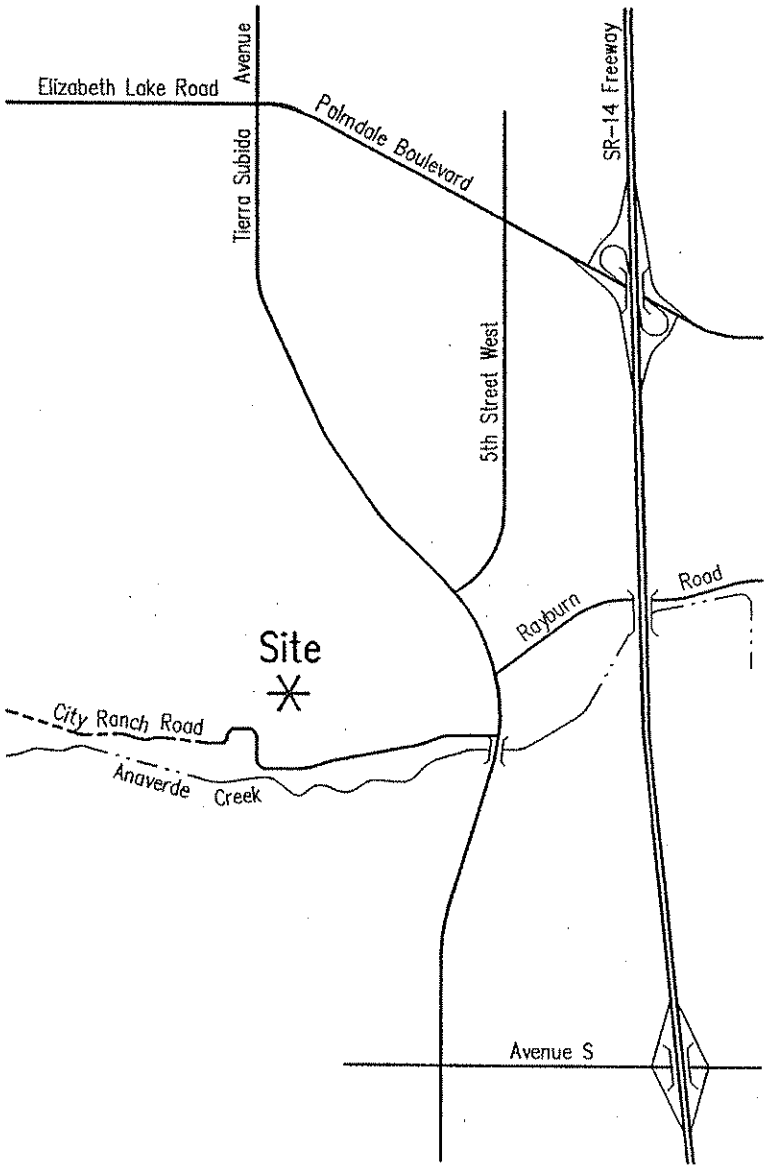
However, the existing landfill also accepts concrete for recycling and/or materials used for daily cover or beneficial use, and when a major inflow of these materials occurs, then the daily tonnage today increases to as much as 3,800 tons per day. In the future when the average tons per day is 3,613, it is expected the peak inflow of material can reach 5,548 tons per day. This peak inflow of concrete or daily cover material is sporadic and will last for a few days. The terms "average" inflow of material and "peak" inflow of material will be used to distinguish these two traffic conditions in this traffic analysis.

Today, on average there are 208 loads per day and 1,372 tons per day of deposited material. These 208 loads consist of 142 municipal solid waste loads, 16 transfer trailer loads, 17 contaminated soil loads, 23 greenwaste loads, and 10 loads by others. Waste Management trucks average 4.05 tons each for municipal solid waste, 21 tons each for transfer trailers, 25 tons each for contaminated soil, 0.7 tons each for greenwaste, and an average of 8 tons each for others.

The municipal solid waste truck drivers and helpers arrive at work between 4:00 AM and 6:00 AM and leave between 11:00 AM and 3:00 PM. The office workers arrive at work between 7:00 AM and 8:00 AM and depart between 4:00 PM and 5:00 PM. Typically the municipal solid waste trucks are exiting prior to 7:00 AM.

It is proposed that the waste management access road alignment will be along R-5 as a two lane roadway (60 foot right-of-way). R-5 will intersect Tierra Subida Avenue opposite Rayburn Road (see Figures 30 and 31).

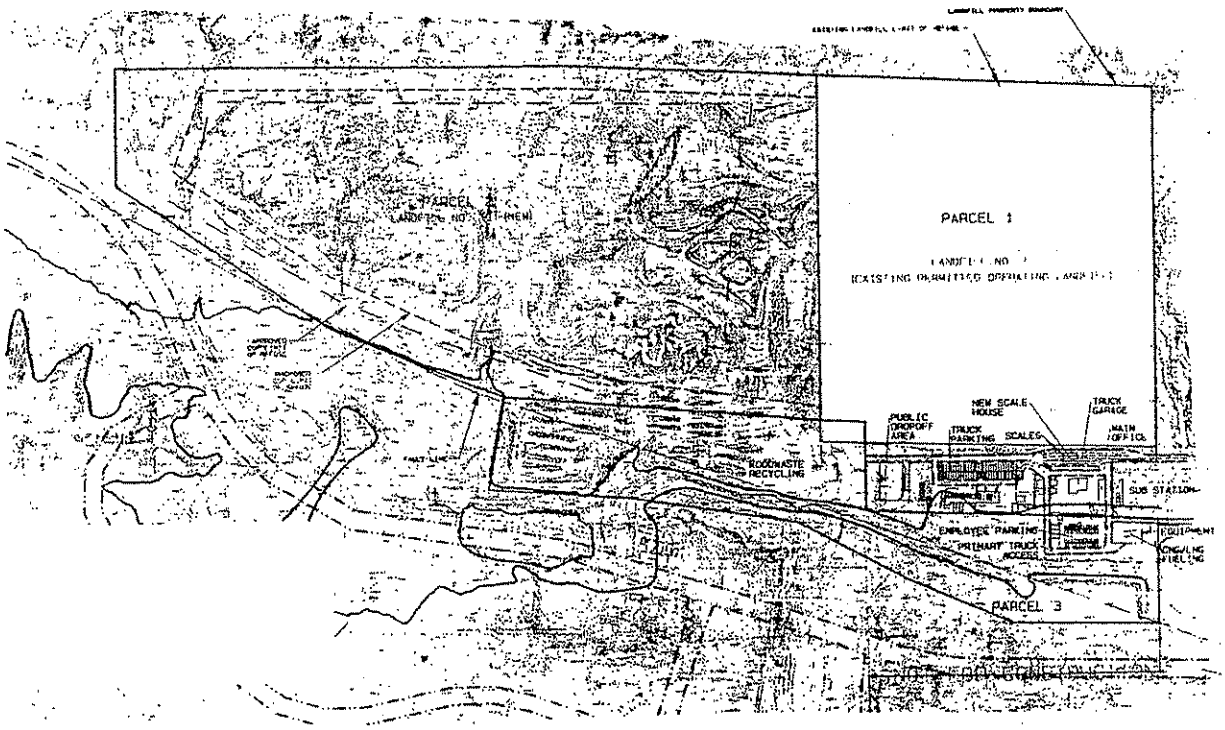
Figure 1
Project Location Map



Kunzman Associates

2051G/1

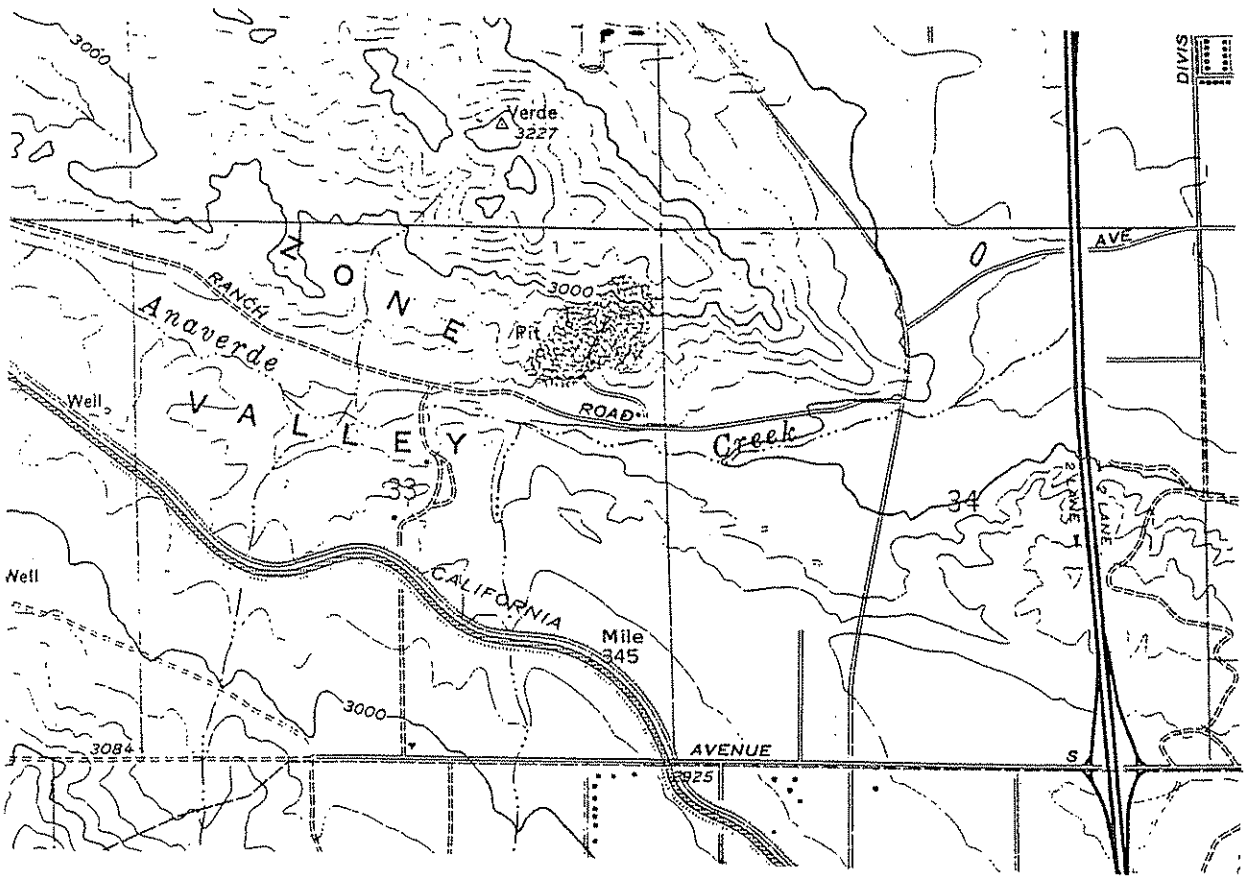
Figure 2
Landfill Parcels



Kunzman Associates

2051F/2

Figure 3
Topographic Map



Kunzman Associates

2051F/3

4. Existing Traffic Conditions

The traffic conditions as they exist today are discussed below and illustrated in Figures 4 to 13.

Surrounding Street System

Roadways that will be utilized by the site expansion include Palmdale Boulevard, Rayburn Road, City Ranch Road, Avenue S, Tierra Subida Avenue, and 5th Street West. In the vicinity of the project site, the following roadway conditions exist.

Palmdale Boulevard: This east-west four lane divided to six lane divided roadway is classified as a Regional Arterial (six lane divided) on the City of Palmdale General Plan Circulation Element. It currently carries approximately 12,400 to 19,900 vehicles per day in the study area.

Rayburn Road: This east-west two lane undivided roadway is classified as a Major Arterial (114 foot right-of-way; six lane divided) on the City of Palmdale General Plan Circulation Element. It currently carries approximately 5,100 vehicles per day in the study area.

City Ranch Road: This east-west two lane undivided roadway is classified as a Secondary Arterial (84 foot right-of-way; four lane divided) on the City of Palmdale General Plan Circulation Element. It currently carries approximately 700 vehicles per day in the study area.

Avenue S: This east-west two lane undivided to four lane divided roadway is classified as a Major Arterial (114 foot right-of-way; six lane divided) on the City of Palmdale General Plan Circulation Element. It currently carries approximately 1,100 to 24,000 vehicles per day in the study area.

Tierra Subida Avenue: This north-south two lane undivided to six lane divided roadway is classified as a Regional Arterial north of Palmdale Boulevard, Major Arterial (114 foot right-of-way; six lane divided) between Palmdale Boulevard and Avenue S, and a Secondary Arterial (84 foot right-of-way; four lane divided) south of Avenue S on the City of Palmdale General Plan Circulation Element. It currently carries approximately 1,700 to 14,100 vehicles per day in the study area.

5th Street West: This north-south four lane divided roadway is classified as a Major Arterial (114 foot right-of-way; six lane divided) north of Palmdale Boulevard and as a Secondary Arterial (84 foot right-of-way; four lane divided) south of Palmdale Boulevard on the City of Palmdale General Plan Circulation Element. It currently carries approximately 2,900 to 4,100 vehicles per day in the study area.

Existing Travel Lanes and Intersection Controls

Figure 4 identifies the existing roadway conditions for arterials near the site. The number of through lanes for existing roadways and the existing intersection controls are identified.

Existing Average Daily Traffic (ADT) Volumes

Figure 5 depicts the existing average daily traffic (ADT) volumes. Traffic volumes were obtained from the 2001 Traffic Volumes on California State Highways by Caltrans and factored from peak hour intersection turning movement counts obtained by Kunzman Associates (see Appendix B).

Existing Volume to Capacity Ratios

Roadway capacity is generally defined as the number of vehicles that can be reasonably expected to pass over a given section of road in a given time period. Congestion, high accident rates, the quality of traffic flow (Level of Service), and environmental acceptability all come into play in defining a particular roadway's effective capacity. It is possible to identify maximum desirable volumes for typical roadway types based on the number of roadway travel lanes. These daily volumes reflect estimates of the amount of daily traffic that will result in peak hour traffic volumes equal to the maximum desirable capacity of each roadway type. Table 2 contains City of Palmdale daily capacities by roadway type.

By dividing existing ADT volumes by the daily roadway capacities listed in Table 2, existing daily volume to capacity ratios have been calculated and are shown in Figure 6. As may be seen on Figure 6, the roadway links in the vicinity of the site currently operate within acceptable Levels of Service.

Existing Intersection Capacity Utilization (ICU)

The technique used to assess the operation of an intersection is known as Intersection Capacity Utilization (ICU). To calculate an ICU value the volume of traffic using the intersection is compared with the capacity of the intersection. An ICU value is usually expressed as a percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

The ICU's for the existing traffic conditions have been calculated and are shown in Table 3. Existing ICU values are based upon manual morning and evening peak hour turning movement counts obtained by Kunzman Associates in November, 2002 (see Figures 7 and 8). Traffic count worksheets are provided in Appendix B. There are two peak hours in a weekday. The morning peak hour is between 7:00 AM and 9:00 AM, and the evening peak hour is between 4:00 PM and 6:00 PM. The actual peak hour within the two hour interval is the four consecutive 15 minute

periods with the highest total volume when all movements are added together. Thus, the evening peak hour at one intersection may be 4:45 PM to 5:45 PM if those four consecutive 15 minute periods have the highest combined volume.

The intersections in the vicinity of the site currently operate at Level of Service B or better during the peak hours. Existing ICU worksheets are provided in Appendix C.

Comparison of daily volume to capacity ratios and corresponding Level of Service, and peak hour Intersection Capacity Utilization and corresponding Level of Service reveals significant differences. The differences between daily link volume to capacity ratios and peak hour ICU values is particularly pronounced when cross traffic is light. Daily volume to capacity ratios assume that all cross streets require 50 percent of the time to satisfy their demand, and assume that the subject street has 50 percent of the time available to it. The daily link volume to capacity ratios are a generalized indicator while peak hour ICU actually represents what can be expected in the peak hour at intersections. Of the two indicators, the peak hour ICU value and corresponding LOS is by far the best measure of roadway performance.

Existing City of Palmdale General Plan Circulation Element

Figure 9 exhibits the City of Palmdale General Plan Circulation Element. Both existing and future roadways are included in the Circulation Element of the General Plan and are graphically depicted on Figure 9. This figure shows the nature and extent of arterial highways that are needed to serve adequately the ultimate development depicted by the Land Use Element of the General Plan.

Figure 10 shows the existing General Plan land use designations and Figure 11 shows the existing land use zoning in the vicinity of the site.

Figure 12 shows the parcels and lot numbers for the land surrounding the landfill. Figure 13 shows which lots are vacant and occupied. A lot was considered occupied if it had an above ground structure on it or was part of the landfill.

Existing Traffic Signal Warrants

Traffic signals appear to currently be warranted at the following study area intersections (see Appendix D):

Tierra Subida Avenue (NS) at:
- 5th Street West (EW)
- Rayburn Road (EW)
- Avenue S (EW) (Installation will be in 2005)

Table 2

City of Palmdale
Roadway Capacities

Facility Type	Number of Lanes
Two Lane Undivided	12,000 vehicles per day
Four Lane Divided	36,000 vehicles per day
Six Lane Divided	54,000 vehicles per day

Table 3

Existing Intersection Capacity Utilization (ICU) and Level of Service (LOS)

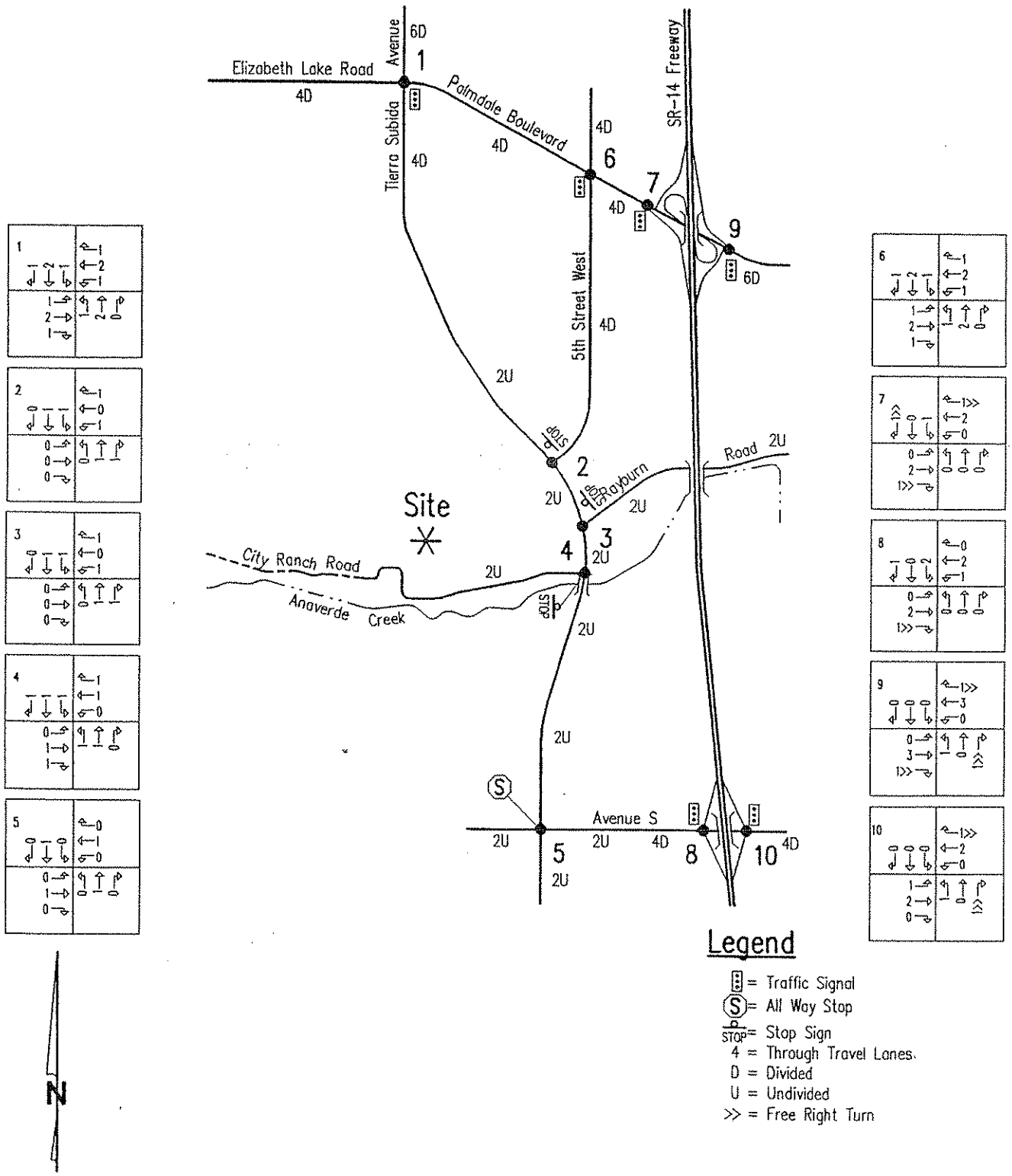
Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
		Northbound			Southbound			Eastbound			Westbound				
		L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	52.0-A	66.9-B
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	39.9-A	48.9-A
Rayburn Road (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	51.3-A	63.4-B
City Ranch Road (EW)	CSS	1	1	0	1	1	1	0	1	1	0	1	1	27.1-A	42.7-A
Avenue S (EW)	AWS	0	1	0	0	1	0	0	1	0	0	1	0	40.5-A	55.9-A
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	30.0-A	51.7-A
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	36.6-A	67.3-B
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	46.1-A	48.9-A
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	26.9-A	44.0-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	30.0-A	41.4-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; >> = Free Right Turn

[2] ICU-LOS = Intersection Capacity Utilization - Level of Service

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

Figure 4
Existing Through Travel Lanes and Intersection Controls

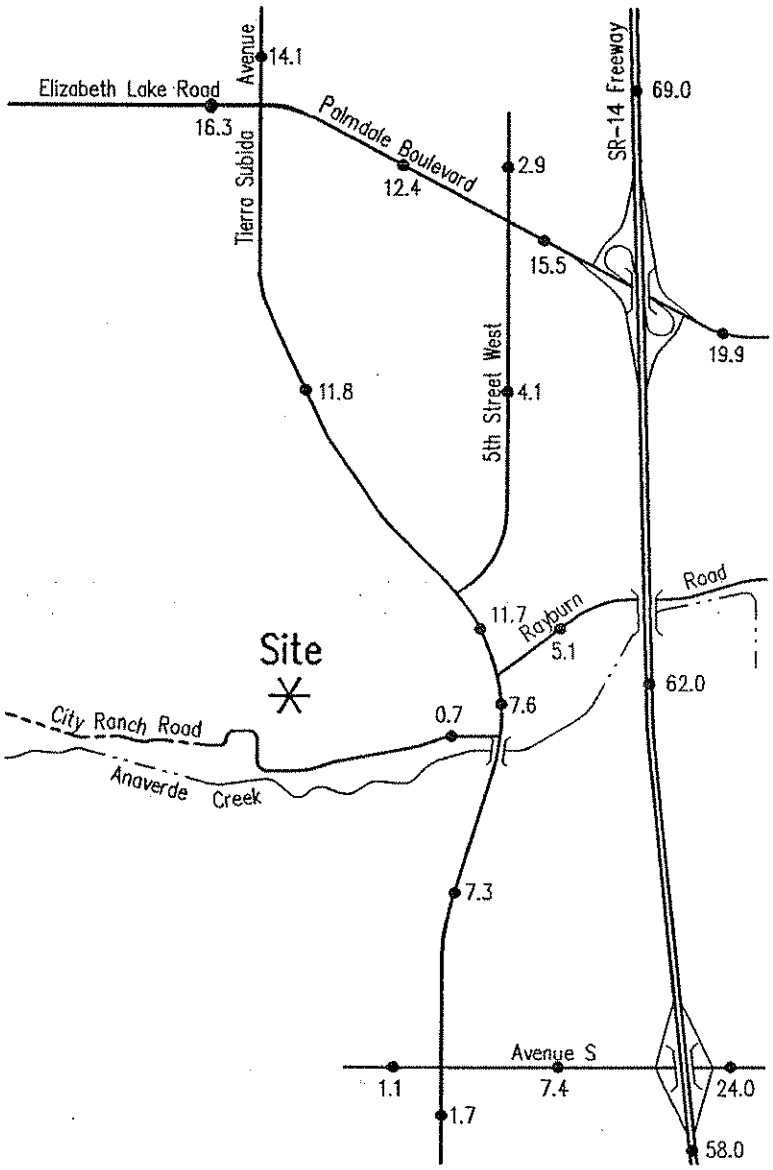


Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/4

Figure 5
Existing Average Daily Traffic (ADT) Volumes



Legend

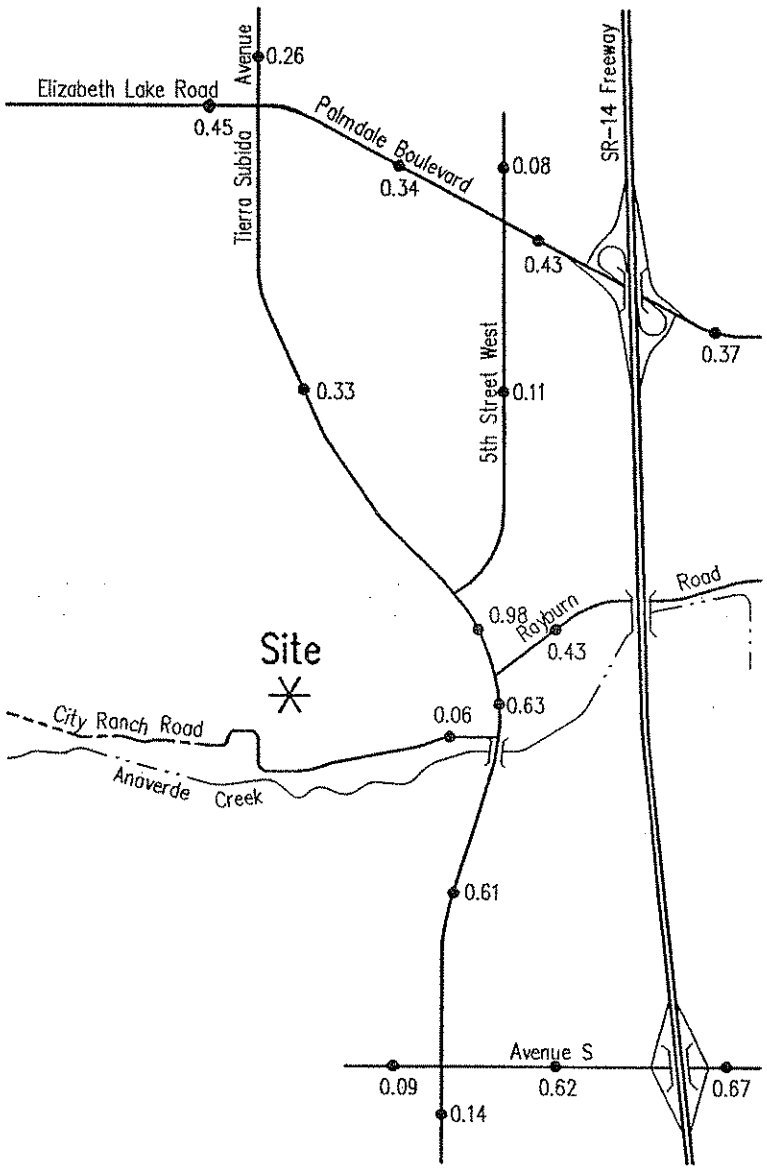
1.5 = Vehicles Per Day (1000's)

N

Kunzman Associates

2051G/5

Figure 6
Existing Volume to Capacity Ratios



Legend

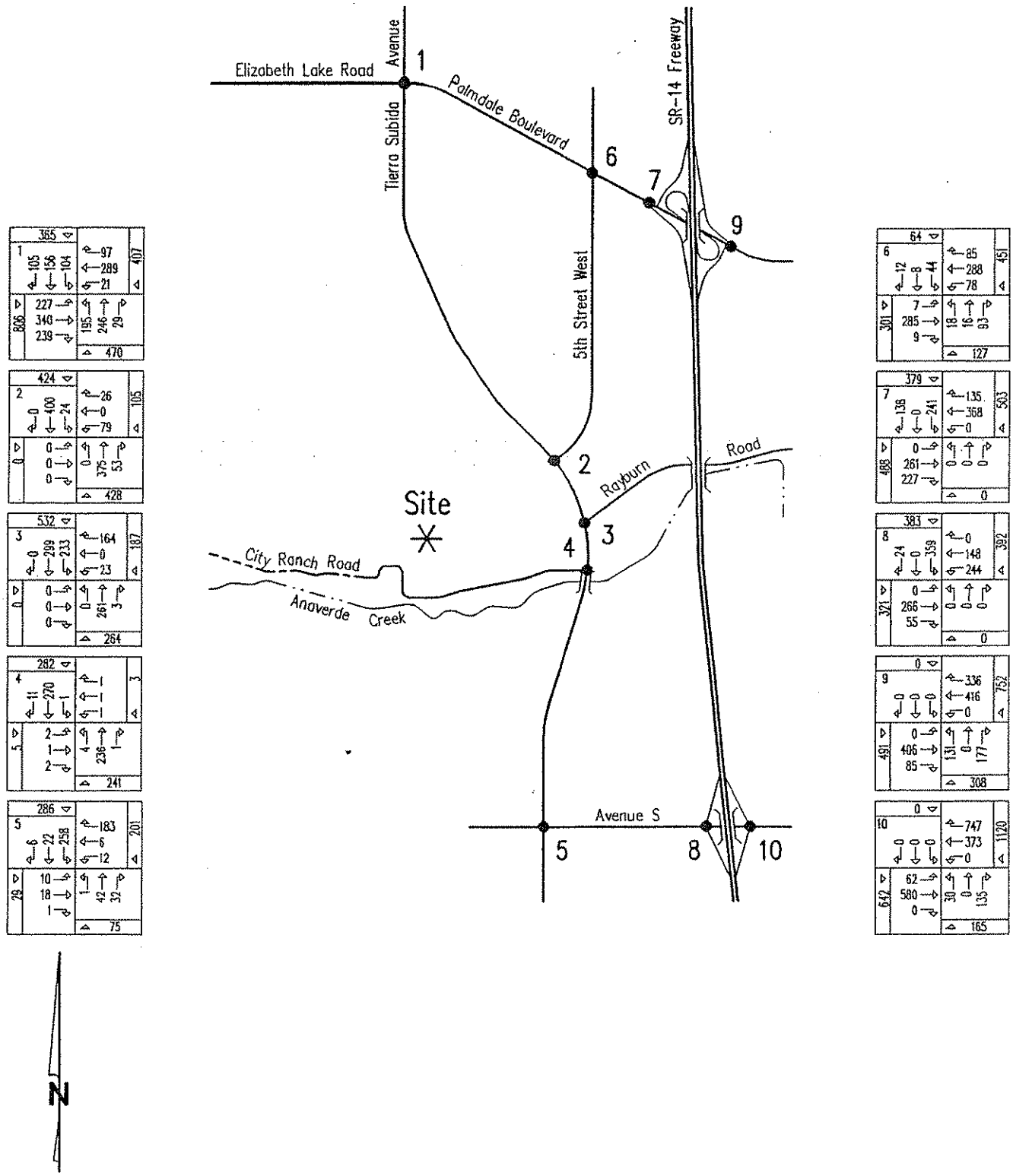
0.14 = Volume To Capacity Ratio

N

Kunzman Associates

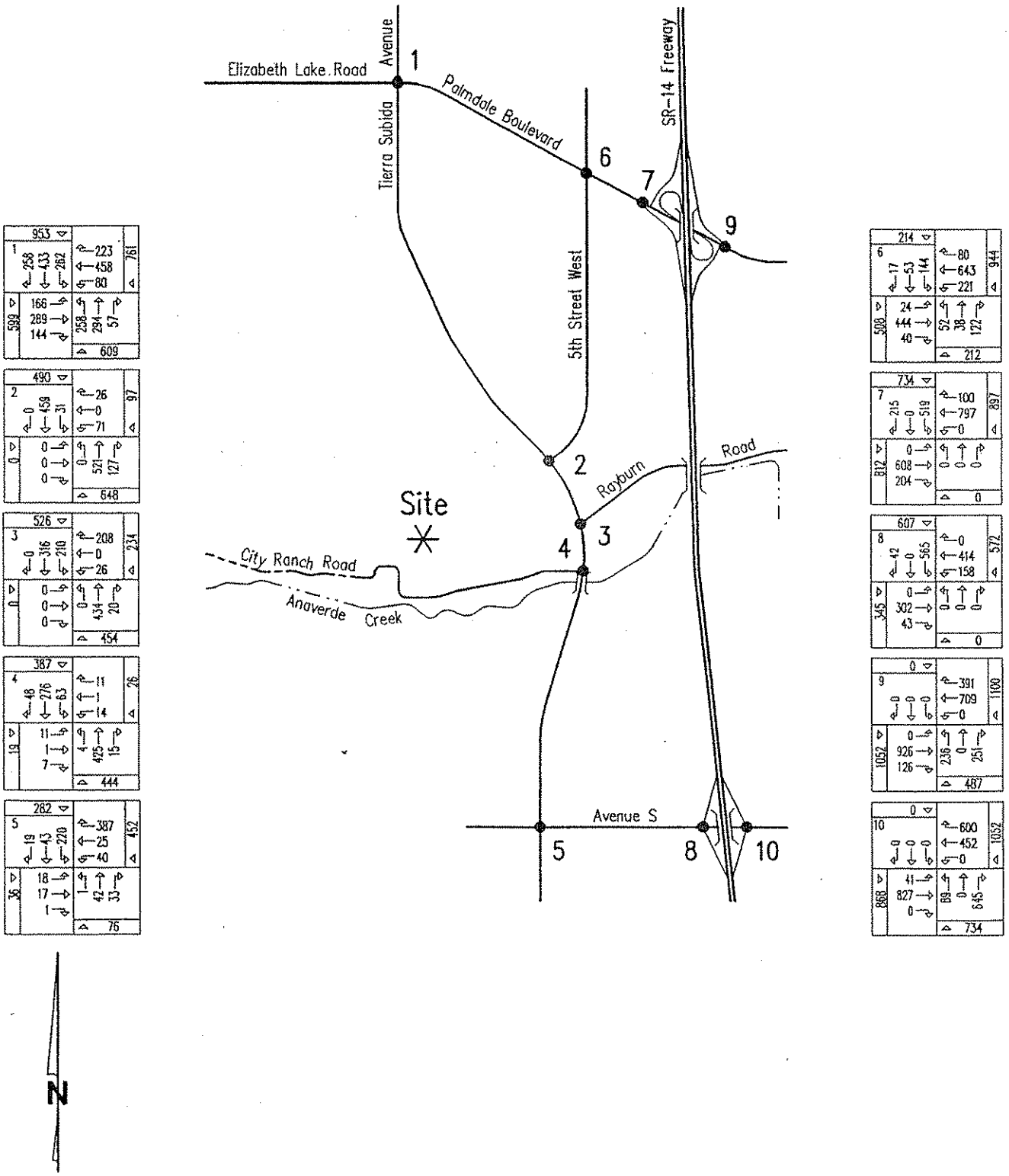
2051G/6

Figure 7
Existing Morning Peak Hour Intersection Turning Movement Volumes



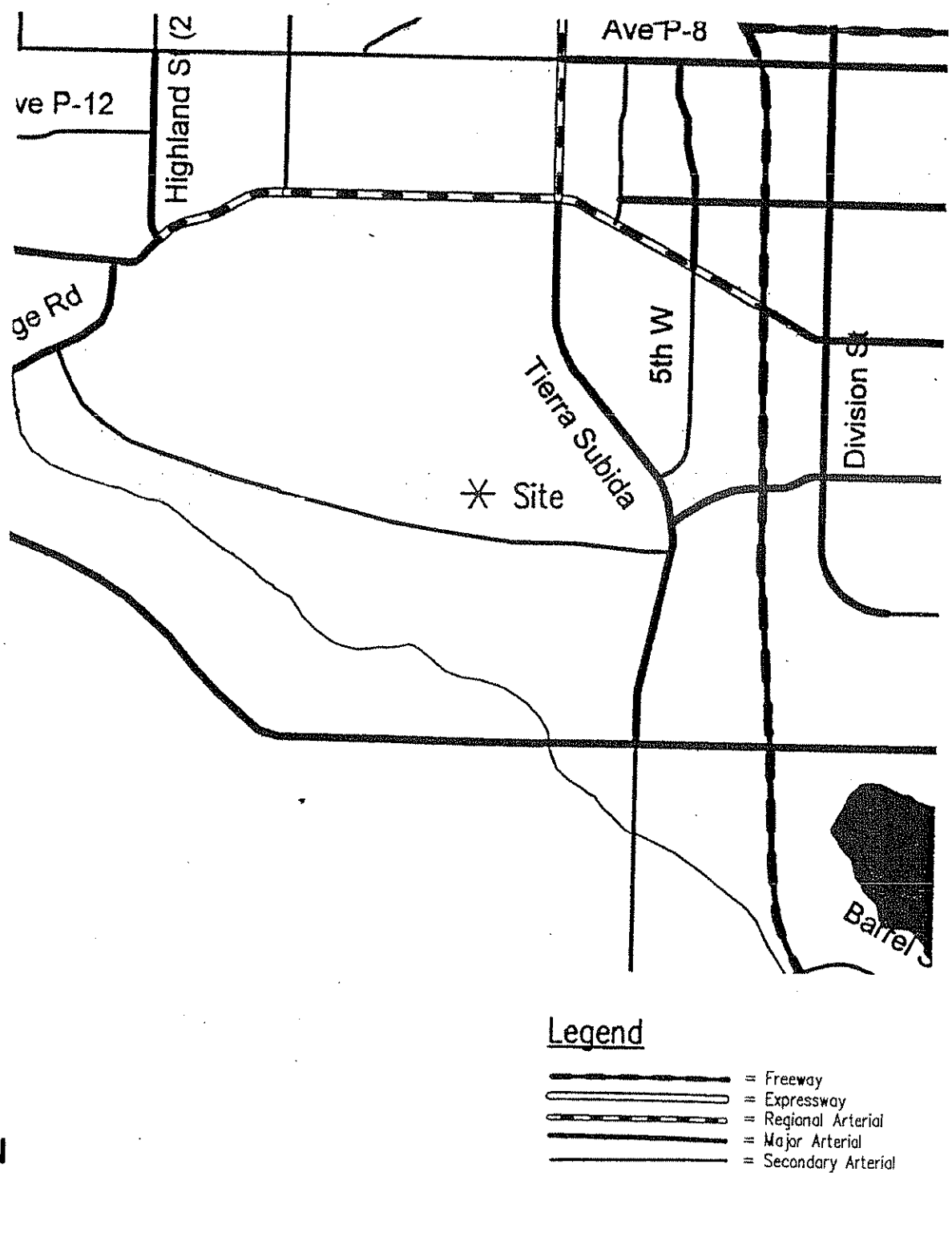
Kunzman Associates Intersection reference numbers are in upper left corner of turning movement boxes. 2051F/bbas

Figure 8
Existing Evening Peak Hour Intersection Turning Movement Volumes



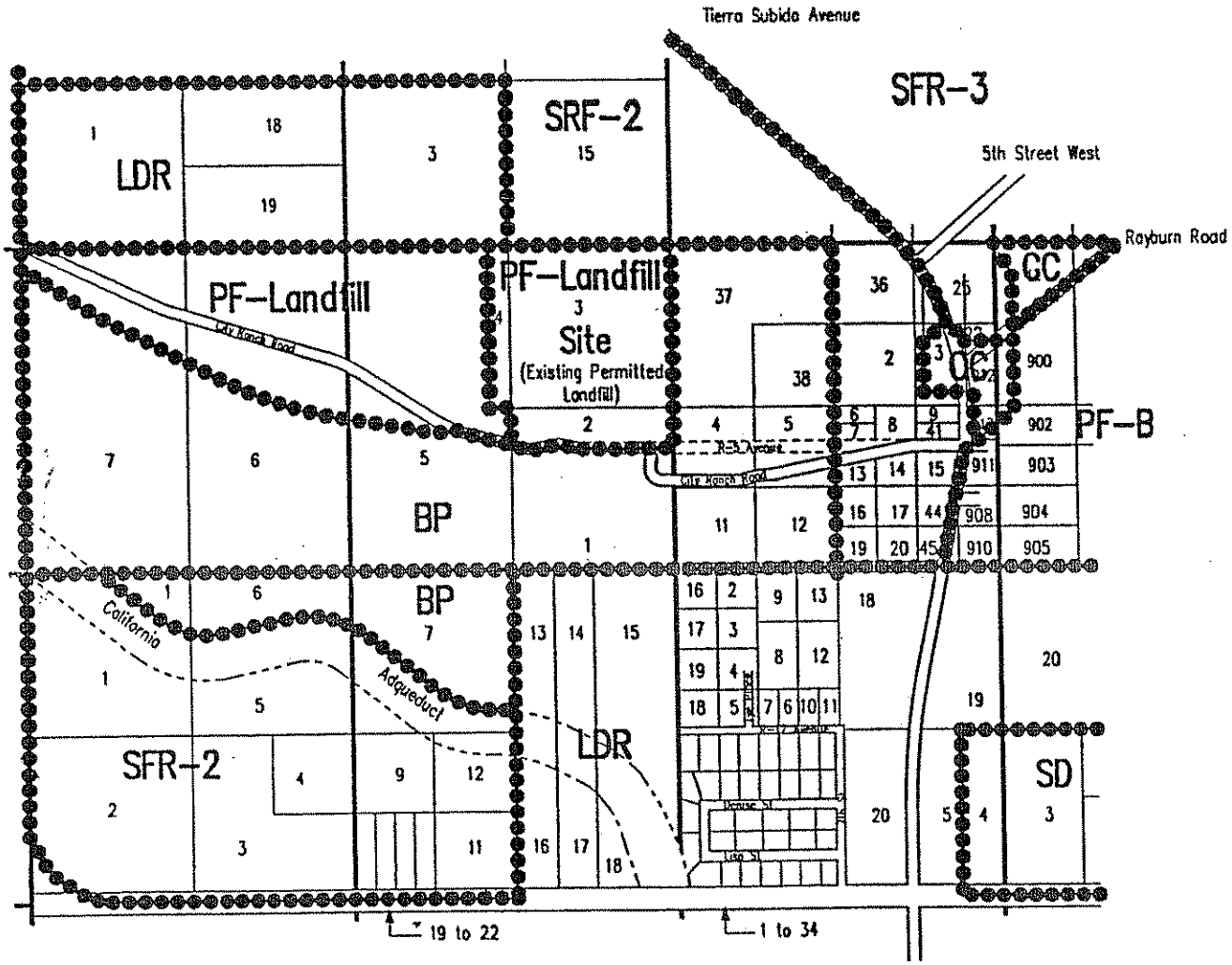
Kunzman Associates Intersection reference numbers are in upper left corner of turning movement boxes. 2051F/bbas

Figure 9
City of Palmdale General Plan Circulation Element



Kunzman Associates Source: City of Palmdale 2051F/9

Figure 10
General Plan Land Use Designations



Legend

LDR = Low Density Residential (1 du/ac)

SFR-1 = 1 Single Family (0-3 du/ac)

SFR-3 = 3 Single Family (3.1-6 du/ac)

CC = Community Commercial

OC = Office Commercial

PB = Business Park

PF = Public Facility

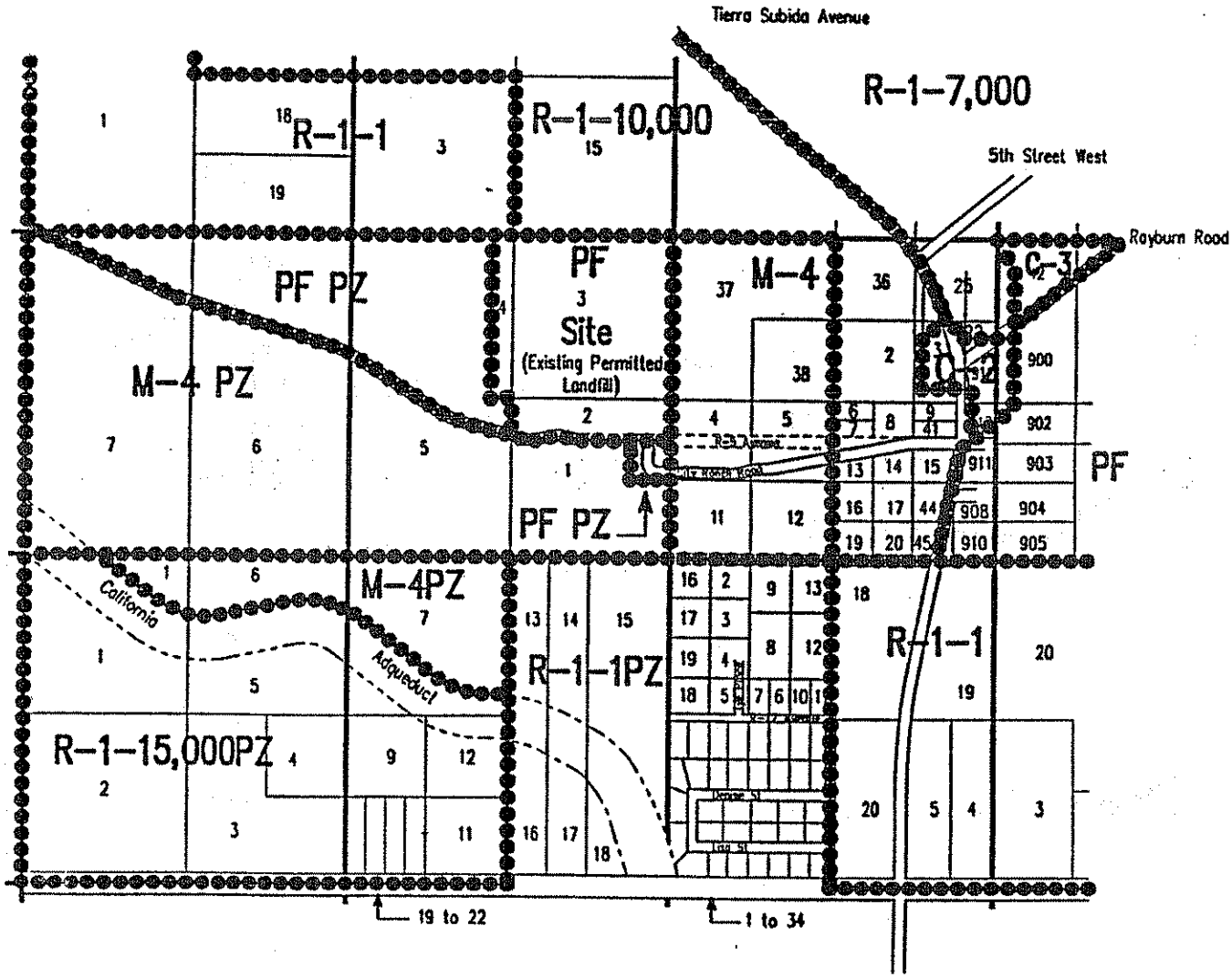
SD = Special Development

N

Kunzman Associates

2051F/10

Figure 11
Zoning Designations



Legend

R-1 = Single Family Residential

C-2 = Office Commercial

C-3 = General Commercial

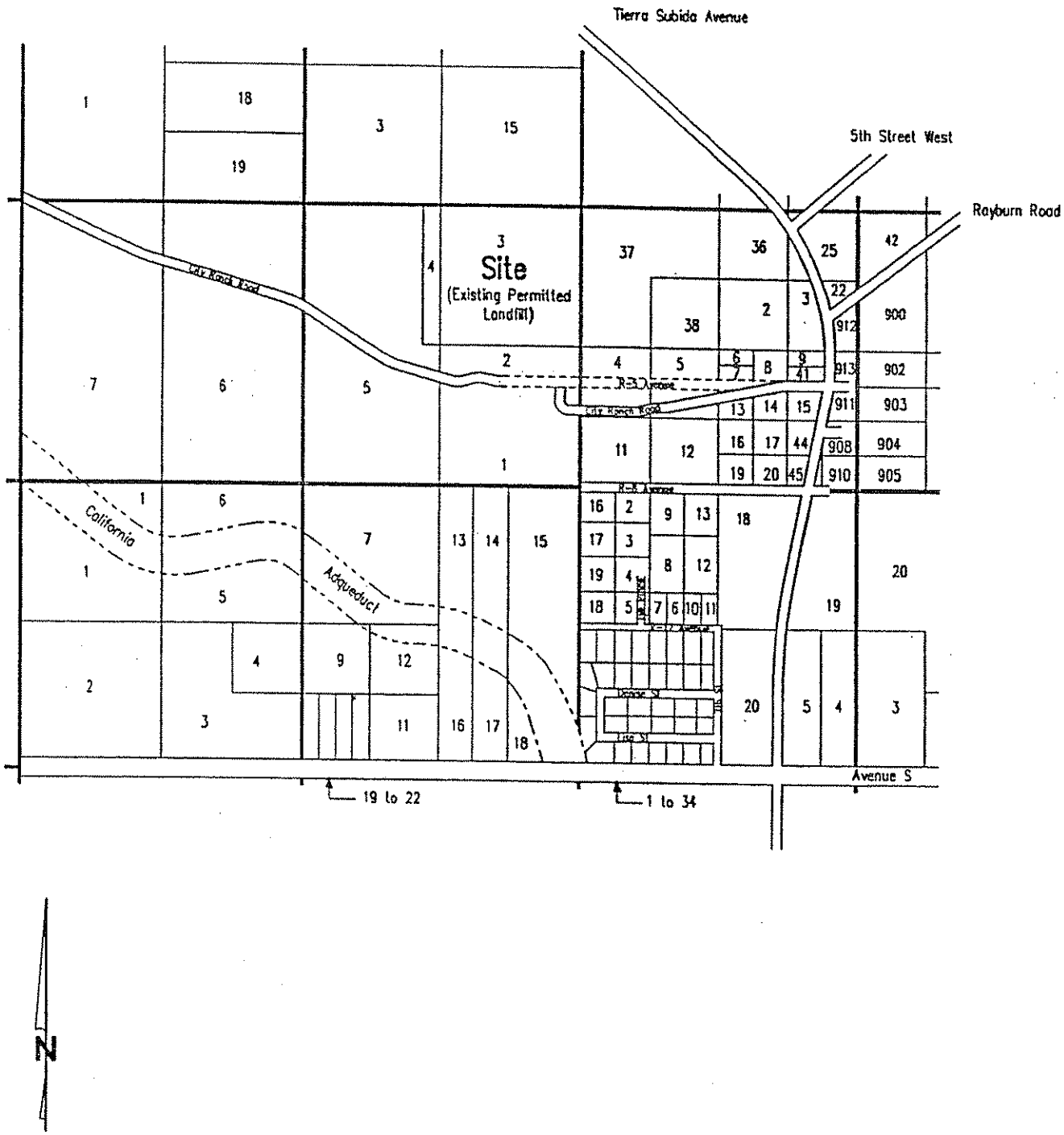
M-4 = Planned Industrial

PF = Public Facility

Kunzman Associates

2051F/11

Figure 12
Lot Numbers

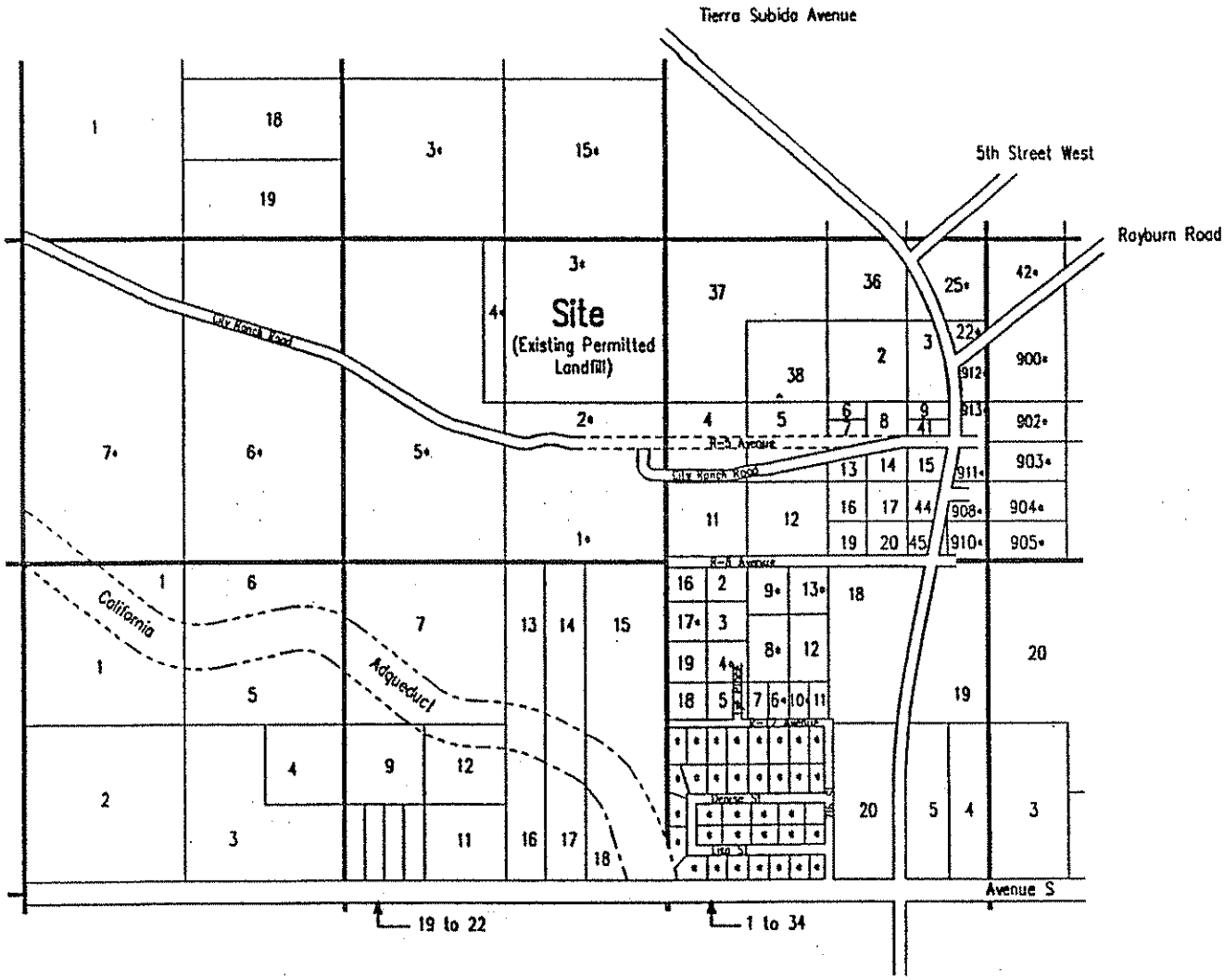


Kunzman Associates

Numbers shown in each parcel are Lot Numbers

2051F/12

Figure 13
Vacant and Occupied Lots



Legend

7 = Vacant Lot
7• = Occupied Lot (Has a structure or is landfill)

N

Kunzman Associates

Numbers shown in each parcel are Lot Numbers

2051F/13

5. Project Traffic

The existing landfill is currently accepting an average of 1,372 tons of material per day. For purposes of this analysis, it was assumed that the project site will increase operations to an average of 3,613 tons per day.

However, the existing landfill also accepts concrete for recycling and/or materials used for daily cover or beneficial use, and when a major inflow of these materials occurs, then the daily tonnage can reach 3,800 tons per day. This peak inflow of concrete or daily cover material is sporadic and lasts for a few days.

For purposes of this analysis, it was assumed that the project site will increase operations to an average of 3,613 tons per day, and a peak of 5,548 tons per day.

Traffic Generation

The traffic generated by the project is determined by multiplying an appropriate trip generation rate by the quantity of land use. Trip generation rates are predicated on the assumption that energy costs, the availability of vehicles to drive, and our life styles remain similar to what we know today. A major change in these variables may affect trip generation rates.

Trip generation rates were determined for daily traffic, morning peak hour inbound and outbound traffic, and evening peak hour inbound and outbound traffic for the proposed land use. Trip generation is documented in Tables 4, 5, and 6.

Table 4 shows actual existing count data for truck loads and tonnage. The data was collected over 51 working days. Table 4 also shows the expected future truck loads and tonnage, as well as the expected change between the existing and future operation. It should be noted that the change in transfer trucks is 71 loads per day, or 142 in plus out trips. These trucks will all use the State Route 14 Freeway. They represent approximately 15 percent of the increase in traffic by the proposed land fill expansion. Also, see Table 1a for a summary of changes in traffic generation.

Table 5 shows data collected on an hourly basis. It shows when the trucks arrive and depart the site, as well as when cars arrive and depart the site. From Table 5 one can determine the peak hour and daily in and out volumes. The peak hour and daily volumes in Table 5 are summarized in Table 6.

Table 6 exhibits the traffic generation rates, project peak hour volumes, and project daily traffic volumes. Per Table 6, the existing landfill is currently generating 416 truck trips per day, 39 and 24 of which occur during the morning and evening peak hours, respectively. In addition, the site is currently generating 210 car trips per day, of which 14 and 36 occur during the morning and evening peak hours, respectively (see Table 6).

The project site is projected to generate in the future on the average a total of approximately 1,324 trips per day (662 in and 662 out), 105 and 85 of which occur during the morning and evening peak hours, respectively (see Table 6).

The landfill expansion is projected to generate on the average approximately 698 new daily vehicle trips, 52 new vehicles per hour will occur during the morning peak hour, and 25 new vehicles per hour will occur during the evening peak hour (see Table 6).

The project site is projected to generate in the future for peak inflow conditions a total of approximately 1,594 trips per day (797 in and 797 out), 124 and 96 of which occur during the morning and evening peak hours, respectively (see Table 6).

The landfill expansion is projected to generate for peak inflow conditions approximately 968 new daily vehicle trips, 71 new vehicles per hour will occur during the morning peak hour, and 36 new vehicles per hour will occur during the evening peak hour (see Table 6).

Traffic Distribution and Assignment

Traffic distribution is the determination of the directional orientation of traffic. It is based on the geographical location of employment centers, commercial centers, recreational areas, or residential area concentrations.

Traffic assignment is the determination of which specific route development traffic will use, once the generalized traffic distribution is determined. The basic factors affecting route selection are minimum time path and minimum distance path.

Figure 14 contains an estimate of the directional distribution and assignment of the existing traffic from the landfill. This estimate is based on information in the previous traffic studies for the landfill and field observations. Traffic from the landfill expansion is expected to have a distribution that is similar to the existing landfill traffic.

Project-Related Traffic

Based on the identified traffic generation and distribution, project related ADT volumes are shown on Figure 15. The project related morning and evening peak hour intersection turning movement volumes are shown on Figures 16 and 17, respectively.

The project traffic is expected to have an average one-way trip length of 5.5 miles for trips originating in the City and 15 miles for trips originating outside of the City. It is approximately 15 miles to Lancaster going north on the State Route 14 Freeway, and approximately 15 miles to the Antelope Valley Air Pollution Control District boundary going south on the State Route 14 Freeway.

Table 4

Truck Traffic For Antelope Valley Landfill

Existing Truck Traffic					
Type	Tons	Loads	Tons/Load	Tons/Day	Loads/Day
Municipal Solid Waste (Com., Res., Ind.)	29,299	7,228	4.05	574	142
Transfer Trailers	16,743	797	21.01	328	16
Recycle (Com., Res., Ind.)	0	0	4.20	0	0
Recycle - Concrete	1,182	264	4.48	23	5
Cover Soil	414	16	25.88	8	1
Contaminated Soil	21,412	856	25.01	420	17
Greenwaste	826	1,189	0.69	16	23
Other Recycling	103	194	0.53	2	4
Total	69,979	10,544		1,372	208

Average Inflow of Material Future Truck Traffic (3,613 tons per day)					
Type	Tons	Loads	Tons/Load	Tons/Day	Loads/Day
Municipal Solid Waste (Com., Res., Ind.)	59,874	14,771	4.05	1174	290
Transfer Trailers	93,093	4,433	21.00	1826	87
Recycle (Com., Res., Ind.)	1,180	281	4.20	20	5
Recycle - Concrete	1,020	228	4.48	20	5
Cover Soil	345	14	25.00	7	1
Contaminated Soil	25,486	1,019	25.00	500	20
Greenwaste	14,095	4,698	3.00	64	21
Other Recycling	102	192	0.53	2	4
Total	195,195	25,636		3,613	432

Difference For Truck Traffic for Average Inflow of Material					
Type	Tons	Loads	Tons/Load	Tons/Day	Loads/Day
Municipal Solid Waste (Com., Res., Ind.)	30,575	7,543	4.05	600	148
Transfer Trailers	76,350	3,636	21.00	1,498	71
Recycle (Com., Res., Ind.)	1,180	281	4.20	20	5
Recycle - Concrete	-162	-36	4.48	-3	0
Cover Soil	-69	-2	25.00	-1	0
Contaminated Soil	4,074	163	25.00	80	3
Greenwaste	13,269	3,509	3.00	48	-2
Other Recycling	-1	-2	0.53	0	0
Total Difference	125,216	15,092		2,241	224

Peak Inflow of Material Future Truck Traffic (5,548 tons per day)					
Type	Tons	Loads	Tons/Load	Tons/Day	Loads/Day
Municipal Solid Waste (Com., Res., Ind.)	59,822	14,771	4.05	1174	290
Transfer Trailers	93,093	4,433	21.00	1826	87
Recycle (Com., Res., Ind.)	1,180	281	4.20	20	5
Recycle - Concrete	1,020	228	4.48	337	75
Cover Soil	357	14	25.00	250	10
Contaminated Soil	25,500	1,019	25.00	1875	75
Greenwaste	14,095	4,698	3.00	64	21
Other Recycling	102	192	0.53	2	4
Total	195,169	25,636		5,548	567

Difference For Peak Inflow of Material Truck Traffic					
Type	Tons	Loads	Tons/Load	Tons/Day	Loads/Day
Municipal Solid Waste (Com., Res., Ind.)	30,523	7,543	4.05	600	148
Transfer Trailers	76,350	3,636	21.00	1,498	71
Recycle (Com., Res., Ind.)	1,180	281	4.20	20	5
Recycle - Concrete	-162	-36	4.48	314	70
Cover Soil	-57	-2	25.00	242	9
Contaminated Soil	4,088	163	25.00	1,455	58
Greenwaste	13,269	3,509	3.00	48	-2
Other Recycling	-1	-2	0.53	0	0
Total Difference	125,190	15,092		4,176	359

Notes:
1.) Existing Measured January 1, 2003 to February 28, 2003 (51 working days).
2.) Future assumes additional 400 tons per day Municipal Solid Waste from Lancaster.
3.) Future assumes 20 tons per day of Greenwaste transferred from Lancaster.
4.) Future assumes 30 tons per day from proposed Palmdale Greenwaste.
5.) The columns labeled "Tons" and "Loads" are for 51 working days.
6.) Because of rounding, some totals may differ by 1 compared to the sum of the components.

Table 5 (Page 1 of 2)

Traffic Schedule For Antelope Valley Landfill - Average Inflow of Material Condition

Existing Traffic Schedule For Antelope Valley Landfill

Time Period	Inbound: Trucks (includes pickups): MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Outbound: Trucks (includes pickups): MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Total Inbound/ Outbound Trucks & Cars
5:00 AM - 6:00 AM	0	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	0	3
6:00 AM - 7:00 AM	3	0	0	0	0	3	5	0	5	8	30	0	3	0	0	33	0	0	0	33	41
7:00 AM - 8:00 AM	3	0	2	0	0	5	27	0	27	32	30	0	4	1	0	35	0	0	0	35	67
8:00 AM - 9:00 AM	10	5	2	0	1	18	0	7	7	25	17	2	2	0	0	21	0	7	7	28	53
9:00 AM - 10:00 AM	10	1	2	1	6	20	0	8	8	28	17	3	2	1	5	28	0	8	8	36	64
10:00 AM - 11:00 AM	19	0	4	0	2	25	0	8	8	33	14	1	2	0	2	19	0	8	8	27	60
11:00 AM -12:00 NOON	15	4	2	1	1	23	0	8	8	31	14	2	4	1	2	23	0	8	8	31	62
12:00 NOON - 1:00 PM	13	1	2	0	5	21	0	8	8	29	7	3	2	0	4	16	0	8	8	24	53
1:00 PM - 2:00 PM	13	0	2	1	1	17	0	8	8	25	7	0	2	1	2	12	0	8	8	20	45
2:00 PM - 3:00 PM	18	4	3	1	1	27	0	8	8	35	3	2	2	0	1	8	3	8	11	19	54
3:00 PM - 4:00 PM	19	1	4	1	3	28	0	8	8	36	3	3	0	1	2	9	5	8	13	22	58
4:00 PM - 5:00 PM	19	0	0	0	2	21	0	7	7	28	0	0	0	0	3	3	22	7	29	32	60
5:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	5	6	6
6:00 PM - 7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
After 8:00 PM	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	142	16	23	5	22	208	35	70	105	313	142	16	23	5	22	208	35	70	105	313	626

Future Traffic Schedule For Antelope Valley Landfill for Average Inflow of Material (3,613 tons per day)

Time Period	Inbound: Trucks (includes pickups): MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Outbound: Trucks (includes pickups): MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Total Inbound/ Outbound Trucks & Cars
5:00 AM - 6:00 AM	0	0	0	0	0	0	65	0	65	65	0	0	0	0	0	0	0	0	0	0	65
6:00 AM - 7:00 AM	5	0	1	0	1	7	25	2	27	34	60	0	2	0	1	63	0	2	2	65	99
7:00 AM - 8:00 AM	6	0	1	0	1	8	42	2	44	52	60	0	3	1	1	65	0	2	2	67	119
8:00 AM - 9:00 AM	21	19	1	0	2	43	0	7	7	50	35	11	1	0	1	48	0	7	7	55	105
9:00 AM - 10:00 AM	21	4	1	1	6	33	0	8	8	41	35	10	1	1	5	52	0	8	8	60	101
10:00 AM - 11:00 AM	39	0	3	0	2	44	0	8	8	52	29	2	1	0	2	34	0	8	8	42	94
11:00 AM -12:00 NOON	29	19	1	1	2	52	0	9	9	61	29	11	3	1	2	46	0	9	9	55	116
12:00 NOON - 1:00 PM	27	4	2	0	5	38	0	9	9	47	15	10	2	0	4	31	0	9	9	40	87
1:00 PM - 2:00 PM	27	0	2	1	1	31	0	9	9	40	15	2	2	1	2	22	0	9	9	31	71
2:00 PM - 3:00 PM	37	19	2	1	1	60	0	9	9	69	6	11	1	0	2	20	20	9	29	49	118
3:00 PM - 4:00 PM	39	4	3	1	3	50	3	8	11	61	6	10	1	1	2	20	35	8	43	63	124
4:00 PM - 5:00 PM	19	0	1	0	2	22	5	8	13	35	0	2	1	0	3	6	35	8	43	49	84
5:00 PM - 6:00 PM	15	10	1	0	1	27	0	4	4	31	0	8	1	0	2	11	39	4	43	54	85
6:00 PM - 7:00 PM	4	8	1	0	1	14	0	4	4	18	0	10	1	0	1	12	3	4	7	19	37
7:00 PM - 8:00 PM	1	0	1	0	1	3	0	3	3	6	0	0	1	0	1	2	0	3	3	5	11
After 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	8	8
Total	290	87	21	5	29	432	140	90	230	662	290	87	21	5	29	432	140	90	230	662	1,324

Difference in Traffic Schedule For Antelope Valley Landfill for Average Inflow of Material (3,613 tons per day)

Time Period	Inbound: Trucks (includes pickups): MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Outbound: Trucks (includes pickups): MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Cars: Employee	Misc.	Total Cars	Total Trucks & Cars	Total Inbound/ Outbound Trucks & Cars
5:00 AM - 6:00 AM	0	0	0	0	0	0	62	0	62	62	0	0	0	0	0	0	0	0	0	0	62
6:00 AM - 7:00 AM	2	0	1	0	1	4	20	2	22	26	30	0	-1	0	1	30	0	2	2	32	58
7:00 AM - 8:00 AM	3	0	-1	0	1	3	15	2	17	20	30	0	-1	0	1	30	0	2	2	32	52
8:00 AM - 9:00 AM	11	14	-1	0	1	25	0	0	0	25	18	9	-1	0	1	27	0	0	0	27	52
9:00 AM - 10:00 AM	11	3	-1	0	0	13	0	0	0	13	18	7	-1	0	0	24	0	0	0	24	37
10:00 AM - 11:00 AM	20	0	-1	0	0	19	0	0	0	19	15	1	-1	0	0	15	0	0	0	15	34
11:00 AM -12:00 NOON	14	15	-1	0	1	29	0	1	1	30	15	9	-1	0	0	23	0	1	1	24	54
12:00 NOON - 1:00 PM	14	3	0	0	0	17	0	1	1	18	8	7	0	0	0	15	0	1	1	16	34
1:00 PM - 2:00 PM	14	0	0	0	0	14	0	1	1	15	8	2	0	0	0	10	0	1	1	11	26
2:00 PM - 3:00 PM	19	15	-1	0	0	33	0	1	1	34	3	9	-1	0	1	12	17	1	18	30	64
3:00 PM - 4:00 PM	20	3	-1	0	0	22	3	0	3	25	3	7	1	0	0	11	30	0	30	41	66
4:00 PM - 5:00 PM	0	0	1	0	0	1	5	1	6	7	0	2	1	0	0	3	13	1	14	17	24
5:00 PM - 6:00 PM	15	10	1	0	1	27	0	4	4	31	0	8	1	0	1	10	34	4	38	48	79
6:00 PM - 7:00 PM	4	8	1	0	1	14	0	4	4	18	0	10	1	0	1	12	3	4	7	19	37
7:00 PM - 8:00 PM	1	0	1	0	1	3	0	3	3	6	0	0	1	0	1	2	0	3	3	5	11
After 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	8	8
Total	148	71	-2	0	7	224	105	20	125	349	148	71	-2	0	7	224	105	20	125	349	698

Table 5 continues on next page

Notes:
1.) MSW[1] = Municipal Solid Waste
2.) Assumes average roundtrips to landfill 3.5 hours.
3.) Other = Contaminated soil, clean soil, recycling, and other included under inbound recycling.
4.) Inbound/Outbound recycling refers to crushed concrete.
5.) Truck count includes commercial vehicles and residential customers (pickup trucks, etc.)
6.) Misc. = Car and pickup trips to pay disposable bill, recycle oil, recycle batteries, etc.
7.) Because of rounding, some totals may differ by 1 compared to the sum of the components.

Table 5 (page 2 of 2)

Traffic Schedule For Antelope Valley Landfill - Peak Inflow of Material Condition

Existing Traffic Schedule For Antelope Valley Landfill

	Inbound										Outbound										Total Inbound/ Outbound Trucks & Cars
	Trucks (includes pickups)						Cars			Total	Trucks (includes pickups)						Cars			Total	
Time Period	MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	
5:00 AM - 6:00 AM	0	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	0	0	0	0	3
6:00 AM - 7:00 AM	3	0	0	0	0	3	5	0	5	8	30	0	3	0	0	33	0	0	0	33	41
7:00 AM - 8:00 AM	3	0	2	0	0	5	27	0	27	32	30	0	4	1	0	35	0	0	0	35	67
8:00 AM - 9:00 AM	10	5	2	0	1	18	0	7	7	25	17	2	2	0	0	21	0	7	7	28	53
9:00 AM - 10:00 AM	10	1	2	1	6	20	0	8	8	28	17	3	2	1	5	28	0	8	8	36	64
10:00 AM - 11:00 AM	19	0	4	0	2	25	0	8	8	33	14	1	2	0	2	19	0	8	8	27	60
11:00 AM -12:00 NOON	15	4	2	1	1	23	0	8	8	31	14	2	4	1	2	23	0	8	8	31	62
12:00 NOON - 1:00 PM	13	1	2	0	5	21	0	8	8	29	7	3	2	0	4	16	0	8	8	24	53
1:00 PM - 2:00 PM	13	0	2	1	1	17	0	8	8	25	7	0	2	1	2	12	0	8	8	20	45
2:00 PM - 3:00 PM	18	4	3	1	1	27	0	8	8	35	3	2	2	0	1	8	3	8	11	19	54
3:00 PM - 4:00 PM	19	1	4	1	3	28	0	8	8	36	3	3	0	1	2	9	5	8	13	22	58
4:00 PM - 5:00 PM	19	0	0	0	2	21	0	7	7	28	0	0	0	0	3	3	22	7	29	32	60
5:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	5	6	6
6:00 PM - 7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
After 8:00 PM	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	142	16	23	5	22	208	35	70	105	313	142	16	23	5	22	208	35	70	105	313	626

Future Traffic Schedule For Antelope Valley Landfill for Peak Inflow of Material (5,548 tons per day)

	Inbound										Outbound										Total Inbound/ Outbound Trucks & Cars
	Trucks (includes pickups)						Cars			Total	Trucks (includes pickups)						Cars			Total	
Time Period	MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	
5:00 AM - 6:00 AM	0	0	0	0	0	0	65	0	65	65	0	0	0	0	0	0	0	0	0	0	65
6:00 AM - 7:00 AM	5	0	1	0	1	7	25	2	27	34	60	0	2	0	1	63	0	2	2	65	99
7:00 AM - 8:00 AM	6	0	1	0	2	9	42	2	44	53	60	0	3	3	2	68	0	2	2	70	123
8:00 AM - 9:00 AM	21	19	1	7	5	53	0	7	7	60	35	11	1	5	5	57	0	7	7	64	124
9:00 AM - 10:00 AM	21	4	1	10	10	46	0	8	8	54	35	10	1	10	10	66	0	8	8	74	128
10:00 AM - 11:00 AM	39	0	3	10	9	61	0	8	8	69	29	2	1	10	9	51	0	8	8	59	128
11:00 AM -12:00 NOON	29	19	1	10	8	67	0	9	9	76	29	11	3	10	8	61	0	9	9	70	146
12:00 NOON - 1:00 PM	27	4	2	10	11	54	0	9	9	63	15	10	2	10	11	48	0	9	9	57	120
1:00 PM - 2:00 PM	27	0	2	10	10	49	0	9	9	58	15	2	2	10	10	39	0	9	9	48	106
2:00 PM - 3:00 PM	37	19	2	10	8	76	0	9	9	85	6	11	1	10	8	36	20	9	29	65	150
3:00 PM - 4:00 PM	39	4	3	8	9	63	3	8	11	74	6	10	1	7	9	33	35	8	43	76	150
4:00 PM - 5:00 PM	19	0	1	0	10	30	5	8	13	43	0	2	1	0	10	13	35	8	43	56	99
5:00 PM - 6:00 PM	15	10	1	0	7	33	0	4	4	37	0	8	1	0	7	16	39	4	43	59	96
6:00 PM - 7:00 PM	4	8	1	0	2	15	0	4	4	19	0	10	1	0	2	13	3	4	7	20	39
7:00 PM - 8:00 PM	1	0	1	0	2	4	0	3	3	7	0	0	1	0	2	3	0	3	3	6	13
After 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	8	8
Total	290	87	21	75	94	567	140	90	230	797	290	87	21	75	94	567	140	90	230	797	1,594

Difference In Traffic Schedule For Antelope Valley Landfill for Peak Inflow of Material (5,548 tons per day)

	Inbound										Outbound										Total Inbound/ Outbound Trucks & Cars
	Trucks (includes pickups)						Cars			Total	Trucks (includes pickups)						Cars			Total	
Time Period	MSW[1]	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	MSW	Transfer	G/W	Recycle/ Concrete	Other	Total Trucks	Employee	Misc.	Total Cars	Trucks & Cars	
5:00 AM - 6:00 AM	0	0	0	0	0	0	62	0	62	62	0	0	0	0	0	0	0	0	0	0	62
6:00 AM - 7:00 AM	2	0	1	0	1	4	20	2	22	26	30	0	-1	0	1	30	0	2	2	32	58
7:00 AM - 8:00 AM	3	0	-1	0	2	4	15	2	17	21	30	0	-1	2	2	33	0	2	2	35	56
8:00 AM - 9:00 AM	11	14	-1	7	4	35	0	0	0	35	18	9	-1	5	5	36	0	0	0	36	71
9:00 AM - 10:00 AM	11	3	-1	9	4	26	0	0	0	26	18	7	-1	9	5	38	0	0	0	38	64
10:00 AM - 11:00 AM	20	0	-1	10	7	36	0	0	0	36	15	1	-1	10	7	32	0	0	0	32	68
11:00 AM -12:00 NOON	14	15	-1	9	7	44	0	1	1	45	15	9	-1	9	6	38	0	1	1	39	84
12:00 NOON - 1:00 PM	14	3	0	10	6	33	0	1	1	34	8	7	0	10	7	32	0	1	1	33	67
1:00 PM - 2:00 PM	14	0	0	9	9	32	0	1	1	33	8	2	0	9	8	27	0	1	1	28	61
2:00 PM - 3:00 PM	19	15	-1	9	7	49	0	1	1	50	3	9	-1	10	7	28	17	1	18	46	96
3:00 PM - 4:00 PM	20	3	-1	7	6	35	3	0	3	38	3	7	1	6	7	24	30	0	30	54	92
4:00 PM - 5:00 PM	0	0	1	0	8	9	5	1	6	15	0	2	1	0	7	10	13	1	14	24	39
5:00 PM - 6:00 PM	15	10	1	0	7	33	0	4	4	37	0	8	1	0	6	15	34	4	38	53	90
6:00 PM - 7:00 PM	4	8	1	0	2	15	0	4	4	19	0	10	1	0	2	13	3	4	7	20	39
7:00 PM - 8:00 PM	1	0	1	0	2	4	0	3	3	7	0	0	1	0	2	3	0	3	3	6	13
After 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8	8	8
Total	148	71	-2	70	72	359	105	20	125	484	148	71	-2	70	72	359	105	20	125	484	968

Notes:

1.) MSW[1] = Municipal Solid Waste
2.) Assumes average roundtrips to landfill 3.5 hours.
3.) Other = Contaminated soil, clean soil, recycling, and other included under inbound recycling.
4.) Inbound/Outbound recycling refers to crushed concrete.
5.) Truck count includes commercial vehicles and residential customers (pickup trucks, etc.)
6.) Misc. = Car and pickup trips to pay disposable bill, recycle oil, recycle batteries, etc.
7.) Because of rounding, some totals may differ by 1 compared to the sum of the components.

Table 6
Project Traffic Generation

Average Inflow Of Material (3,613 ons per day)							
	Existing Average Volume (1,372 Tons/Day)			Future Average Volume (3,613 Tons/Day)			
Time Period	Trucks	Cars	Total	Trucks	Cars	Total	Difference
Morning Peak Hour (8:00 AM - 9:00 AM)							
Inbound	18	7	25	43	7	50	25
Outbound	21	7	28	48	7	55	27
Total	39	14	53	91	14	105	52
Evening Peak Hour (5:00 PM - 6:00 PM)							
Inbound	21	7	28	27	4	31	3
Outbound	3	29	32	11	43	54	22
Total	24	36	60	38	47	85	25
Daily	416	210	626	864	460	1,324	698

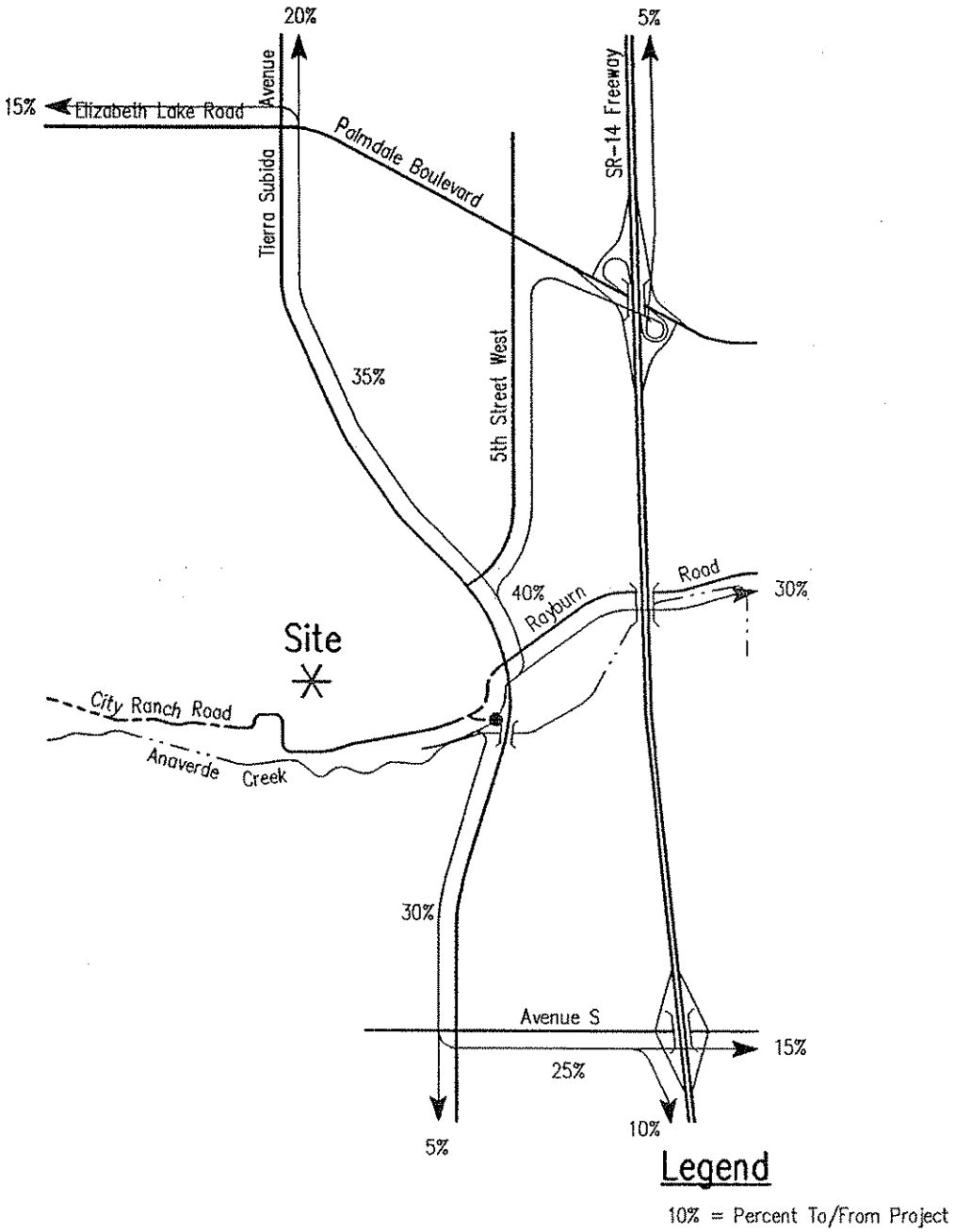
Peak Inflow Of Material (5,548 tons per day)							
	Existing Average Volume (1,372 Tons/Day)			Future Peak Volume (5,548 Tons/Day)			
Time Period	Trucks	Cars	Total	Trucks	Cars	Total	Difference
Morning Peak Hour (8:00 AM - 9:00 AM)							
Inbound	18	7	25	53	7	60	35
Outbound	21	7	28	57	7	64	36
Total	39	14	53	110	14	124	71
Evening Peak Hour (5:00 PM - 6:00 PM)							
Inbound	21	7	28	33	4	37	9
Outbound	3	29	32	16	43	59	27
Total	24	36	60	49	47	96	36
Daily	416	210	626	1,134	460	1,594	968

Permitted Peak to Future Peak Comparison							
	Permitted Peak Volume (3,564 Tons/Day)			Future Peak Volume (5,548 Tons/Day)			
Time Period	Trucks	Cars	Total	Trucks	Cars	Total	Total Difference
Daily	1,100	360	1,460	1,134	460	1,594	134

The truck tonnage capacities have changed since the 1993 CUP aapproval. Today, trucks can accommodate a larger tonnage than in 1993; therefore, less trucks are required today for the same tonnage.

Because of rounding, some totals may differ by 1 compared to the sum of the componentns.

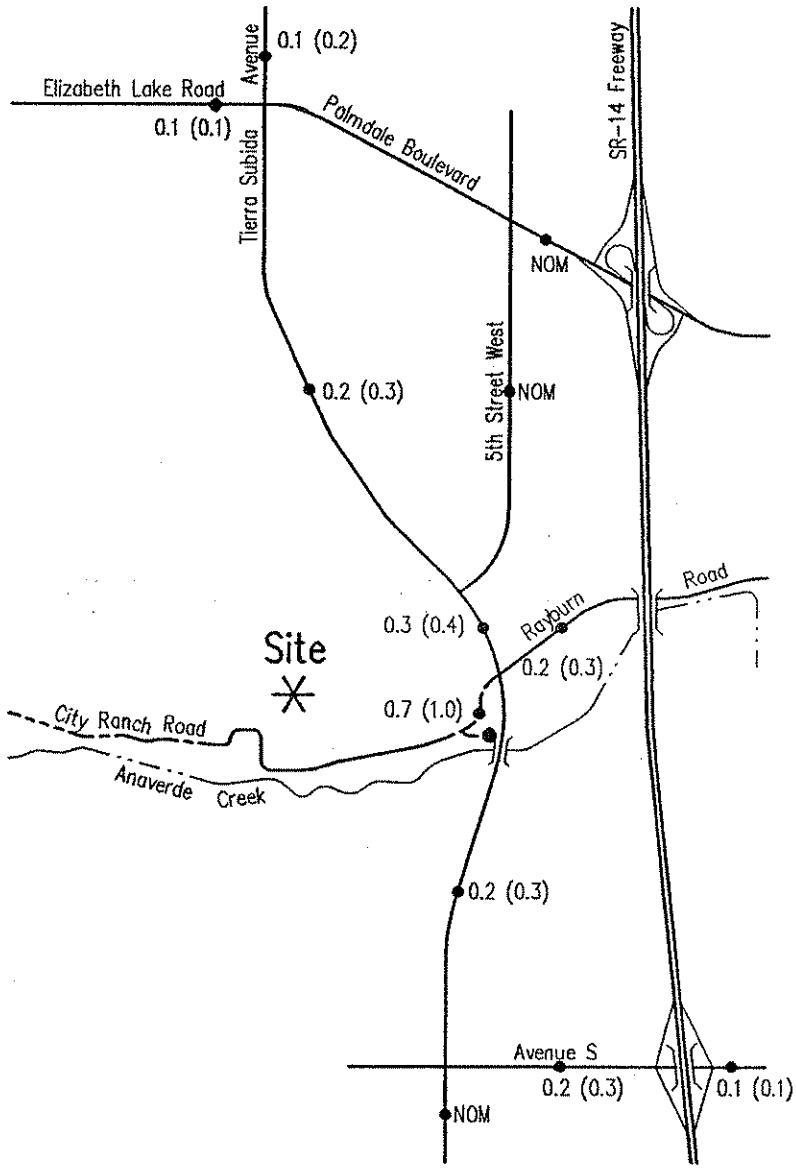
Figure 14
Project Traffic Distribution



Kunzman Associates

2051G/14

Figure 15
Project Average Daily Traffic (ADT) Volumes



Legend

0.1 (0.1) = Vehicles Per Day (1000's) for Average and Peak Inflow of Material

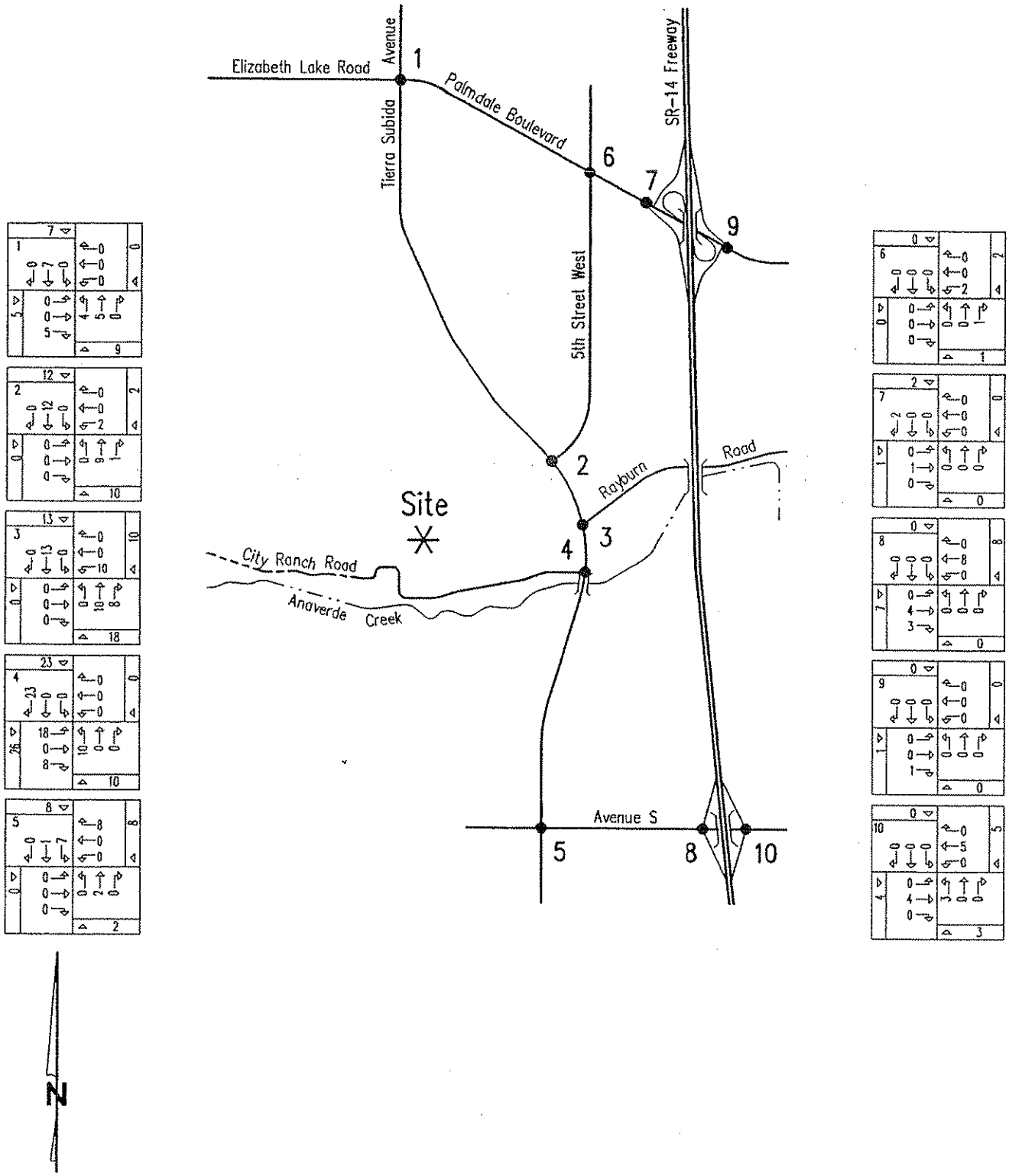
NOM = Nominal, Less Than 50 Vehicles Per Day

N

Kunzman Associates

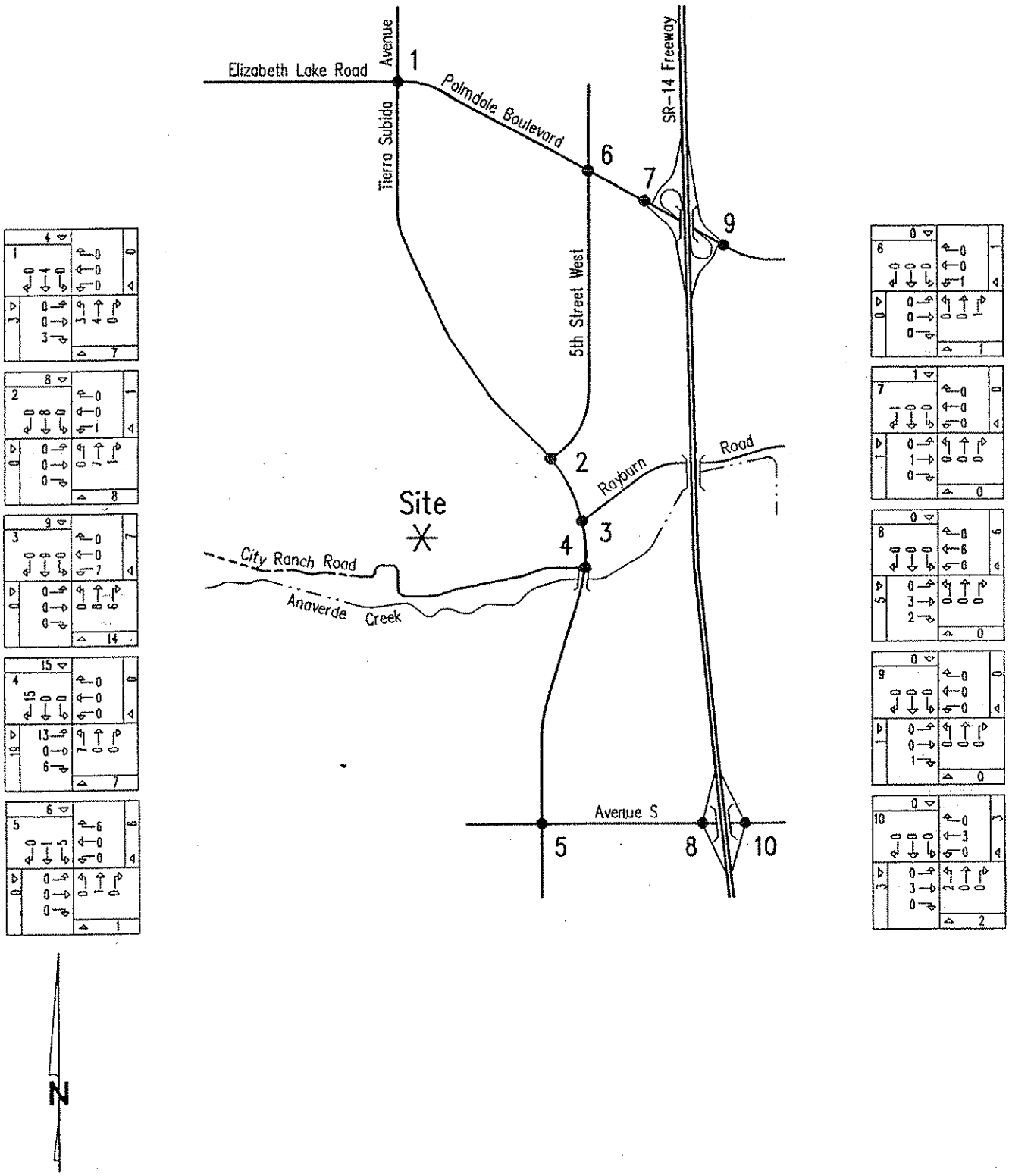
2051G/15

Figure 16
Project Morning Peak Hour Intersection Turning Movement Volumes



Kunzman Associates Intersection reference numbers are in upper left corner of turning movement boxes. 2051F/bbas

Figure 17
Project Evening Peak Hour Intersection Turning Movement Volumes



Kunzman Associates Intersection reference numbers are in upper left corner of turning movement boxes. 2051F/bbas

6. Existing Plus Project Traffic Conditions

Once the project-related traffic is assigned to the existing street network and added to existing volumes, the traffic impact can be assessed. Figures 18 to 21 illustrate the existing plus project traffic conditions.

Existing Plus Project Average Daily Traffic (ADT) Volumes

With the landfill expansion, the existing plus project ADT volumes are as illustrated on Figure 18.

Existing Plus Project Volume to Capacity Ratios

For existing plus project traffic conditions, daily volume to capacity ratios have been calculated and are as shown on Figure 19. Daily volume to capacity ratios are based on City of Palmdale roadway capacities depicted in Table 2. For existing plus project traffic conditions, the roadway links in the vicinity of the site are projected to continue to operate within acceptable Levels of Service.

Existing Plus Project Intersection Capacity Utilization (ICU)

The technique used to assess the operation of an intersection is known as Intersection Capacity Utilization (ICU). To calculate an ICU value the volume of traffic using the intersection is compared with the capacity of the intersection. An ICU value is usually expressed as a percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

The ICU's for the existing plus project traffic conditions have been calculated and are shown in Table 7. Existing plus project morning and evening peak hour turning movement volumes are shown on Figures 20 and 21, respectively.

For existing plus project traffic conditions, the intersections in the vicinity of the site are projected to continue to operate at Level of Service B or better during the peak hours. Existing plus project ICU worksheets are provided in Appendix C.

Table 7

Existing Plus Project Intersection Capacity Utilization (ICU) and Level of Service (LOS)

Average Inflow of Material (3,613 tons per day)																
		Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
	Traffic	Northbound			Southbound			Eastbound			Westbound				
Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	52.2-A	67.1-B
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	40.6-A	49.4-A
Rayburn Road (EW)	TS	1	1	1	1	1	1	1	1	0	1	1	0	52.5-A	64.1-B
City Ranch Road (EW)	CSS	0	1	0	1	1	0	0	0	0	1	0	1	27.6-A	42.7-A
Avenue S (EW)	TS	0	1	0	0	1	0	0	1	0	0	1	0	41.3-A	56.4-A
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	30.0-A	51.7-A
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	36.6-A	67.3-B
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	46.2-A	49.0-A
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	26.9-A	44.0-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	30.4-A	41.5-A

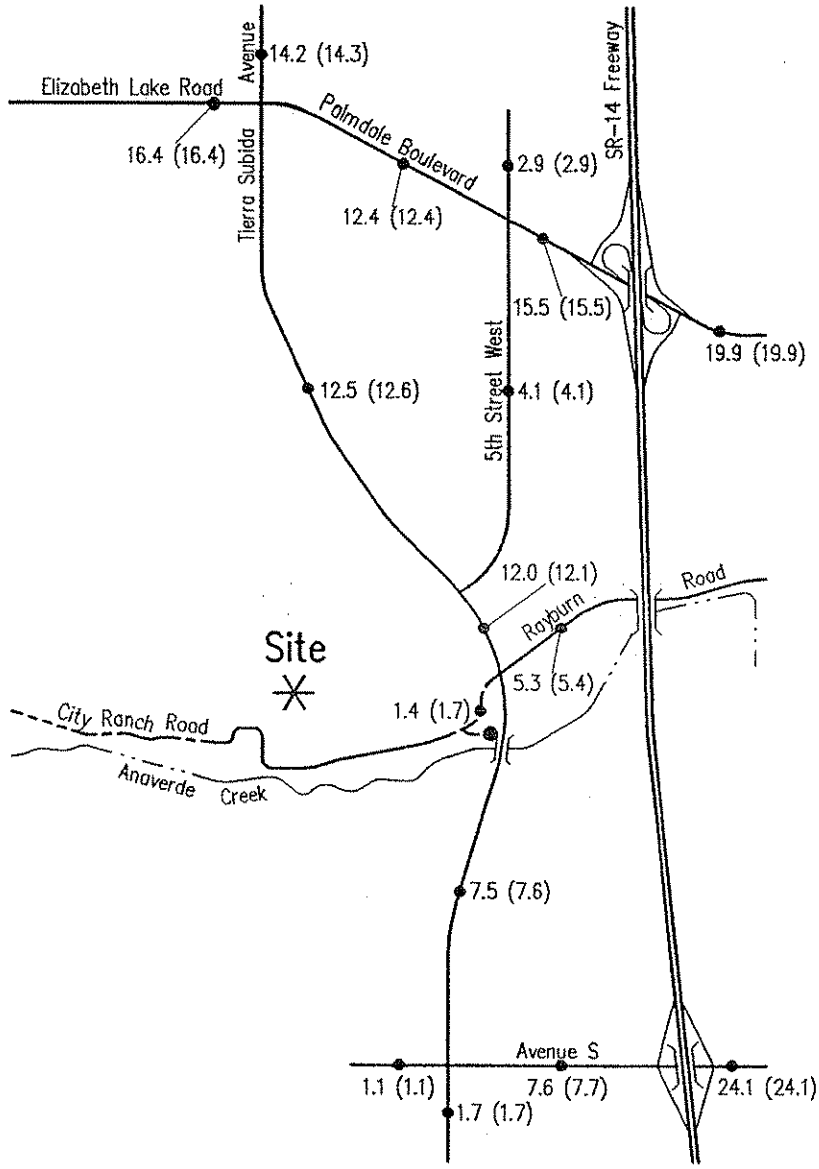
Peak Inflow of Material (5,548 tons per day)																
		Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
	Traffic	Northbound			Southbound			Eastbound			Westbound				
Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	52.3-A	67.2-B
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	40.9-A	49.4-A
Rayburn Road (EW)	TS	1	1	1	1	1	1	1	1	0	1	1	0	52.8-A	64.3-B
City Ranch Road (EW)	CSS	0	1	0	1	1	0	0	0	0	1	0	1	27.8-A	42.8-A
Avenue S (EW)	TS	0	1	0	0	1	0	0	1	0	0	1	0	41.7-A	56.5-A
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	30.2-A	51.7-A
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	36.6-A	67.3-B
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	46.3-A	49.1-A
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	26.9-A	44.0-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	30.4-A	41.6-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; >> = Free Right Turn; 1 = Improvement

[2] ICU-LOS = Intersection Capacity Utilization - Level of Service

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

Figure 18
Existing Plus Project Average Daily Traffic (ADT) Volumes



Legend

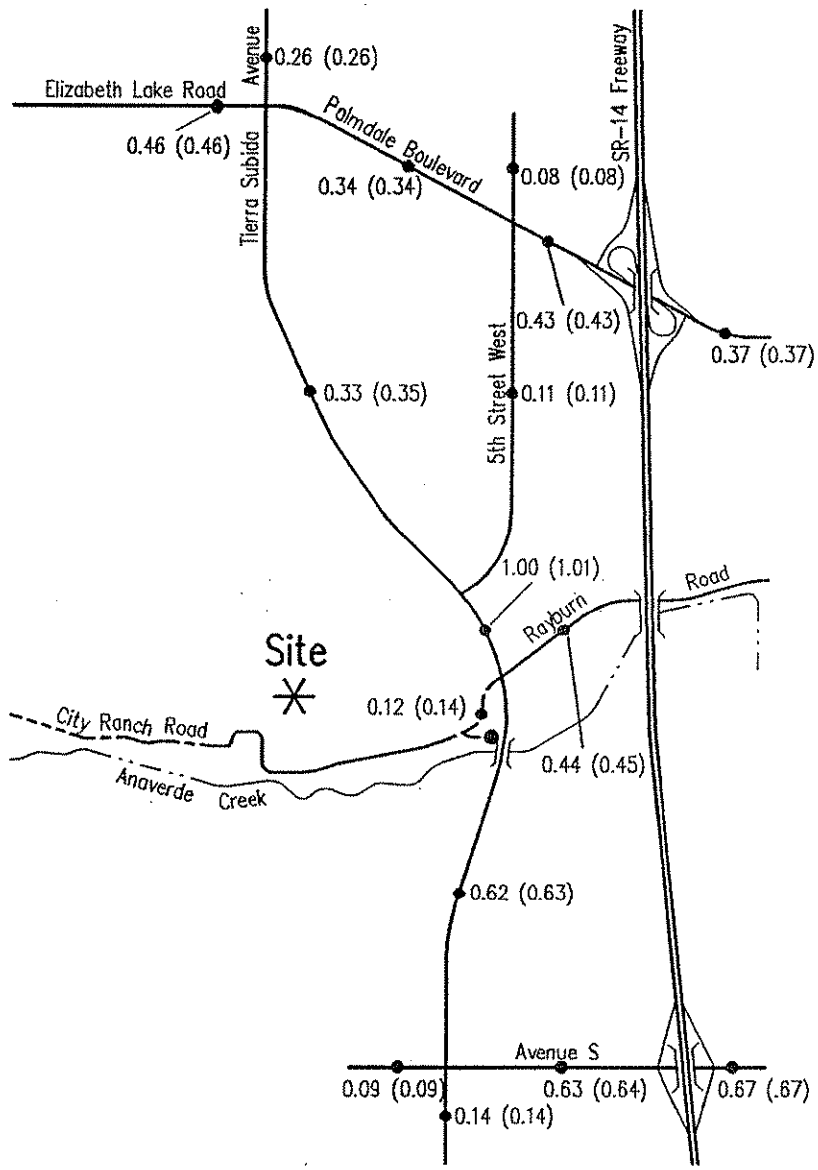
1.7 (1.7) = Vehicles Per Day (1000's) for Average and Peak Inflow of Material

N

Kunzman Associates

2051H/18

Figure 19
Existing Plus Project Volume to Capacity Ratios



Legend

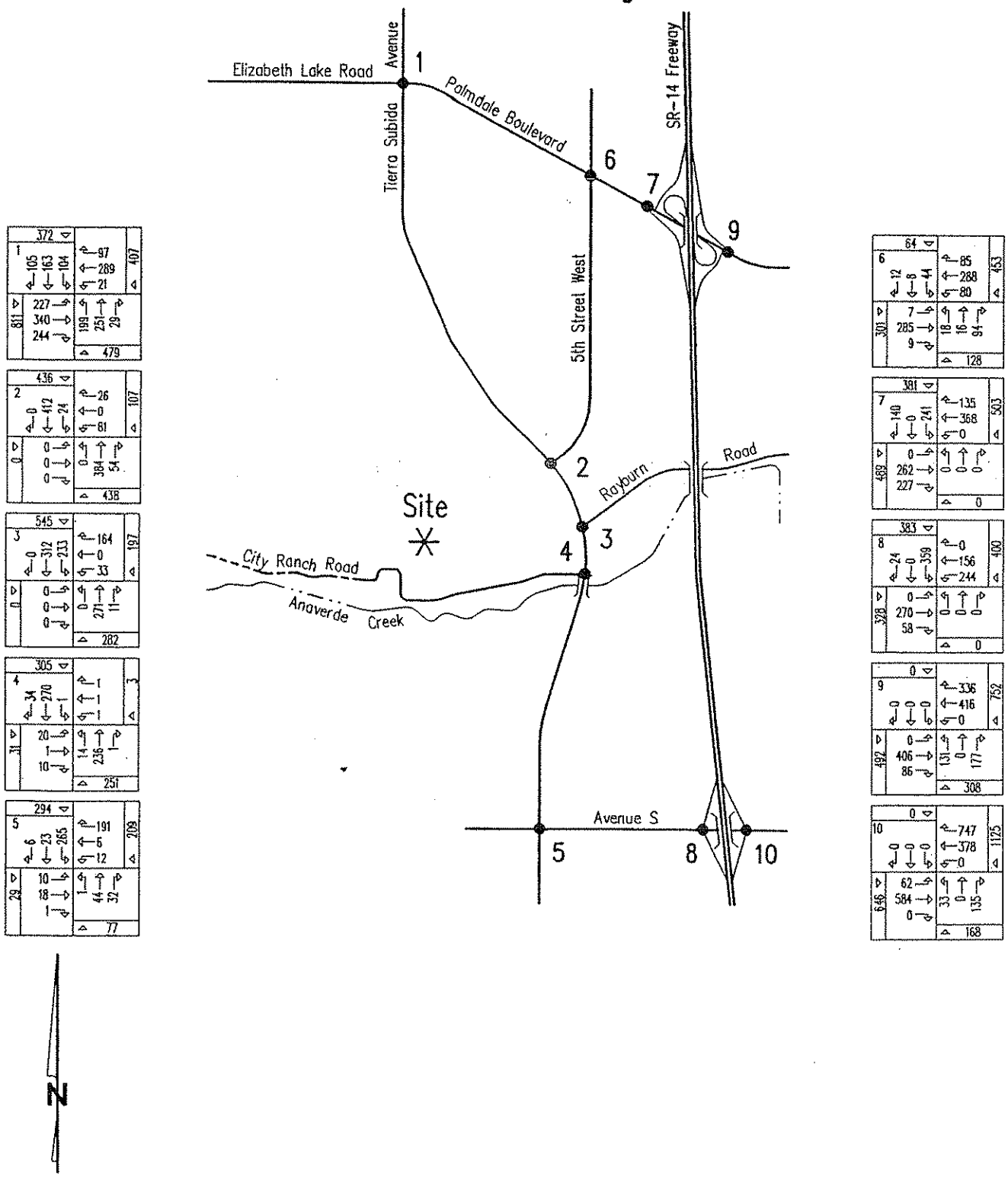
0.14 (0.14) = Volume to Capacity Ratio for Average and Peak Inflow of Material

N

Kunzman Associates

2051G/19

Figure 20
Existing Plus Project
Morning Peak Hour Intersection Turning Movement Volumes

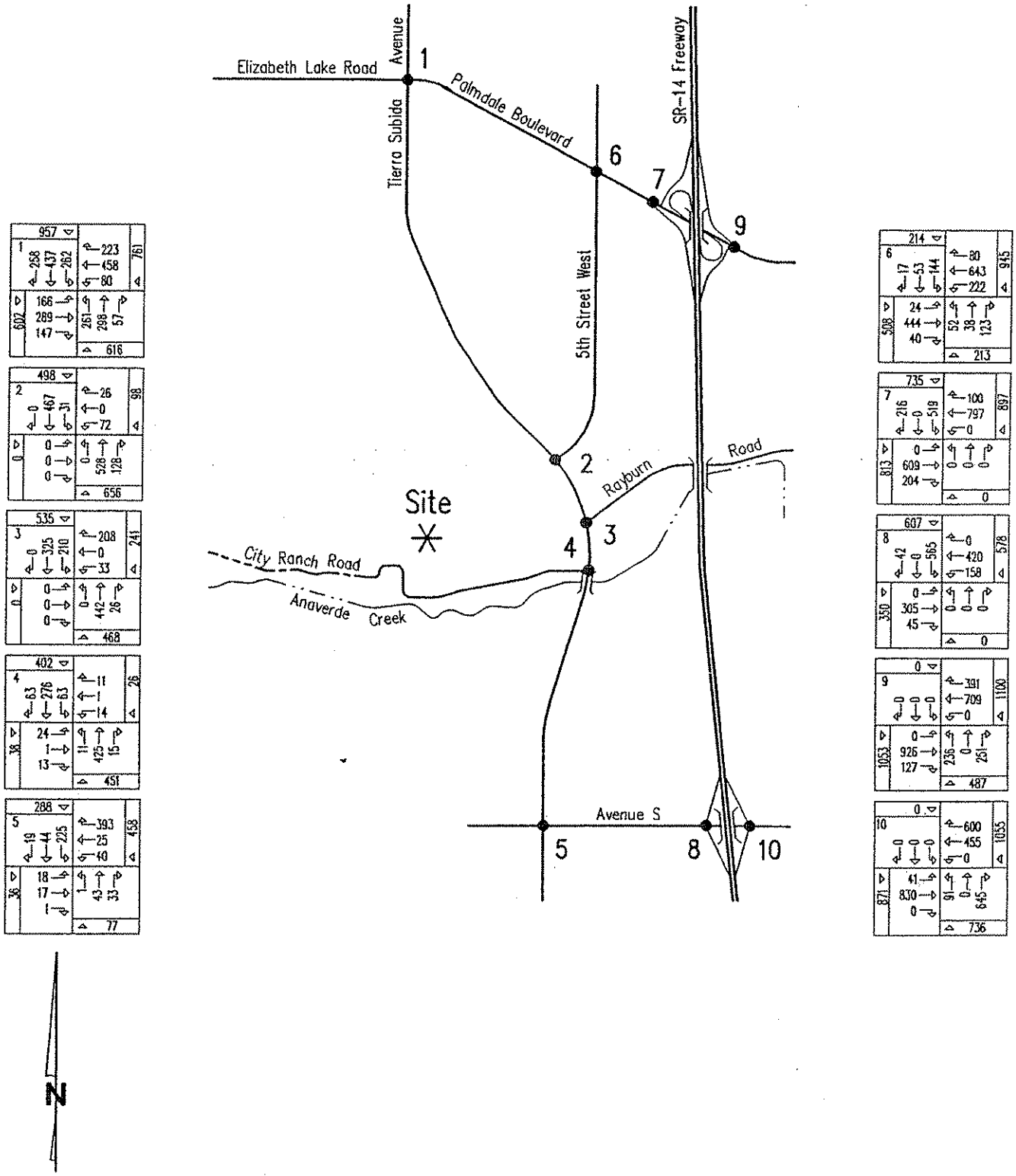


Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/bbas

Figure 21
Existing Plus Project
Evening Peak Hour Intersection Turning Movement Volumes



Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/bbas

7. Year 2007 Traffic Conditions

In this section, Year 2007 traffic conditions without and with the project are discussed. Figures 22 to 31 show the Year 2007 traffic conditions.

Method of Projection

To account for areawide growth on roadways, Year 2007 traffic volumes have been calculated based on a 6.0 percent annual growth rate of existing traffic volumes over a 5 year period. The Los Angeles County Congestion Management Plan calls for an annual growth rate of 0.6 percent for North County, which is the area encompassing the Lancaster / Palmdale and is northeast of the San Fernando Valley. For this study, 6.0 percent was assumed.

Areawide growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the project.

Year 2007 Average Daily Traffic (ADT) Volumes

Year 2007 without project ADT volumes are depicted on Figure 22 and the Year 2007 with project ADT volumes are as illustrated on Figure 23.

Year 2007 Volume to Capacity Ratios

For Year 2007 without and with project traffic conditions, daily volume to capacity ratios have been calculated and are as shown on Figures 24 and 25. Daily volume to capacity ratios are based on City of Palmdale roadway capacities depicted in Table 2. For Year 2007 without project and with project traffic conditions, most of the roadway links in the vicinity of the site are projected to operate within acceptable Levels of Service, except for Tierra Subida Avenue between 5th Street West and Rayburn Road. This cumulative impact condition will remain until Tierra Subida is widened to its ultimate General Plan designation. Implementation of the proposed mitigation/recommendations will reduce the project's contribution to the this unacceptable Level of Service.

Year 2007 Intersection Capacity Utilization (ICU)

The technique used to assess the operation of an intersection is known as Intersection Capacity Utilization (ICU). To calculate an ICU value the volume of traffic using the intersection is compared with the capacity of the intersection. An ICU value is usually expressed as a percent. The percent represents that portion

of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

The ICU's for the Year 2007 without project traffic conditions have been calculated and are shown in Table 8. Year 2007 without project morning and evening peak hour turning movement volumes are shown on Figures 26 and 27, respectively.

For Year 2007 without project traffic conditions, the intersections in the vicinity of the site are projected to operate at Level of Service D or better during the peak hours. Year 2007 without project ICU worksheets are provided in Appendix C.

The ICU's for the Year 2007 with project traffic conditions have been calculated and are shown in Table 9. Year 2007 with project morning and evening peak hour turning movement volumes are shown on Figures 28 and 29, respectively.

For Year 2007 with project traffic conditions, the intersections in the vicinity of the site are projected to operate at Level of Service D or better during the peak hours. Year 2007 with project ICU worksheets are provided in Appendix C.

Table 8

Year 2007 Without Project Intersection Capacity Utilization (ICU) and Level of Service (LOS)

Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
		Northbound			Southbound			Eastbound			Westbound				
		L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	66.2-B	86.3-D
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	50.1-A	62.1-B
Rayburn Road (EW)	TS	1	1	1	1	1	1	1	1	0	1	1	0	65.2-B	81.7-D
City Ranch Road (EW)	CSS	0	1	0	1	1	0	0	0	0	1	0	1	33.0-A	53.8-A
Avenue S (EW)	TS	0	1	0	0	1	0	0	1	0	0	1	0	50.8-A	71.5-C
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	36.7-A	65.9-B
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	45.6-A	86.9-D
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	58.2-A	62.1-B
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	32.6-A	55.7-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	36.8-A	52.1-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; >> = Free Right Turn; 1 = Improvement

[2] ICU-LOS = Intersection Capacity Utilization - Level of Service

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

Table 9

Year 2007 With Project Intersection Capacity Utilization (ICU) and Level of Service (LOS)

Average Inflow of Material (3,613 tons per day)															
		Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
	Traffic	Northbound			Southbound			Eastbound			Westbound				
Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	66.5-B	86.5-D
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	50.8-A	62.6-B
Rayburn Road (EW)	TS	1	1	1	1	1	1	1	1	0	1	1	0	66.4-B	82.3-D
City Ranch Road (EW)	CSS	0	1	0	1	1	0	0	0	0	1	0	1	33.5-A	53.8-A
Avenue S (EW)	TS	0	1	0	0	1	0	0	1	0	0	1	0	51.7-A	72.0-C
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	36.8-A	65.9-B
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	45.6-A	86.9-D
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	58.4-A	62.2-B
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	32.6-A	55.7-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	37.1-A	52.2-A

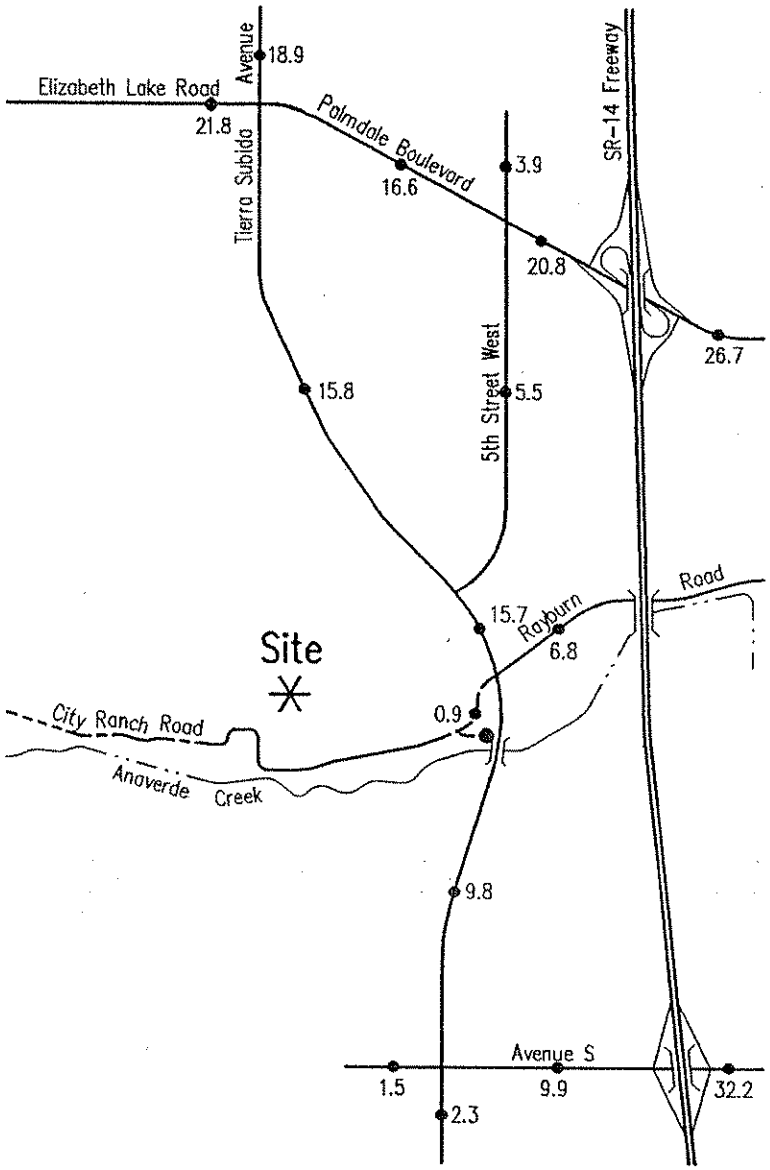
Peak Inflow of Material (5,548 tons per day)															
		Intersection Approach Lanes[1]												Peak Hour ICU-LOS[2]	
	Traffic	Northbound			Southbound			Eastbound			Westbound				
Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	Morning	Evening
Tierra Subida Avenue (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	66.5-B	86.6-D
5th Street West (EW)	CSS	0	1	1	1	1	0	0	0	0	1	0	1	51.0-A	62.7-B
Rayburn Road (EW)	TS	1	1	1	1	1	1	1	1	0	1	1	0	66.8-B	82.5-D
City Ranch Road (EW)	CSS	0	1	0	1	1	0	0	0	0	1	0	1	33.7-A	54.0-A
Avenue S (EW)	TS	0	1	0	0	1	0	0	1	0	0	1	0	52.0-A	72.1-C
5th Street West (NS) at:															
Palmdale Boulevard (EW)	TS	1	2	0	1	2	1	1	2	1	1	2	1	36.9-A	65.9-B
SR-14 Freeway SB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	0	0	0	1	0	1>>	0	2	1>>	0	2	1>>	45.6-A	86.9-D
Avenue S (EW)	TS	0	0	0	2	0	1	0	2	1>>	1	2	0	58.4-A	62.3B
SR-14 Freeway NB Ramps (NS) at:															
Palmdale Boulevard (EW)	TS	1	0	1>>	0	0	0	0	3	1>>	0	3	1>>	32.6-A	55.7-A
Avenue S (EW)	TS	1	0	1>>	0	0	0	1	2	0	0	2	1>>	37.2-A	52.3-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; >> = Free Right Turn; 1 = Improvement

[2] ICU-LOS = Intersection Capacity Utilization - Level of Service

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

Figure 22
Year 2007 Without Project Average Daily Traffic (ADT) Volumes



Legend

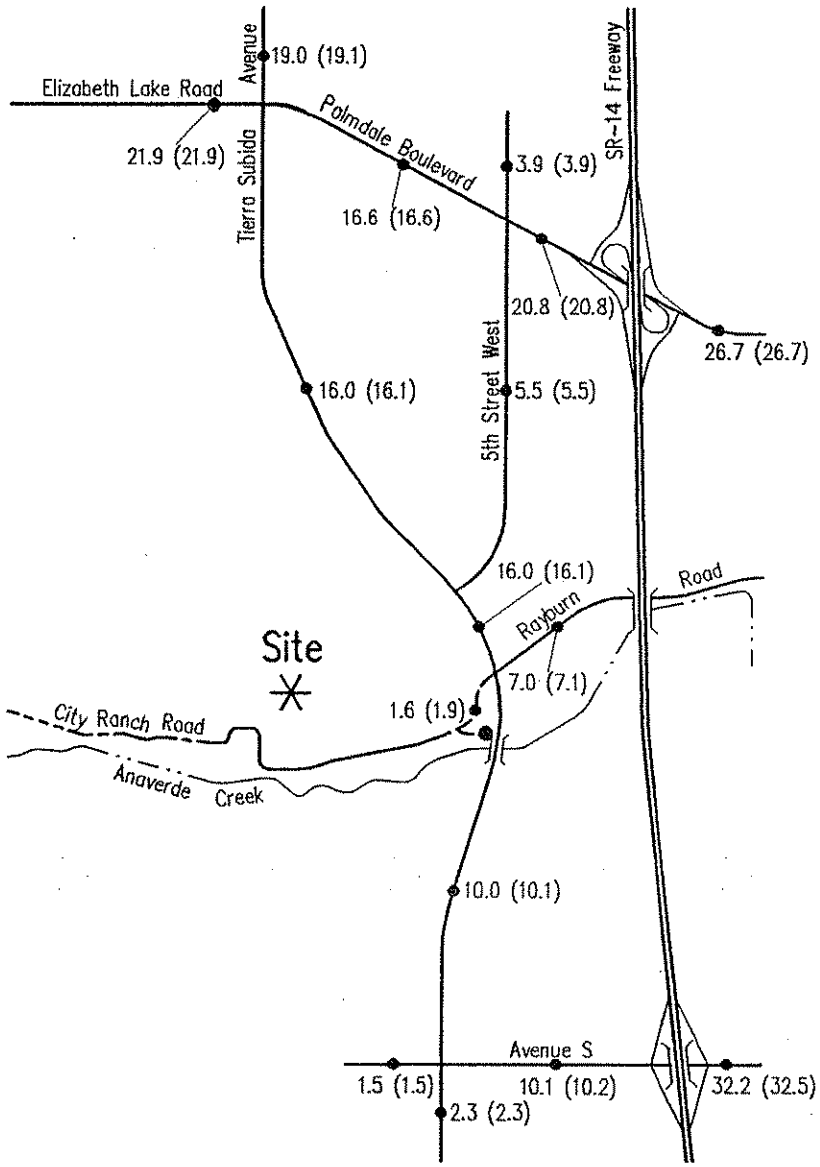
2.3 = Vehicles Per Day (1000's)

N

Kunzman Associates

2051G/22

Figure 23
Year 2007 With Project Average Daily Traffic (ADT) Volumes



Legend

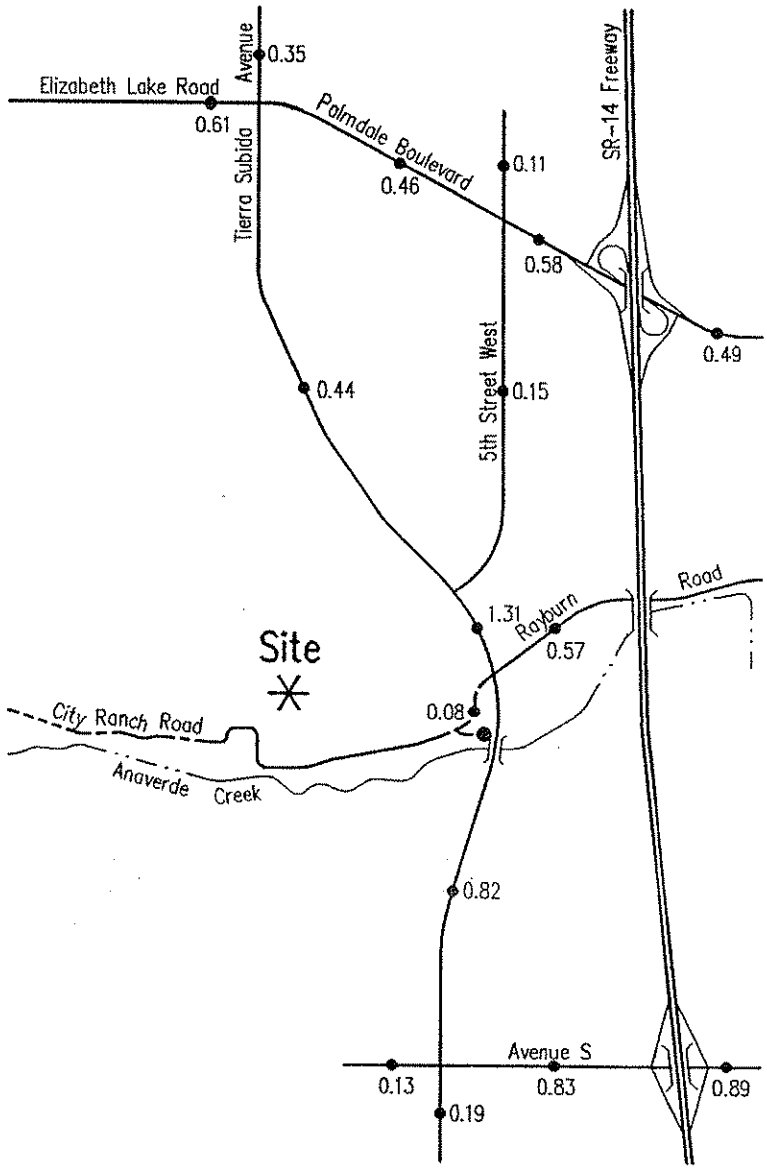
2.3 (2.5) = Vehicles Per Day (1000's) for Average and Peak Inflow of Material

N

Kunzman Associates

2051H/23

Figure 24
Year 2007 Without Project Volume to Capacity Ratios



Legend

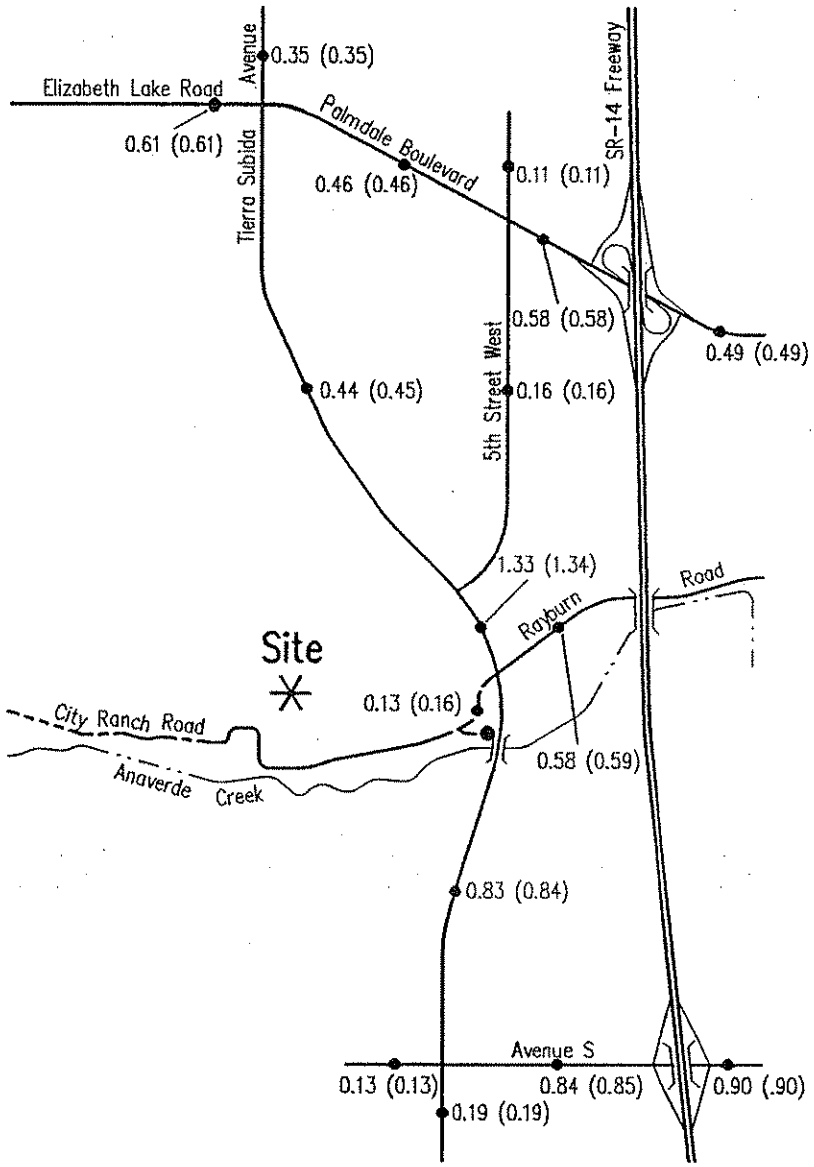
0.19 = Volume To Capacity Ratio

N

Kunzman Associates

2051G/24

Figure 25
Year 2007 With Project Volume to Capacity Ratios



Legend

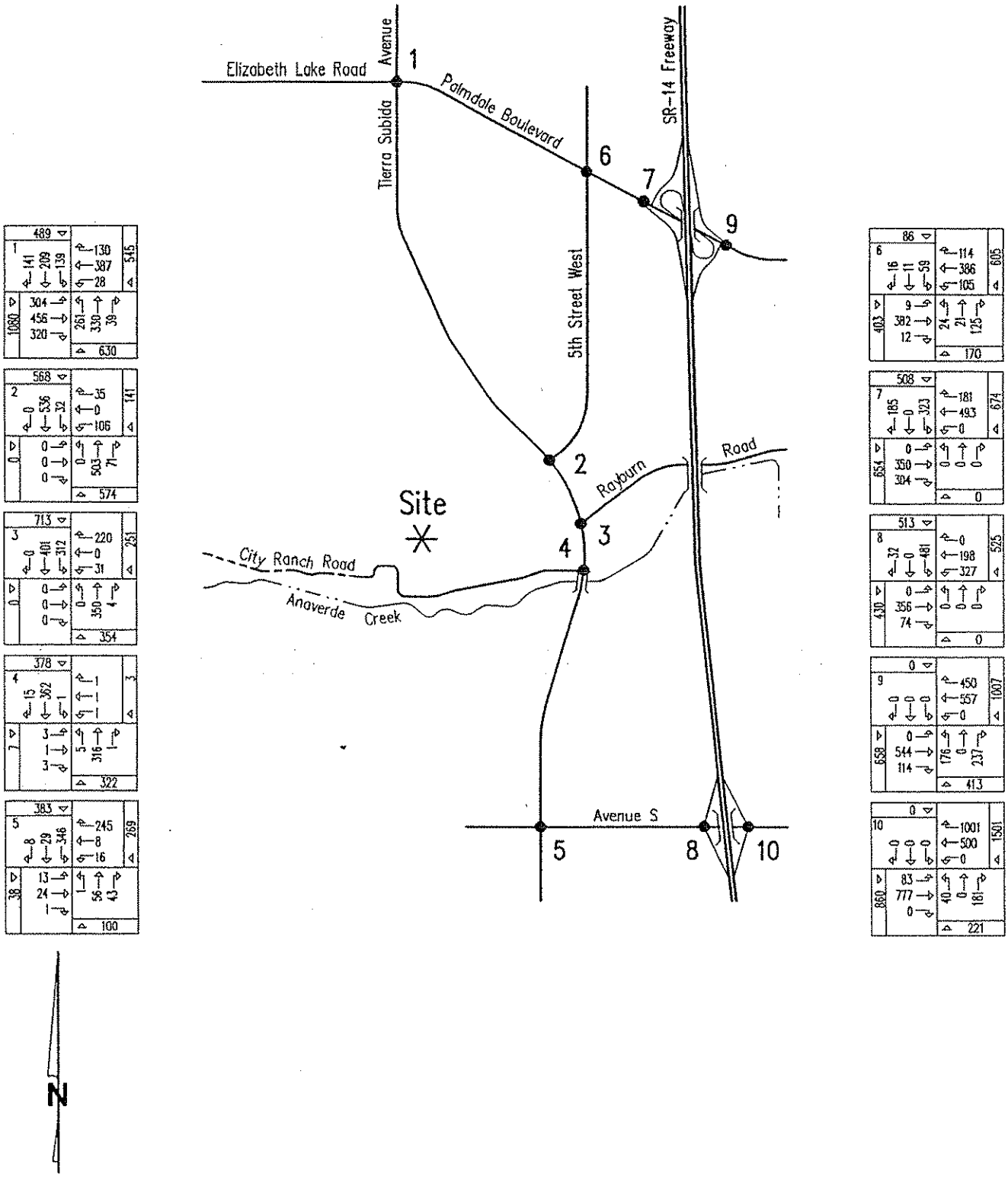
0.19 (0.19) = Volume to Capacity Ratio for Average and Peak Inflow of Material

N

Kunzman Associates

2051G/25

Figure 26
Year 2007 Without Project
Morning Peak Hour Intersection Turning Movement Volumes

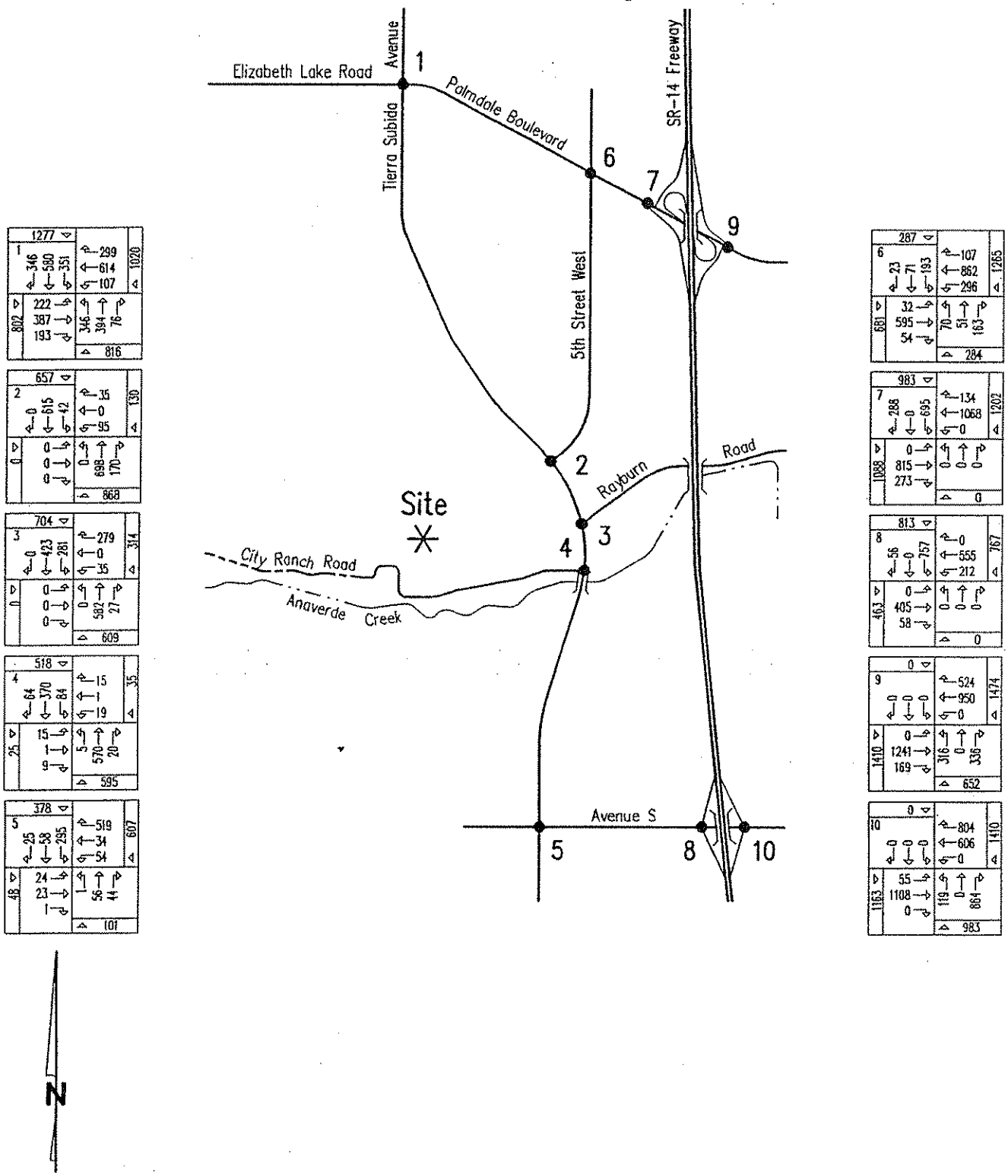


Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/bbas

Figure 27
Year 2007 Without Project
Morning Peak Hour Intersection Turning Movement Volumes

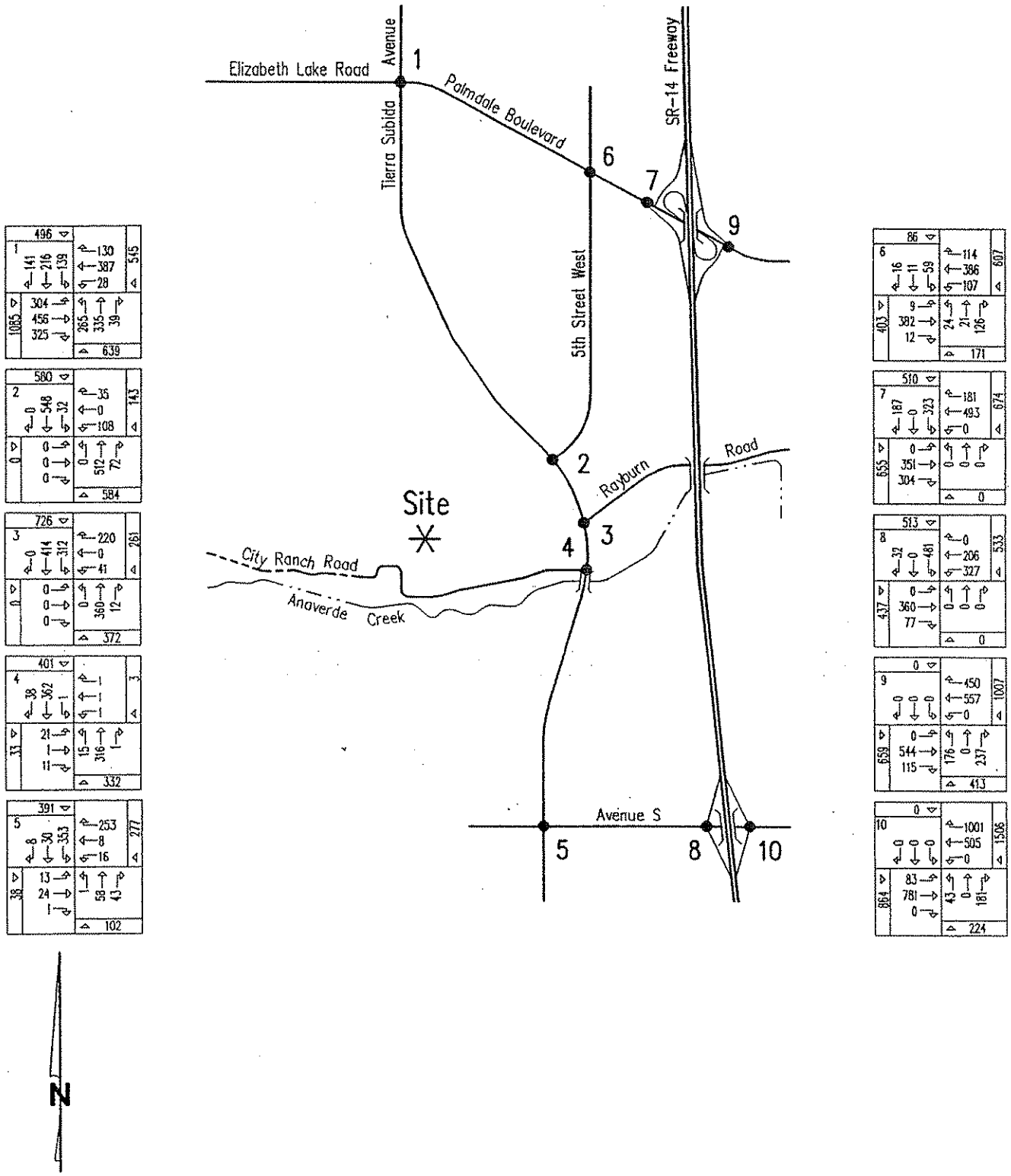


Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/bbas

Figure 28
Year 2007 With Project
Morning Peak Hour Intersection Turning Movement Volumes

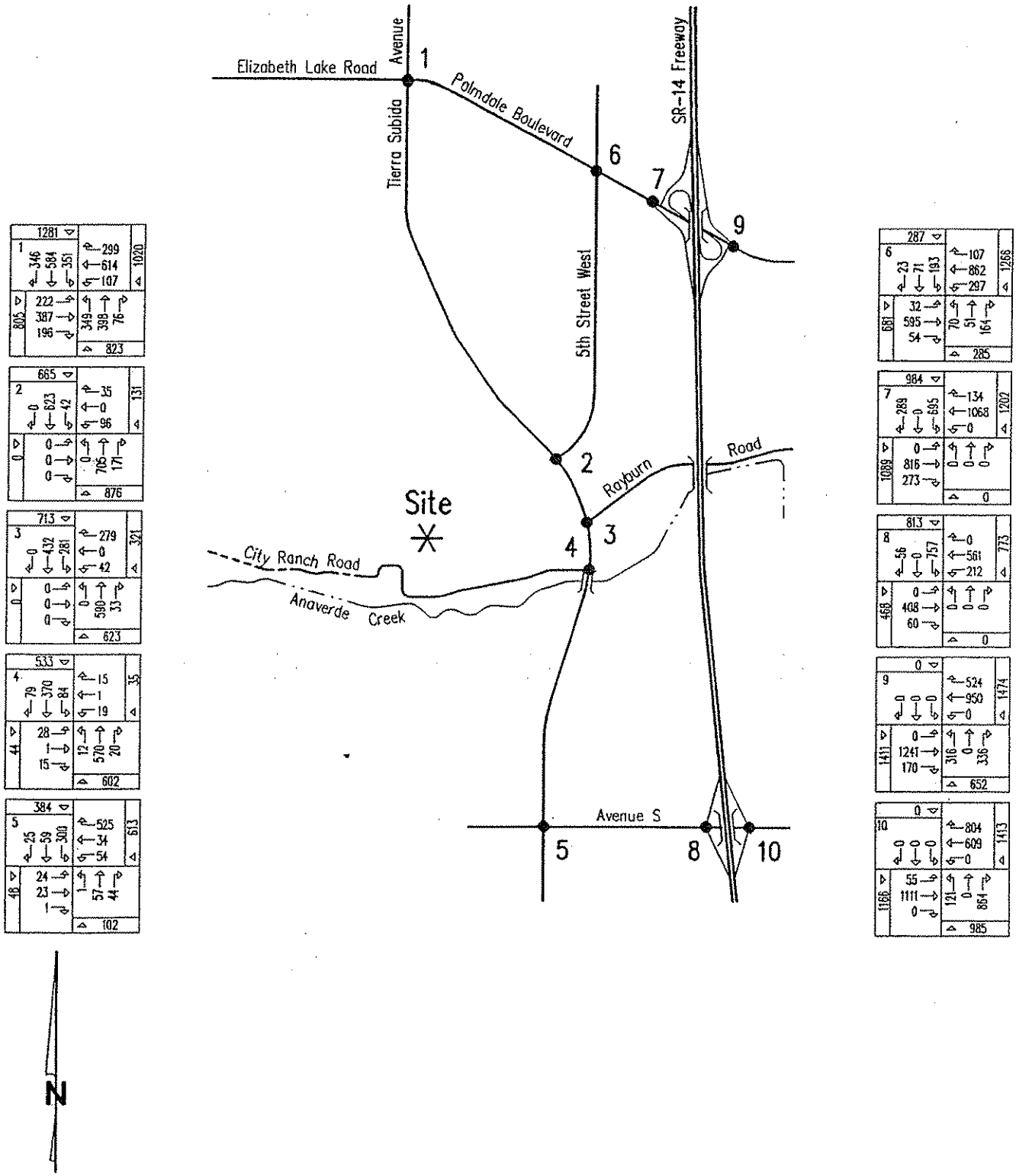


Kunzman Associates

Intersection reference numbers are in upper left corner of turning movement boxes.

2051F/bbas

Figure 29
Year 2007 With Project
Morning Peak Hour Intersection Turning Movement Volumes



Kunzman Associates Intersection reference numbers are in upper left corner of turning movement boxes. 2051F/bbas

8. Circulation Recommendations

Site-specific circulation and access recommendations are depicted on Figures 30 and 31.

Site Access

It is proposed that the waste management access road alignment will be along R-5 as a two lane roadway (60 foot right-of-way). R-5 will intersect Tierra Subida Avenue opposite Rayburn Road (see Figures 30 and 31).

The realignment of the waste management access to R-5 will improve the following:

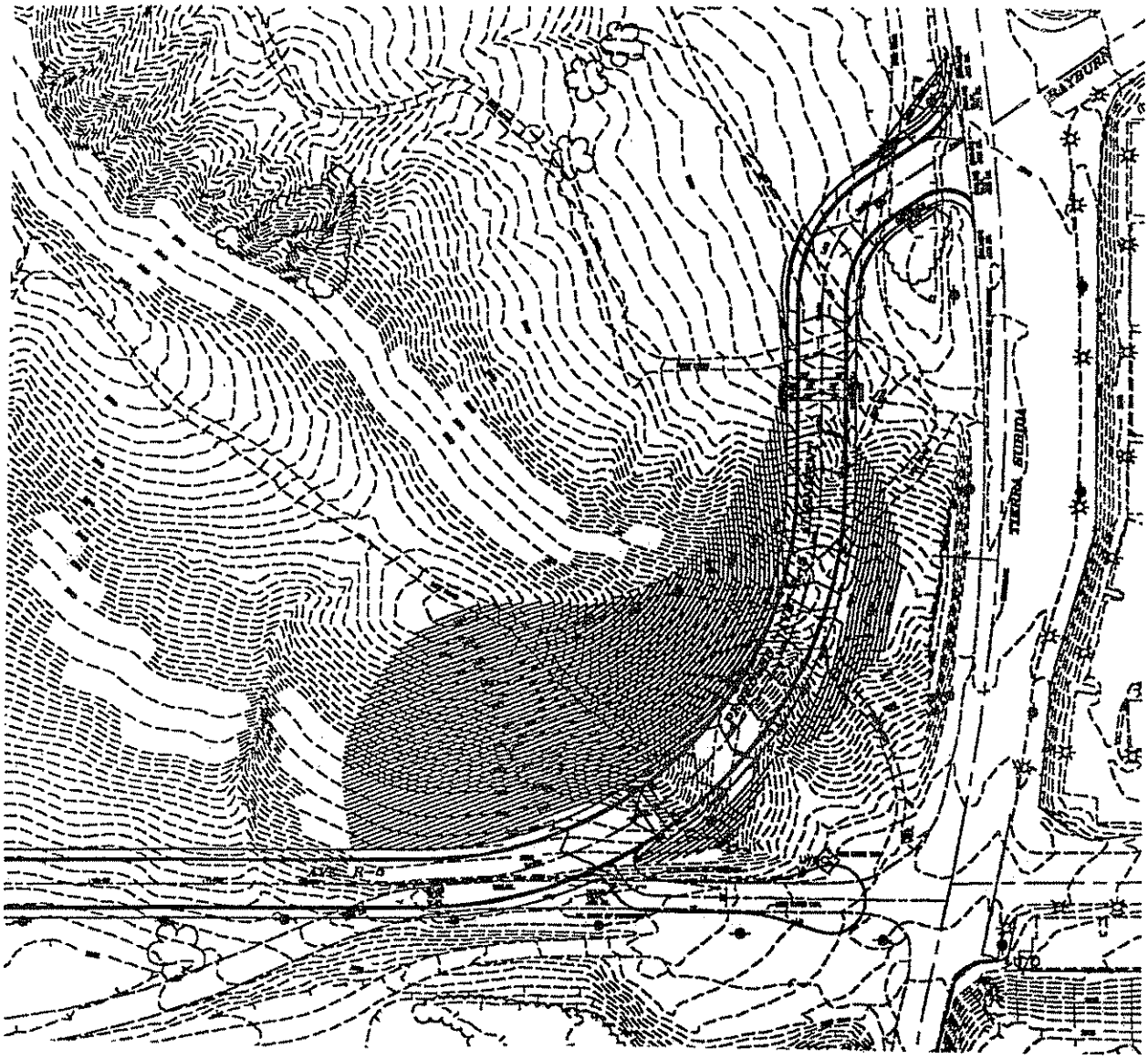
- sight distance
- horizontal and vertical alignment
- wider lanes will result at the Tierra Subida Avenue/Rayburn Road intersection than at the City Ranch Road intersection
- improve traffic signal spacing along Tierra Subida Avenue

Existing City Ranch Road in the realigned portion will terminate as a cul-de-sac bulb immediately west of Tierra Subida Avenue.

The intersection of existing City Ranch Road and R-5 will be at a skew; however, because the existing City Ranch Road cul-de-sac only serves a small hillside parcel that is vacant, no traffic operational problems are expected.

As is the case for any roadway design, the City of Palmdale should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

Figure 30
Proposed Realignment of City Ranch Road to be Opposite Rayburn Road at Tierra Subida Avenue

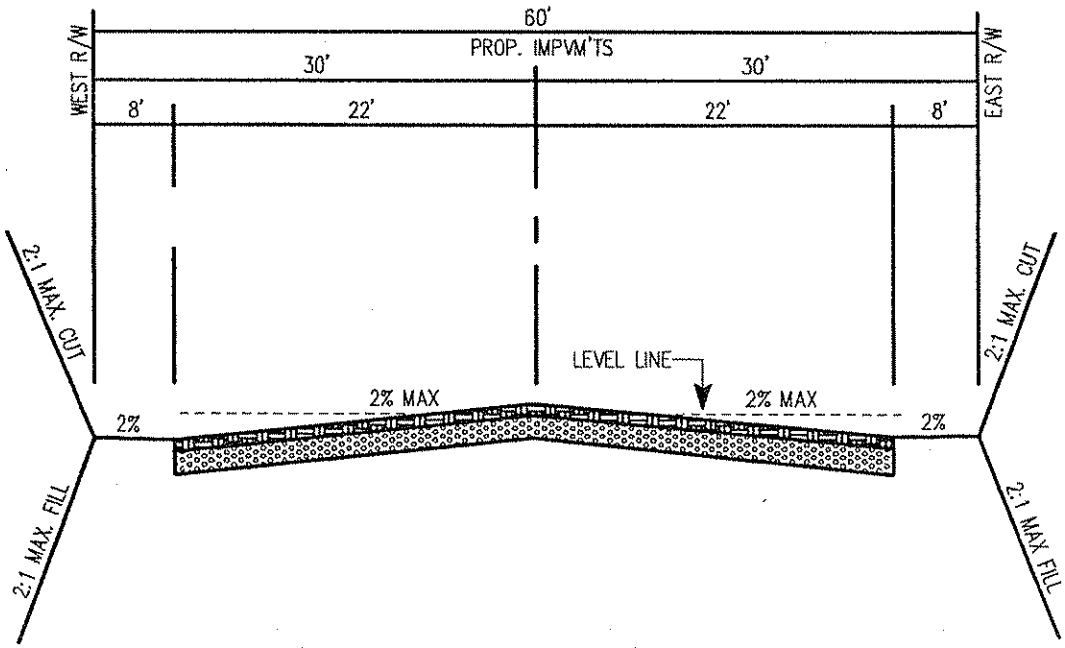


N

Kunzman Associates

2051G/33

Figure 31
Proposed City Ranch Road Roadway Cross-Section



Kunzman Associates

2051G/34

9. Traffic Generation Comparison

The study to this point has discussed Existing Conditions traffic generation average for an average tonnage intake of 1,372 tons per day. And the study has discussed Future Average Conditions traffic generation for 3,613 total tons per day, as well as Future Peak Conditions traffic generation for 5,548 tons per day.

The analysis of the change in the traffic impacts between existing and future scenarios should be viewed as a maximum likely analysis with over estimation of traffic impacts.

Because Land Fill II is permitted by County CUP 93041 to receive a peak intake of 3,564 tons per day, which corresponds to a total truck traffic volume of 1,100 trucks per day (Refer to the September 7, 1993 correspondence and supplemental traffic analysis contained in Appendix E), a permitted peak to proposed peak comparison has also been provided. Table 6 shows the permitted peak and the proposed future peak.

For purposes of measuring the future traffic impact, the change in trip generation for existing average conditions compared to future average conditions, or existing peak conditions compared to future peak conditions should be used. What should not be used is existing average conditions compared to future peak conditions.

Appendices

Appendix A	Glossary of Transportation Terms
Appendix B	Traffic Count Worksheets
Appendix C	Explanation and Calculation of Intersection Capacity Utilization (ICU)
Appendix D	Traffic Signal Warrant Worksheets

APPENDIX A

Glossary of Transportation Terms

GLOSSARY OF TRANSPORTATION TERMS

COMMON ABBREVIATIONS

AC:	Acres
ADT:	Average Daily Traffic
Caltrans:	California Department of Transportation
DU:	Dwelling Unit
ICU:	Intersection Capacity Utilization
LOS:	Level of Service
TSF:	Thousand Square Feet
V/C:	Volume/Capacity
VMT:	Vehicle Miles Traveled

TERMS

AVERAGE DAILY TRAFFIC: The total volume during a year divided by the number of days in a year. Usually only weekdays are included.

BANDWIDTH: The number of seconds of green time available for through traffic in a signal progression.

BOTTLENECK: A constriction along a travelway that limits the amount of traffic that can proceed downstream from its location.

CAPACITY: The maximum number of vehicles that can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

CHANNELIZATION: The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

CLEARANCE INTERVAL: Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

CORDON: An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).

CYCLE LENGTH: The time period in seconds required for one complete signal cycle.

CUL-DE-SAC STREET: A local street open at one end only, and with special provisions for turning around.

DAILY CAPACITY: The daily volume of traffic that will result in a volume during the peak hour equal to the capacity of the roadway.

DELAY: The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

DEMAND RESPONSIVE SIGNAL: Same as traffic-actuated signal.

DENSITY: The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

DETECTOR: A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

DESIGN SPEED: A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

DIRECTIONAL SPLIT: The percent of traffic in the peak direction at any point in time.

DIVERSION: The rerouting of peak hour traffic to avoid congestion.

FORCED FLOW: Opposite of free flow.

FREE FLOW: Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

GAP: Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

HEADWAY: Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.

INTERCONNECTED SIGNAL SYSTEM: A number of intersections that are connected to achieve signal progression.

LEVEL OF SERVICE: A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

LOOP DETECTOR: A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.

MINIMUM ACCEPTABLE GAP: Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

MULTI-MODAL: More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

OFFSET: The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

PLATOON: A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

ORIGIN-DESTINATION SURVEY: A survey to determine the point of origin and the point of destination for a given vehicle trip.

PASSENGER CAR EQUIVALENTS (PCE): One car is one Passenger Car Equivalent. A truck is equal to 2 or 3 Passenger Car Equivalents in that a truck requires longer to start, goes slower, and accelerates slower. Loaded trucks have a higher Passenger Car Equivalent than empty trucks.

PEAK HOUR: The 60 consecutive minutes with the highest number of vehicles.

PRETIMED SIGNAL: A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions. Also, fixed time signal.

PROGRESSION: A term used to describe the progressive movement of traffic through several signalized intersections.

SCREEN-LINE: An imaginary line or physical feature across which all trips are counted, normally to verify the validity of mathematical traffic models.

SIGNAL CYCLE: The time period in seconds required for one complete sequence of signal indications.

SIGNAL PHASE: The part of the signal cycle allocated to one or more traffic movements.

STARTING DELAY: The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through a signalized intersection.

TRAFFIC-ACTUATED SIGNAL: A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

TRIP: The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

TRIP-END: One end of a trip at either the origin or destination; i.e. each trip has two trip-ends. A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

TRIP GENERATION RATE: The quality of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

TRUCK: A vehicle having dual tires on one or more axles, or having more than two axles.

UNBALANCED FLOW: Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

VEHICLE MILES OF TRAVEL: A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.

APPENDIX B

Traffic Count Worksheets

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 10th St. West DATE: 11/14/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: THURSDAY PROJECT# 02-1401-008 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	1	1	2	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	78	89	5	29	47	38	50	99	61	3	147	38	684
7:15 AM	73	44	10	29	36	26	75	121	107	3	80	19	623
7:30 AM	21	42	5	20	44	20	58	65	32	4	30	20	361
7:45 AM	23	71	9	26	29	21	44	55	39	11	32	20	380
8:00 AM	19	65	8	26	43	18	30	41	17	10	30	27	334
8:15 AM	35	54	12	29	37	22	37	49	17	12	22	23	349
8:30 AM	24	50	8	29	41	24	48	38	24	12	30	27	355
8:45 AM	29	71	17	40	36	23	62	57	18	9	43	37	442
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 302	NT 486	NR 74	SL 228	ST 313	SR 192	EL 404	ET 525	ER 315	WL 64	WT 414	WR 211	TOTAL 3528

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	195	246	29	104	156	105	227	340	239	21	289	97	2048

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 10th St. West DATE: 11/14/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: THURSDAY PROJECT# 02-1401-008 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	1	1	2	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	49	66	8	77	99	59	47	76	31	11	91	67	681
4:15 PM	55	76	13	64	89	61	54	77	29	12	118	67	715
4:30 PM	47	68	9	63	83	61	47	78	23	18	68	64	629
4:45 PM	70	83	15	65	98	65	38	71	37	20	96	49	707
5:00 PM	77	62	13	67	80	66	43	68	40	19	129	59	723
5:15 PM	61	71	20	65	129	62	44	68	34	23	128	52	757
5:30 PM	50	78	9	65	126	65	41	82	33	18	105	63	735
5:45 PM	63	79	20	73	114	66	34	48	30	17	87	56	687
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 472	NT 583	NR 107	SL 539	ST 818	SR 505	EL 348	ET 568	ER 257	WL 138	WT 822	WR 477	TOTAL 5634

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	258	294	57	262	433	258	166	289	144	80	458	223	2922

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: 5th St. West DAY: TUESDAY PROJECT# 02-1401-011 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1					1	0	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		166	12	5	87					17		4	291
7:15 AM		88	14	6	135					19		9	271
7:30 AM		52	12	5	96					20		8	193
7:45 AM		69	15	8	82					23		5	202
8:00 AM		54	12	5	53					15		7	146
8:15 AM		49	11	4	55					16		6	141
8:30 AM		67	17	3	61					13		8	169
8:45 AM		68	14	5	52					11		7	157
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	0	613	107	41	621	0	0	0	0	134	0	54	1570

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	375	53	24	400	0	0	0	0	79	0	26	957

CONTROL: 1-Way Stop, West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: 5th St. West DAY: TUESDAY PROJECT# 02-1401-011 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1					1	0	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		72	19	5	98					16		8	218
4:15 PM		97	25	4	107					20		6	259
4:30 PM		88	28	8	98					25		9	256
4:45 PM		127	31	4	107					23		5	297
5:00 PM		131	37	9	97					18		8	300
5:15 PM		138	31	10	137					14		6	336
5:30 PM		125	28	8	118					16		7	302
5:45 PM		112	26	7	87					13		5	250
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 890	NR 225	SL 55	ST 849	SR 0	EL 0	ET 0	ER 0	WL 145	WT 0	WR 54	TOTAL 2218

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	0	521	127	31	459	0	0	0	0	71	0	26	1235

CONTROL: 1-Way Stop, West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Rayburn Rd. DAY: TUESDAY PROJECT# 02-1401-012 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1					1	0		
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		131	0	62	92					3		47	335
7:15 AM		52	0	76	79					5		49	261
7:30 AM		31	2	59	58					8		38	196
7:45 AM		47	1	36	70					7		30	191
8:00 AM		30	3	37	36					8		35	149
8:15 AM		31	2	32	41					6		28	140
8:30 AM		43	3	30	44					4		34	158
8:45 AM		49	4	29	35					2		32	151
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	0	414	15	361	455	0	0	0	0	43	0	293	1581

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	261	3	233	299	0	0	0	0	23	0	164	983

CONTROL: 1-Way Stop, West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Rayburn Rd. DAY: TUESDAY PROJECT# 02-1401-012 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	1	1	1					1	0		
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM		57	10	28	80					2		32	209
4:15 PM		78	8	42	85					5		40	258
4:30 PM		80	7	51	71					6		37	252
4:45 PM		103	6	58	67					7		52	293
5:00 PM		118	3	47	66					4		49	287
5:15 PM		110	5	51	93					8		58	325
5:30 PM		103	6	54	90					7		49	309
5:45 PM		93	5	46	57					6		40	247
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 0	NT 742	NR 50	SL 377	ST 609	SR 0	EL 0	ET 0	ER 0	WL 45	WT 0	WR 357	TOTAL 2180

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	0	434	20	210	316	0	0	0	0	26	0	208	1214

CONTROL: 1-Way Stop, West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: City Ranch Rd. DAY: TUESDAY PROJECT# 02-1401-013 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2	89	0	0	50	4	1		0	0		1	147
7:15 AM	1	60	0	0	74	3	0		1	0		0	139
7:30 AM	0	49	0	1	82	2	1		0	0		0	135
7:45 AM	1	38	0	0	64	2	0		1	0		0	106
8:00 AM	0	34	0	1	54	4	1		0	1		0	95
8:15 AM	0	38	1	0	45	2	2		0	0		1	89
8:30 AM	1	49	0	0	43	1	1		1	0		0	96
8:45 AM	0	44	0	1	47	2	0		0	0		0	94
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	5	401	1	3	459	20	6	0	3	1	0	2	901

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	4	236	0	1	270	11	2	0	2	0	0	1	527

CONTROL: 2-Way Stop, East & West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: City Ranch Rd. DAY: TUESDAY PROJECT# 02-1401-013 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	0	1	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	69	3	3	66	10	3		2	1		0	157
4:15 PM	4	91	5	4	70	13	6		1	2		4	200
4:30 PM	2	110	3	4	76	11	5		3	2		1	217
4:45 PM	1	103	1	8	75	14	3		1	3		0	209
5:00 PM	1	99	4	25	63	12	2		2	5		3	216
5:15 PM	0	113	7	26	62	11	1		1	4		7	232
5:30 PM	1	96	5	14	50	10	2		1	6		5	190
5:45 PM	0	54	4	13	45	9	4		2	7		6	144
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 9	NT 735	NR 32	SL 97	ST 507	SR 90	EL 26	ET 0	ER 13	WL 30	WT 0	WR 26	TOTAL 1565

PM Peak Hr Begins at: 430 PM

PEAK VOLUMES =	4	425	15	63	276	48	11	0	7	14	0	11	874

CONTROL: 2-Way Stop, East & West

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/14/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: THURSDAY PROJECT# 02-1401-014 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM		12	5	44	2	0	1	3	0	2	0	75	144
7:15 AM		15	7	60	7	1	2	2	0	4	0	45	143
7:30 AM		9	6	65	6	3	4	5	0	4	5	36	143
7:45 AM		6	14	89	7	2	3	8	0	2	1	27	159
8:00 AM		8	10	40	5	3	4	5	0	3	2	35	115
8:15 AM		9	9	24	5	2	5	4	1	4	2	33	98
8:30 AM		9	5	30	9	1	3	2	0	8	6	32	105
8:45 AM		6	4	25	6	1	2	1	0	6	5	27	83
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 0	NT 74	NR 60	SL 377	ST 47	SR 13	EL 24	ET 30	ER 1	WL 33	WT 21	WR 310	TOTAL 990

AM Peak Hr Begins at: 700 AM

PEAK VOLUMES =	0	42	32	258	22	6	10	18	0	12	6	183	589

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Tierra Subida Ave. DATE: 11/14/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: THURSDAY PROJECT# 02-1401-014 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	1	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	11	8	55	14	9	0	5	1	2	4	61	170
4:15 PM	0	7	6	50	10	7	1	2	0	5	5	80	173
4:30 PM	1	8	7	43	13	11	3	4	0	9	7	95	201
4:45 PM	0	1	10	58	9	8	4	6	1	12	6	102	217
5:00 PM	0	17	5	53	7	5	5	2	0	9	3	88	194
5:15 PM	0	14	7	52	20	0	3	2	0	9	1	103	211
5:30 PM	0	10	11	57	7	6	6	7	0	10	15	94	223
5:45 PM	1	8	6	49	8	3	3	4	0	7	8	87	184
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 2	NT 76	NR 60	SL 417	ST 88	SR 49	EL 25	ET 32	ER 2	WL 63	WT 49	WR 710	TOTAL 1573

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	0	42	33	220	43	19	18	17	1	40	25	387	845

CONTROL: 4-Way Stop

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 5th St. West DATE: 11/13/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: WEDNESDAY PROJECT# 02-1401-018 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	0	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	1	9	21	2	0	1	1	71	3	8	53	3	173
7:15 AM	5	5	21	11	0	2	0	69	4	7	38	12	174
7:30 AM	5	9	33	5	2	2	1	75	4	13	58	13	220
7:45 AM	6	4	26	11	2	2	3	97	0	22	69	25	267
8:00 AM	4	6	16	8	4	5	2	54	3	22	64	28	216
8:15 AM	4	3	28	6	0	2	2	67	1	24	60	18	215
8:30 AM	4	2	18	13	2	1	2	71	1	12	69	19	214
8:45 AM	6	5	31	17	2	4	1	93	4	20	95	20	298
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	35	43	194	73	12	19	12	597	20	128	506	138	1777

AM Peak Hr Begins at: 800 AM

PEAK VOLUMES =	18	16	93	44	8	12	7	285	9	78	288	85	943

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: 5th St. West DATE: 11/13/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: WEDNESDAY PROJECT# 02-1401-018 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	1	2	0	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	12	5	14	30	14	2	2	140	11	35	141	25	431
4:15 PM	9	5	21	23	18	6	6	120	12	42	169	29	460
4:30 PM	7	7	28	28	18	6	5	115	13	46	140	30	443
4:45 PM	13	11	26	28	20	3	5	136	10	45	142	23	462
5:00 PM	14	10	37	48	13	3	5	81	17	50	170	20	468
5:15 PM	11	10	17	38	11	6	11	108	8	61	184	26	491
5:30 PM	15	8	39	32	15	4	5	94	10	52	131	17	422
5:45 PM	12	10	29	26	14	4	3	161	5	58	158	17	497
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 93	NT 66	NR 211	SL 253	ST 123	SR 34	EL 42	ET 955	ER 86	WL 389	WT 1235	WR 187	TOTAL 3674

PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	52	38	122	144	53	17	24	444	40	221	643	80	1878

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 SB Off-Ramp DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: TUESDAY PROJECT# 02-1401-019 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				1		1		2	0		2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM				26		18		29	62		55	31	221
7:15 AM				31		18		35	71		59	42	256
7:30 AM				45		30		25	72		58	40	270
7:45 AM				63		46		67	66		101	43	386
8:00 AM				77		34		54	59		93	26	343
8:15 AM				55		28		71	55		79	40	328
8:30 AM				46		30		69	47		95	26	313
8:45 AM				43		27		65	44		83	30	292
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
VOLUMES =	0	0	0	386	0	231	0	415	476	0	623	278	2409

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	0	0	0	241	0	138	0	261	227	0	368	135	1370

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 SB Off-Ramp DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: TUESDAY PROJECT# 02-1401-019 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				1		1		2	0		2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM				115		36		119	35		162	41	508
4:15 PM				126		32		117	49		151	54	529
4:30 PM				114		43		130	37		178	32	534
4:45 PM				100		54		141	28		203	41	567
5:00 PM				113		40		139	40		197	28	557
5:15 PM				135		62		166	60		207	23	653
5:30 PM				142		59		156	57		204	26	644
5:45 PM				129		54		147	47		189	23	589
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	0	0	0	974	0	380	0	1115	353	0	1491	268	4581

PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	0	0	0	519	0	215	0	608	204	0	797	100	2443

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 SB Ramps DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: TUESDAY PROJECT# 02-1401-021 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				2		1		2	0	1	1		
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM				72		2		29	14	76	62		255
7:15 AM				85		6		58	12	69	51		281
7:30 AM				97		7		65	18	61	42		290
7:45 AM				93		4		81	10	54	22		264
8:00 AM				84		7		62	15	60	33		261
8:15 AM				79		3		55	8	63	28		236
8:30 AM				88		5		26	17	51	35		222
8:45 AM				62		2		29	14	26	18		151
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	0	0	0	660	0	36	0	405	108	460	291	0	1960

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	0	0	0	359	0	24	0	266	55	244	148	0	1096

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 SB Ramps DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: TUESDAY PROJECT# 02-1401-021 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				2		1		2	0	1	1		
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM				107		6		67	13	29	58		280
4:15 PM				116		5		58	8	33	63		283
4:30 PM				118		14		54	12	37	79		314
4:45 PM				137		20		65	10	51	54		337
5:00 PM				136		16		96	13	66	85		412
5:15 PM				146		8		65	11	48	81		359
5:30 PM				145		13		82	12	24	117		393
5:45 PM				138		5		59	7	20	131		360
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	0	0	0	1043	0	87	0	546	86	308	668	0	2738

PM Peak Hr Begins at: 500 PM

PEAK VOLUMES =	0	0	0	565	0	42	0	302	43	158	414	0	1524

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 NB Off-Ramp DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: TUESDAY PROJECT# 02-1401-020 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1		1					2	1		3	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	8		5					46	22		80	42	203
7:15 AM	10		20					60	21		85	45	241
7:30 AM	18		21					66	27		87	68	287
7:45 AM	30		48					97	33		125	106	439
8:00 AM	38		49					118	13		115	79	412
8:15 AM	32		37					95	25		90	71	350
8:30 AM	31		43					96	14		86	80	350
8:45 AM	26		36					85	13		81	76	317
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 193	NT 0	NR 259	SL 0	ST 0	SR 0	EL 0	ET 663	ER 168	WL 0	WT 749	WR 567	TOTAL 2599

AM Peak Hr Begins at: 745 AM

PEAK VOLUMES =	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	131	0	177	0	0	0	0	406	85	0	416	336	1551

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 NB Off-Ramp DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Palmdale Blvd. DAY: TUESDAY PROJECT# 02-1401-020 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1		1					2	1		3	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	58		61					224	26		165	76	610
4:15 PM	63		66					237	35		170	89	660
4:30 PM	52		55					230	31		180	90	638
4:45 PM	63		69					235	34		194	136	731
5:00 PM	46		29					232	14		191	90	602
5:15 PM	49		32					277	21		162	51	592
5:30 PM	48		26					259	18		160	46	557
5:45 PM	40		23					243	16		142	44	508
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 419	NT 0	NR 361	SL 0	ST 0	SR 0	EL 0	ET 1937	ER 195	WL 0	WT 1364	WR 622	TOTAL 4898

PM Peak Hr Begins at: 400 PM

PEAK VOLUMES =	236	0	251	0	0	0	0	926	126	0	709	391	2639

CONTROL: Signalized;

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 NB Ramps DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: TUESDAY PROJECT# 02-1401-022 A

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1		1				1	1			2	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	2		26				15	93			138	162	436
7:15 AM	3		38				20	123			127	189	500
7:30 AM	8		28				19	149			96	170	470
7:45 AM	9		41				13	161			65	203	492
8:00 AM	10		28				10	147			85	185	465
8:15 AM	11		57				9	125			81	131	414
8:30 AM	10		52				10	104			76	158	410
8:45 AM	2		45				8	83			41	174	353
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													
TOTAL VOLUMES =	NL 55	NT 0	NR 315	SL 0	ST 0	SR 0	EL 104	ET 985	ER 0	WL 0	WT 709	WR 1372	TOTAL 3540

AM Peak Hr Begins at: 715 AM

PEAK VOLUMES =	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	30	0	135	0	0	0	62	580	0	0	373	747	1927

CONTROL: Signalized

Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: SR-14 NB Ramps DATE: 11/12/2002 LOCATION: City of Palmdale

E-W STREET: Ave. S DAY: TUESDAY PROJECT# 02-1401-022 P

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1		1				1	1			2	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	9		128				4	181			78	136	536
4:15 PM	10		139				8	196			96	144	593
4:30 PM	29		148				15	157			83	139	571
4:45 PM	22		163				11	193			88	153	630
5:00 PM	23		166				10	203			128	161	691
5:15 PM	20		170				8	205			109	148	660
5:30 PM	24		146				12	226			127	138	673
5:45 PM	23		107				9	189			118	118	564
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													
TOTAL VOLUMES =	NL 160	NT 0	NR 1167	SL 0	ST 0	SR 0	EL 77	ET 1550	ER 0	WL 0	WT 827	WR 1137	TOTAL 4918

PM Peak Hr Begins at: 445 PM

PEAK VOLUMES =	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	89	0	645	0	0	0	41	827	0	0	452	600	2654

CONTROL: Signalized

APPENDIX C

Explanation and Calculation of Intersection Capacity Utilization (ICU)

EXPLANATION AND CALCULATION OF INTERSECTION CAPACITY UTILIZATION (ICU)

Overview

The ability of a roadway to carry traffic is referred to as capacity. The capacity is usually greater between intersections and less at intersections because traffic flows continuously between them and only during the green phase at them. Capacity at intersections is best defined in terms of vehicles per lane per hour of green. If capacity is 1600 vehicles per lane per hour of green, and if the green phase is 50 percent of the cycle and there are three lanes, then the capacity is 1600 times 50 percent times 3 lanes, or 2400 vehicles per hour for that approach.

The technique used to compare the volume and capacity at an intersection is known as Intersection Capacity Utilization (ICU). ICU, usually expressed as a percent, is the proportion of an hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity. If an intersection is operating at 80 percent of capacity (i.e., an ICU of 80 percent), then 20 percent of the signal cycle is not used. The signal could show red on all indications 20 percent of the time and the signal would just accommodate approaching traffic.

ICU analysis consists of (a) determining the proportion of signal time needed to serve each conflicting movement of traffic, (b) summing the times for the movements, and (c) comparing the total time required to the total time available. For example, if for north-south traffic the northbound traffic is 1600 vehicles per hour, the southbound traffic is 1200 vehicles per hour, and the capacity of either direction is 3200 vehicles per hour, then the northbound traffic is critical and requires 1600/3200 or 50 percent of the signal time. If for east-west traffic, 30 percent of the signal time is required, then it can be seen that the ICU is 50 plus 30, or 80 percent. When left turn arrows (left turn phasing) exist, they are incorporated into the analysis. The critical movements are usually the heavy left turn movements and the opposing through movements.

The ICU technique is an ideal tool to quantify existing as well as future intersection operation. The impact of adding a lane can be quickly determined by examining the effect the lane has on the Intersection Capacity Utilization.

ICU Worksheets That Follow This Discussion

The ICU worksheet table contains the following information:

1. Peak hour turning movement volumes.
2. Number of lanes that serve each movement.
3. For right turn lanes, whether the lane is a free right turn lane, whether it has a right turn arrow, and the percent of right turns on red that are assumed.
4. Capacity assumed per lane.
5. Capacity available to serve each movement (number of lanes times capacity per lane).
6. Volume to capacity ratio for each movement.
7. Whether the movement's volume to capacity ratio is critical and adds to the ICU value.
8. The yellow time or clearance interval assumed.
9. Adjustments for right turn movements.
10. The ICU and LOS.

The ICU Worksheet also has two graphics on the same page. These two graphics show the following:

1. Peak hour turning movement volumes.
2. Number of lanes that serve each movement.
3. The approach and exit leg volumes.

4. The two-way leg volumes.

5. An estimate of daily traffic volumes that is fairly close to actual counts and is based strictly on the peak hour leg volumes multiplied by a factor.

6. Percent of daily traffic in peak hours.

7. Percent of peak hour leg volume that is inbound versus outbound.

A more detailed discussion of ICU and LOS follows.

Level of Service (LOS)

Level of Service is used to describe the quality of traffic flow. Levels of Service A to C operate quite well. Level of Service C is typically the standard to which rural roadways are designed.

Level of Service D is characterized by fairly restricted traffic flow. Level of Service D is the standard to which urban roadways are typically designed. Level of Service E is the maximum volume a facility can accommodate and will result in possible stoppages of momentary duration. Level of Service F occurs when a facility is overloaded and is characterized by stop-and-go traffic with stoppages of long duration.

A description of the various Levels of Service appears at the end of the ICU description, along with the relationship between ICU and Level of Service.

Signalized and Unsignalized Intersections

Although calculating an ICU value for an unsignalized intersection is invalid, the presumption is that a signal can be installed and the calculation shows whether the geometrics are capable of accommodating the expected volumes with a signal. A traffic signal becomes warranted before Level of Service D is reached for a signalized intersection.

Signal Timing

The ICU calculation assumes that a signal is properly timed. It is possible to have an ICU well below 100 percent, yet have severe traffic congestion. This would occur if one or more movements is not getting sufficient green time to satisfy its demand, and excess green time exists on other movements. This is an operational problem that should be remedied.

Lane Capacity

Capacity is often defined in terms of roadway width; however, standard lanes have approximately the same capacity whether they are 11 or 14 feet wide. Our data indicates a typical lane, whether a through lane or a left turn lane, has a capacity of approximately 1750 vehicles per hour of green time, with nearly all locations showing a capacity greater than 1600 vehicles per hour of green per lane. Right turn lanes have a slightly lower capacity; however 1600 vehicles per hour is a valid capacity assumption for right turn lanes.

This finding is published in the August, 1978 issue of ITE Journal in the article entitled, "Another Look at Signalized Intersection Capacity" by William Kunzman. A capacity of 1600 vehicles per hour per lane with no yellow time penalty, or 1700 vehicles per hour with a 3 or 5 percent yellow time penalty is reasonable.

Yellow Time

The yellow time can either be assumed to be completely used and no penalty applied, or it can be assumed to be only partially usable. Total yellow time accounts for approximately 10 percent of a signal cycle, and a penalty of 3 to 5 percent is reasonable.

During peak hour traffic operation the yellow times are nearly completely used. If there is no left turn phasing, the left turn vehicles completely use the yellow time. Even if there is left turn phasing, the through traffic continues to enter the intersection on the yellow until just a split second before the red.

Shared Lanes

Shared lanes occur in many locations. A shared lane is often found at the end of an off ramp where the ramp forms an intersection with the cross street. Often at a diamond interchange off ramp, there are three lanes. In the case of a diamond interchange, the middle lane is sometimes shared, and the driver can turn left, go through, or turn right from that lane.

If one assumes a three lane off ramp as described above, and if one assumes that each lane has 1600 capacity, and if one assumes that there are 1000 left turns per hour, 500 right turns per hour, and 100 through vehicles per hour, then how should one assume that the three lanes operate. There are three ways that it is done.

One way is to just assume that all 1600 vehicles (1000 plus 500 plus 100) are served simultaneously by three lanes. When this is done, the capacity is 3 times 1600 or 4800, and the amount of green time needed to serve the ramp is 1600 vehicles divided by 4800 capacity or 33.3 percent. This assumption effectively assumes perfect lane distribution between the three lanes that is not realistic. It also means a left turn can be made from the right lane.

Another way is to equally split the capacity of a shared lane and in this case to assume there are 1.33 left turn lanes, 1.33 right turn lanes, and 0.33 through lanes. With this assumption, the critical movement is the left turns and the 1000 left turns are served by a capacity of 1.33 times 1600, or 2133. The volume to capacity ratio of the critical move is 1000 divided by 2133 or 46.9 percent.

The first method results in a critical move of 33.3 percent and the second method results in a critical move of 46.9 percent. Neither is very accurate, and the difference in the calculated Level of Service will be approximately 1.5 Levels of Service (one Level of Service is 10 percent).

The way Kunzman Associates does it is to assign fractional lanes in a reasonable way. In this example, it would be assumed that there is 1.1 right turn lanes, 0.2 through lanes, and 1.7 left turn lanes. The volume to capacity ratios for each movement would be 31.3 percent for the through traffic, 28.4 percent for the right turn movement, and 36.8 percent for the

left turn movement. The critical movement would be the 36.8 percent for the left turns.

Right Turn on Red

Kunzman Associates' software treats right turn lanes in one of five different ways. Each right turn lane is classified into one of five cases. The five cases are (1) free right turn lane, (2) right turn lane with separate right turn arrow, (3) standard right turn lane with no right turns on red allowed, (4) standard right turn lane with a certain percentage of right turns on red allowed, and (5) separate right turn arrow and a certain percentage of right turns on red allowed.

Free Right Turn Lane

If it is a free right turn lane, then it is given a capacity of one full lane with continuous or 100 percent green time. A free right turn lane occurs when there is a separate approach lane for right turning vehicles, there is a separate departure lane for the right turning vehicles after they turn and are exiting the intersection, and the through cross street traffic does not interfere with the vehicles after they turn right.

Separate Right Turn Arrow

If there is a separate right turn arrow, then it is assumed that vehicles are given a green indication and can proceed on what is known as the left turn overlap.

The left turn overlap for a northbound right turn is the westbound left turn. When the left turn overlap has a green indication, the right turn lane is also given a green arrow indication. Thus, if there is a northbound right turn arrow, then it can be turned green for the period of time that the westbound left turns are proceeding.

If there are more right turns than can be accommodated during the northbound through green and the time that the northbound right turn arrow is on, then an adjustment is made to the ICU to account for the green time that needs to be added to the northbound through green to accommodate the northbound right turns.

Standard Right Turn Lane, No Right Turns on Red

A standard right turn lane, with no right turn on red assumed, proceeds only when there is a green indication displayed for the adjacent through movement. If additional green time is needed above that amount of time, then in the ICU calculation a right turn adjustment green time is added above the green time that is needed to serve the adjacent through movement.

Standard Right Turn Lane, With Right Turns on Red

A standard right turn lane with say 20 percent of the right turns allowed to turn right on a red indication is calculated the same as the standard right turn case where there is no right turn on red allowed, except that the right turn adjustment is reduced to account for the 20 percent of the right turning vehicles that can logically turn right on a red light. The right turns on red are never allowed to exceed the time the overlap left turns take plus the unused part of the green cycle that the cross street traffic moving from left to right has.

As an example of how 20 percent of the cars are allowed to turn right on a red indication, assume that the northbound right turn volume needs 40 percent of the signal cycle to be satisfied. To allow 20 percent of the northbound right turns to turn right on red, then during 8 percent of the signal cycle (40 percent of signal cycle times 20 percent that can turn right on red) right turns on red will be allowed if it is feasible.

For this example, assume that 15 percent of the signal cycle is green for the northbound through traffic, and that means that 15 percent of the signal cycle is available to satisfy northbound right turns. After the northbound through traffic has received its green, 25 percent of the signal cycle is still needed to satisfy the northbound right turns (40 percent of the signal cycle minus the 15 percent of the signal cycle that the northbound through used).

Assume that the westbound left turns require a green time of 6 percent of the signal cycle. This 6 percent of the signal cycle is used by northbound right turns on red. After accounting for the northbound right turns that occur on the westbound overlap left turn, 19 percent of the signal cycle is still needed for the northbound right turns (25 percent of the cycle was needed after the northbound through green time was

accounted for [see above paragraph], and 6 percent was served during the westbound left turn overlap). Also, at this point 6 percent of the signal cycle has been used for northbound right turns on red, and still 2 percent more of the right turns will be allowed to occur on the red if there is unused eastbound through green time.

For purpose of this example, assume that the westbound through green is critical, and that 15 percent of the signal cycle is unused by eastbound through traffic. Thus, 2 percent more of the signal cycle can be used by the northbound right turns on red since there is 15 seconds of unused green time being given to the eastbound through traffic.

At this point, 8 percent of the signal cycle was available to serve northbound right turning vehicles on red, and 15 percent of the signal cycle was available to serve right turning vehicles on the northbound through green. So 23 percent of the signal cycle has been available for northbound right turns.

Because 40 percent of the signal cycle is needed to serve northbound right turns, there is still a need for 17 percent more of the signal cycle to be available for northbound right turns. What this means is the northbound through traffic green time is increased by 17 percent of the cycle length to serve the unserved right turn volume, and a 17 percent adjustment is added to the ICU to account for the northbound right turns that were not served on the northbound through green time or when right turns on red were assumed.

Separate Right Turn Arrow, With Right Turns on Red

A right turn lane with a separate right turn arrow, plus a certain percentage of right turns allowed on red is calculated the same way as a standard right turn lane with a certain percentage of right turns allowed on red, except the turns which occur on the right turn arrow are not counted as part of the percentage of right turns that occur on red.

Critical Lane Method

ICU parallels another calculation procedure known as the Critical Lane Method with one exception. Critical Lane Method dimensions capacity in terms of standardized vehicles per hour per lane. A Critical Lane Method result of 800 vehicles per hour means that the intersection

operates as though 800 vehicles were using a single lane continuously. If one assumes a lane capacity of 1600 vehicles per hour, then a Critical Lane Method calculation resulting in 800 vehicles per hour is the same as an ICU calculation of 50 percent since 800/1600 is 50 percent. It is our opinion that the Critical Lane Method is inferior to the ICU method simply because a statement such as "The Critical Lane Method value is 800 vehicles per hour" means little to most persons, whereas a statement such as "The Intersection Capacity Utilization is 50 percent" communicates clearly. Critical Lane Method results directly correspond to ICU results. The correspondence is as follows, assuming a lane capacity of 1600 vehicles per hour and no clearance interval.

Critical Lane Method Result	ICU Result
800 vehicles per hour	50 percent
960 vehicles per hour	60 percent
1120 vehicles per hour	70 percent
1280 vehicles per hour	80 percent
1440 vehicles per hour	90 percent
1600 vehicles per hour	100 percent
1760 vehicles per hour	110 percent

THIS PAGE IS INTENTIONALLY BLANK

LEVEL OF SERVICE DESCRIPTION[1]

Level of Service	Description	Volume to Capacity Ratio
A	Level of Service A occurs when progression is extremely favorable and vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	0.600 and below
B	Level of Service B generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	0.601 to 0.700
C	Level of Service C generally results when there is fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.	0.701 to 0.800
D	Level of Service D generally results in noticeable congestion. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	0.801 to 0.900
E	Level of Service E is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent.	0.901 to 1.000
F	Level of Service F is considered to be unacceptable to most drivers. This condition often occurs when oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high volume to capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	1.001 and up

[1]Source: Highway Capacity Manual Special Report 209, Transportation Research Board, National Research Council Washington D.C., 2000.

Existing

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

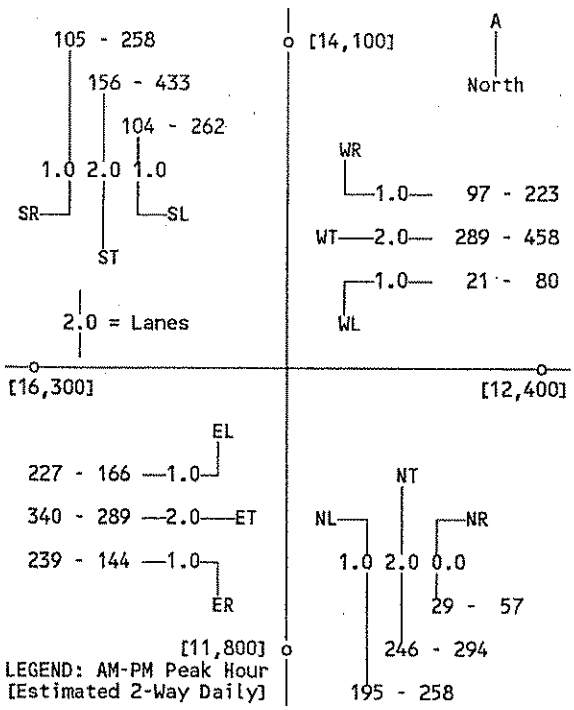
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	195	258	0	0	195	258	0.122*	0.161*
Northbound Through	2	3200	246	294	0	0	246	294	0.086	0.110
Northbound Right	0	0	29	57	0	0	29	57	0.000	0.000
Southbound Left	1	1600	104	262	0	0	104	262	0.065	0.164
Southbound Through	2	3200	156	433	0	0	156	433	0.049*	0.135*
Southbound Right	1	1600	105	258	0	0	105	258	0.066	0.161
Eastbound Left	1	1600	227	166	0	0	227	166	0.142*	0.104*
Eastbound Through	2	3200	340	289	0	0	340	289	0.106	0.090
Eastbound Right	1	1600	239	144	0	0	239	144	0.149	0.090
Westbound Left	1	1600	21	80	0	0	21	80	0.013	0.050
Westbound Through	2	3200	289	458	0	0	289	458	0.090*	0.143*
Westbound Right	1	1600	97	223	0	0	97	223	0.061	0.139
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.017*	0.026*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.520	0.669
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

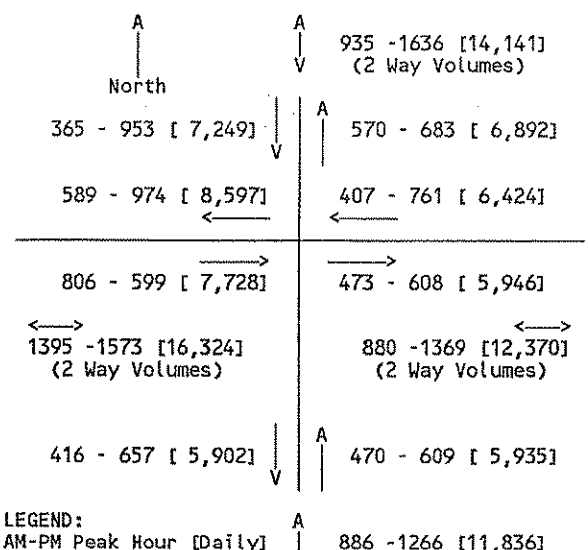
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	7 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

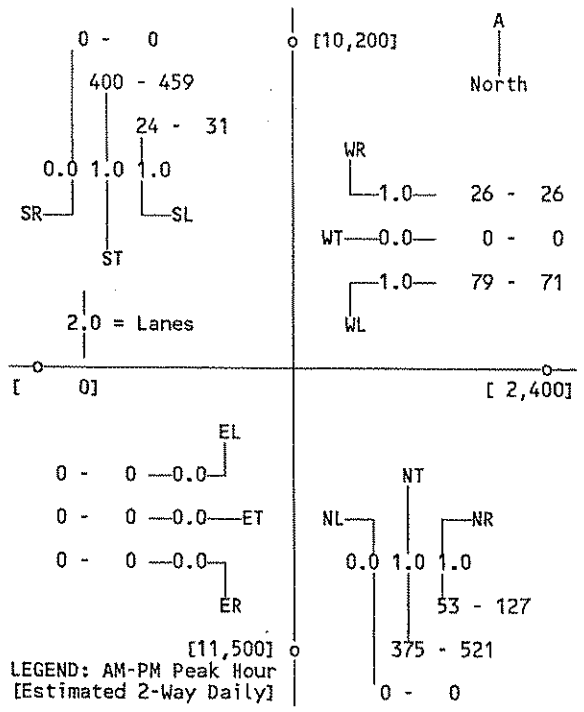
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW)
LAND USE: EXISTING

COUNT DATE: 11-12-02
GEOMETRICS: Existing

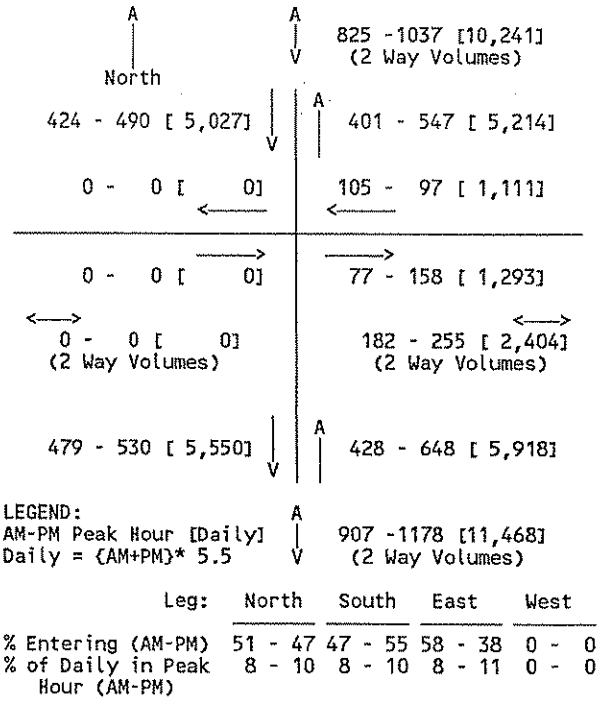
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	375	521	0	0	375	521	0.234	0.326*
Northbound Right	1	1600	53	127	0	0	53	127	0.033	0.079
Southbound Left	1	1600	24	31	0	0	24	31	0.015	0.019*
Southbound Through	1	1600	400	459	0	0	400	459	0.250*	0.287
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	79	71	0	0	79	71	0.049*	0.044*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	26	26	0	0	26	26	0.016	0.016

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.399	0.489
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

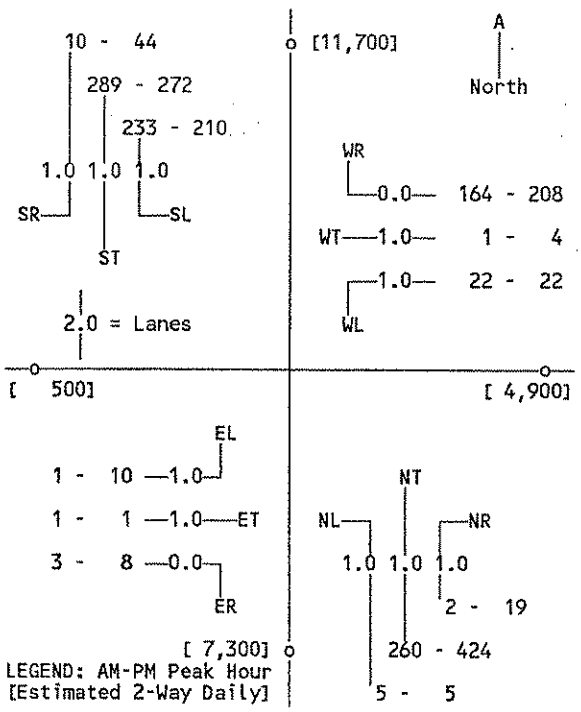
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: EXISTING

COUNT DATE: 11-12-02
GEOMETRICS: Improved

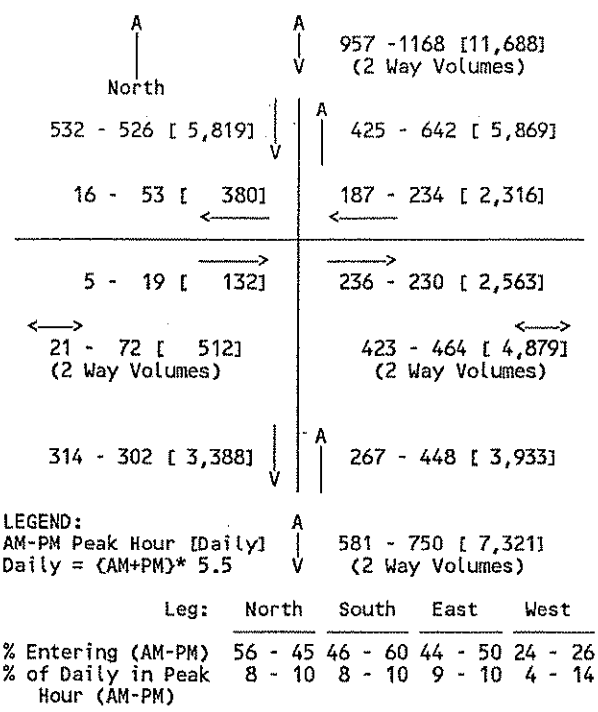
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	5	5	0	0	5	5	0.003	0.003
Northbound Through	1	1600	260	424	0	0	260	424	0.163*	0.265*
Northbound Right	1	1600	2	19	0	0	2	19	0.001	0.012
Southbound Left	1	1600	233	210	0	0	233	210	0.146*	0.131*
Southbound Through	1	1600	289	272	0	0	289	272	0.181	0.170
Southbound Right	1	1600	10	44	0	0	10	44	0.006	0.028
Eastbound Left	1	1600	1	10	0	0	1	10	0.001*	0.006*
Eastbound Through	1	1600	1	1	0	0	1	1	0.003	0.006
Eastbound Right	0	0	3	8	0	0	3	8	0.000	0.000
Westbound Left	1	1600	22	22	0	0	22	22	0.014	0.014
Westbound Through	1	1600	1	4	0	0	1	4	0.103*	0.132*
Westbound Right	0	0	164	208	0	0	164	208	0.000	0.000

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.513	0.634
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	56 - 45	46 - 60	44 - 50	24 - 26
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 10	4 - 14

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW)
LAND USE: EXISTING

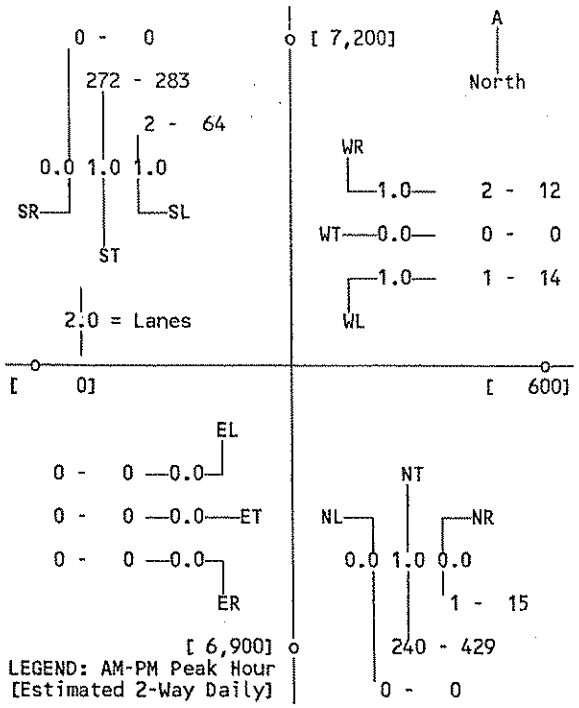
COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	240	429	0	0	240	429	0.151	0.278*
Northbound Right	0	0	1	15	0	0	1	15	0.000	0.000
Southbound Left	1	1600	2	64	0	0	2	64	0.001	0.040*
Southbound Through	1	1600	272	283	0	0	272	283	0.170*	0.177
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	14	0	0	1	14	0.001*	0.009*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	2	12	0	0	2	12	0.001	0.008

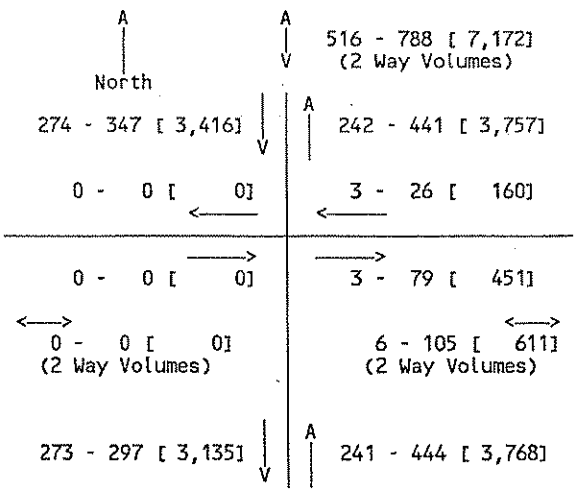
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000* 0.000*
Southbound Right Turn Adjustment		0.000* 0.000*
Eastbound Right Turn Adjustment		0.000* 0.000*
Westbound Right Turn Adjustment		0.000* 0.000*
Clearance Interval		0.100* 0.100*

INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>	0.271	0.427
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)	A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 60	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	7 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

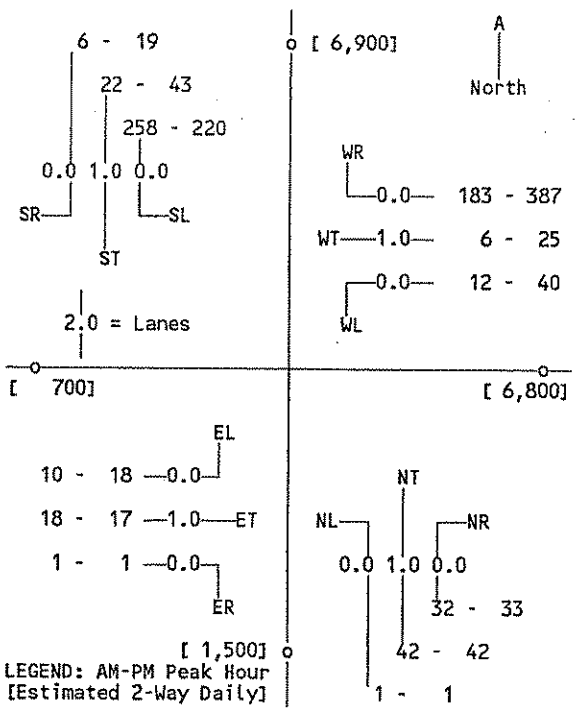
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: EXISTING

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	42	42	0	0	42	42	0.047	0.048
Northbound Right	0	0	32	33	0	0	32	33	0.000	0.000
Southbound Left	0	0	258	220	0	0	258	220	0.000	0.000
Southbound Through	1	1600	22	43	0	0	22	43	0.179*	0.176*
Southbound Right	0	0	6	19	0	0	6	19	0.000	0.000
Eastbound Left	0	0	10	18	0	0	10	18	0.000*	0.000*
Eastbound Through	1	1600	18	17	0	0	18	17	0.018	0.023
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	12	40	0	0	12	40	0.000	0.000
Westbound Through	1	1600	6	25	0	0	6	25	0.126*	0.283*
Westbound Right	0	0	183	387	0	0	183	387	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.405	0.559
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

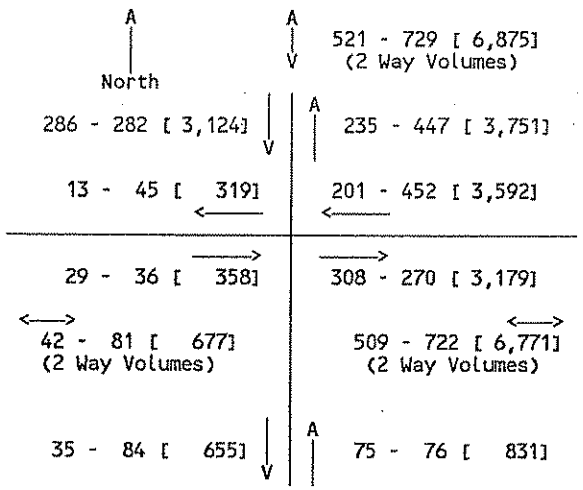
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
110 - 160 [1,485]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 48	39 - 63	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 11	7 - 11	8 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

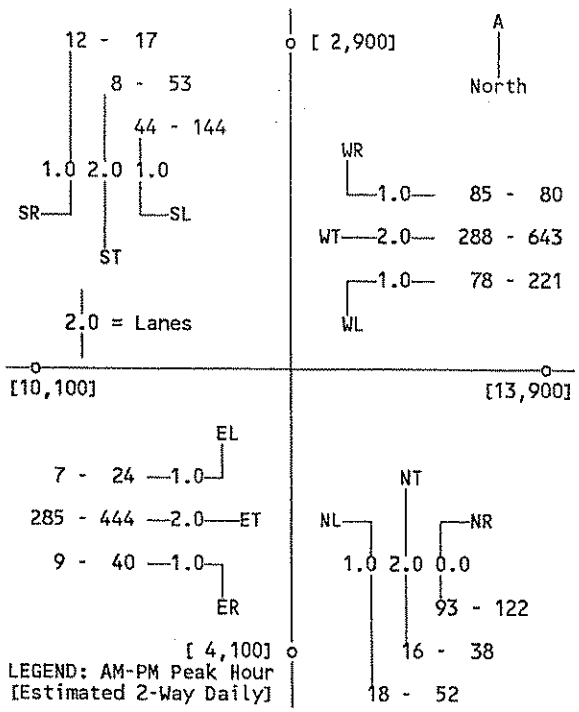
INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING

COUNT DATE: 11-13-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	18	52	0	0	18	52	0.011	0.033
Northbound Through	2	3200	16	38	0	0	16	38	0.034*	0.050*
Northbound Right	0	0	93	122	0	0	93	122	0.000	0.000
Southbound Left	1	1600	44	144	0	0	44	144	0.028*	0.090*
Southbound Through	2	3200	8	53	0	0	8	53	0.003	0.017
Southbound Right	1	1600	12	17	0	0	12	17	0.008	0.011
Eastbound Left	1	1600	7	24	0	0	7	24	0.004	0.015
Eastbound Through	2	3200	285	444	0	0	285	444	0.089*	0.139*
Eastbound Right	1	1600	9	40	0	0	9	40	0.006	0.025
Westbound Left	1	1600	78	221	0	0	78	221	0.049*	0.138*
Westbound Through	2	3200	288	643	0	0	288	643	0.090	0.201
Westbound Right	1	1600	85	80	0	0	85	80	0.053	0.050
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.300	0.517
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

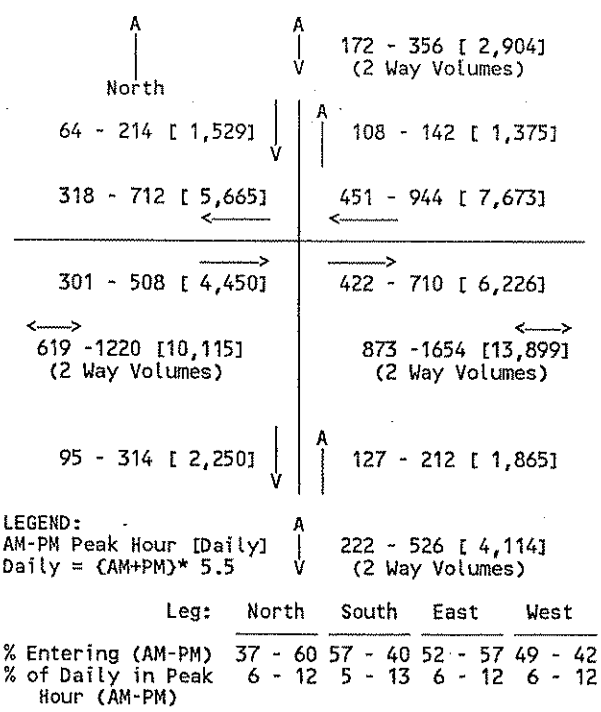
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
222 - 526 [4,114]
V
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

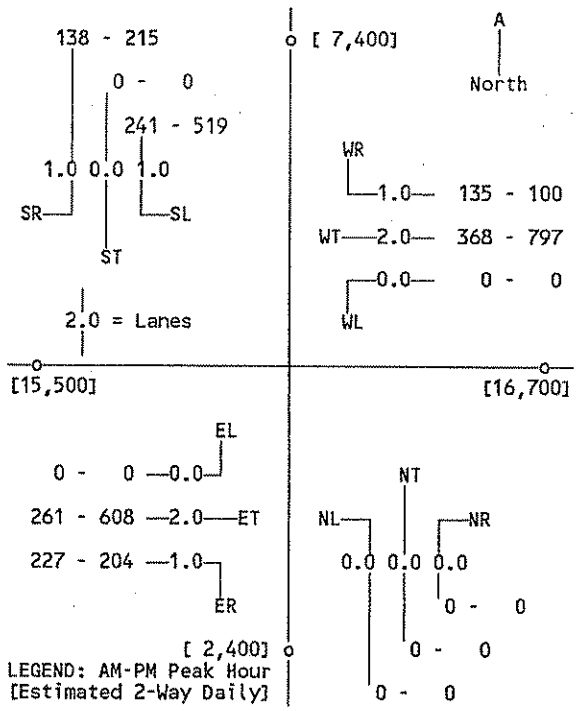
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	241	519	0	0	241	519	0.151*	0.324*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	138	215	0	0	138	215	0.086	0.134
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	261	608	0	0	261	608	0.082	0.190
Eastbound Right	Free 1	1600	227	204	0	0	227	204	0.142	0.128
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	368	797	0	0	368	797	0.115*	0.249*
Westbound Right	Free 1	1600	135	100	0	0	135	100	0.084	0.063

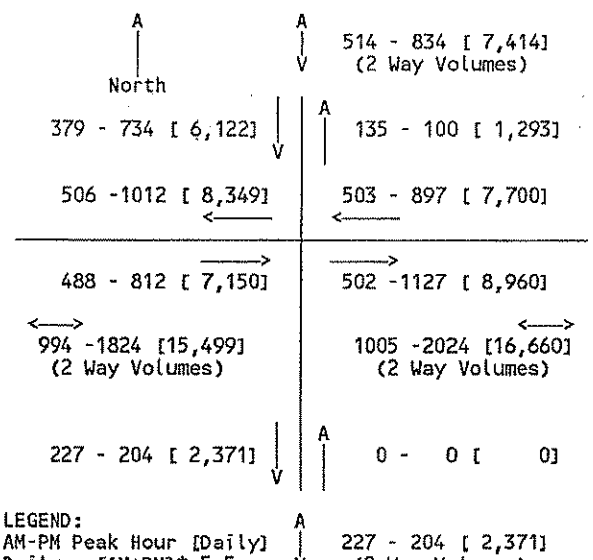
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.366	0.673
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
227 - 204 [2,371]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

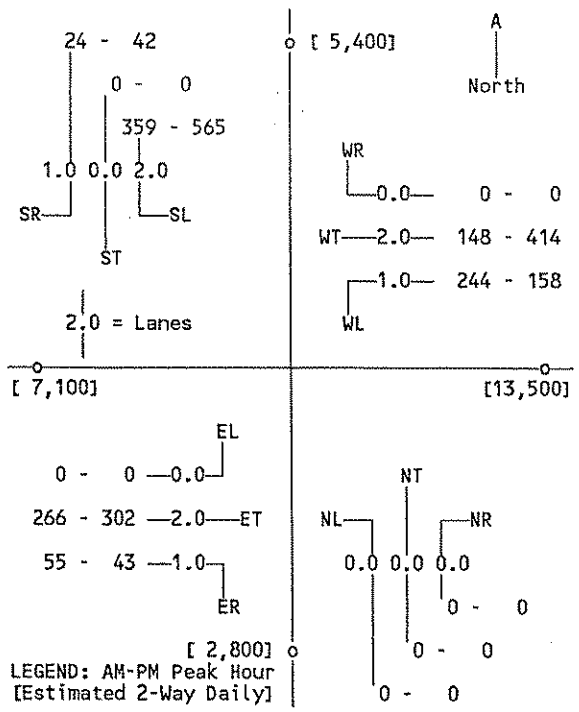
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	359	565	0	0	359	565	0.125*	0.196*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	24	42	0	0	24	42	0.015	0.026
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	266	302	0	0	266	302	0.083*	0.094*
Eastbound Right	Free 1	1600	55	43	0	0	55	43	0.034	0.027
Westbound Left	1	1600	244	158	0	0	244	158	0.153*	0.099*
Westbound Through	2	3200	148	414	0	0	148	414	0.046	0.129
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.461	0.489
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

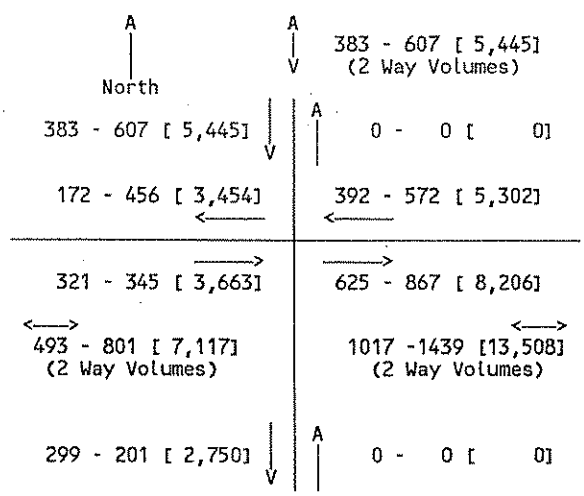
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
299 - 201 [2,750]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

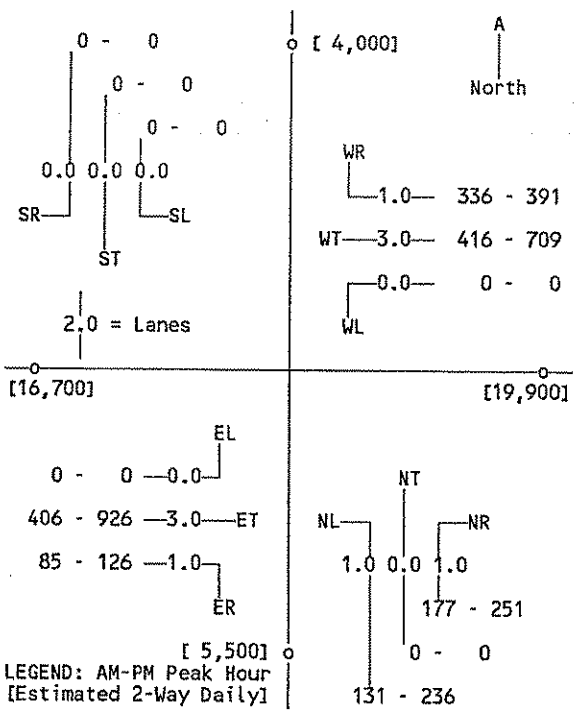
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING

COUNT DATE: 11-12-02
GEOMETRICS: Existing

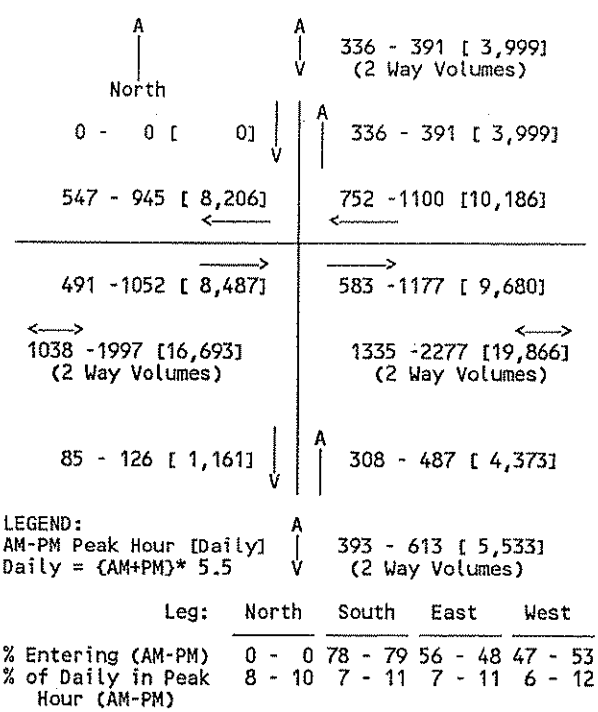
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	131	236	0	0	131	236	0.082*	0.147*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	177	251	0	0	177	251	0.111	0.157
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	406	926	0	0	406	926	0.085	0.193*
Eastbound Right	Free 1	1600	85	126	0	0	85	126	0.053	0.079
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	416	709	0	0	416	709	0.087*	0.148
Westbound Right	Free 1	1600	336	391	0	0	336	391	0.210	0.244
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.269	0.440
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

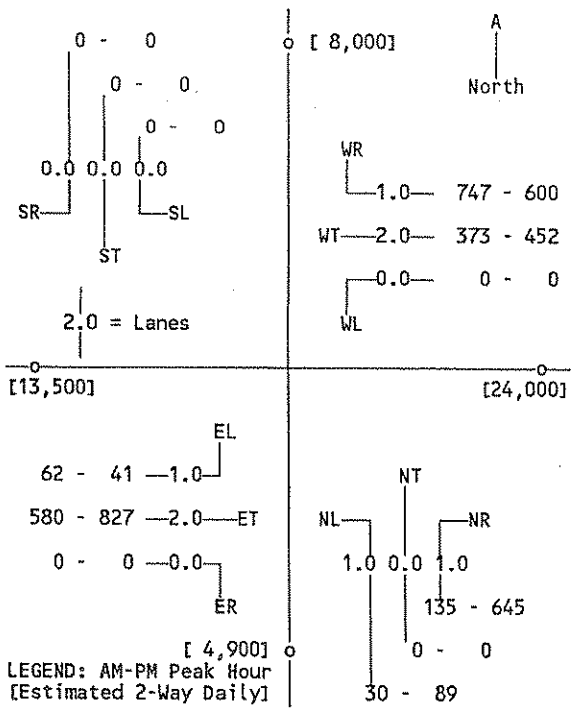
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING

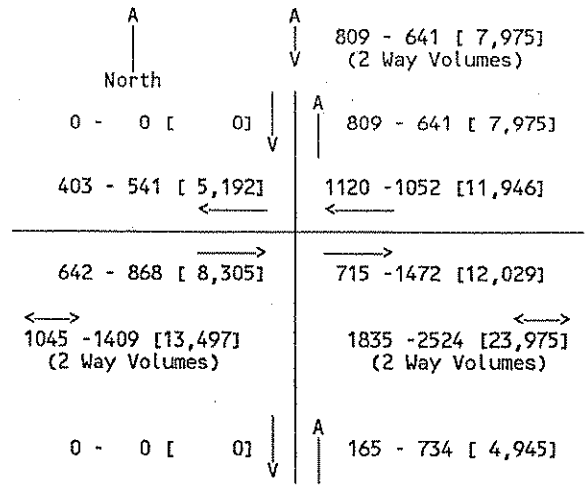
COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	30	89	0	0	30	89	0.019*	0.056*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	135	645	0	0	135	645	0.084	0.403
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	62	41	0	0	62	41	0.039	0.026
Eastbound Through	2	3200	580	827	0	0	580	827	0.181*	0.258*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	373	452	0	0	373	452	0.117	0.141
Westbound Right	Free 1	1600	747	600	0	0	747	600	0.467	0.375
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.300	0.414
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

Existing Plus Project
(Avergae Inflow of Material, 3,613 Tons per Day)

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

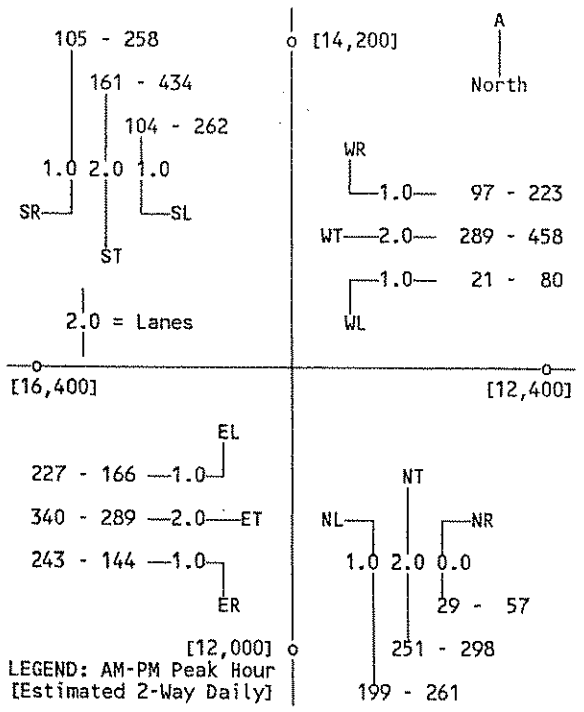
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	195	258	4	3	199	261	0.124*	0.163*
Northbound Through	2	3200	246	294	5	4	251	298	0.088	0.111
Northbound Right	0	0	29	57	0	0	29	57	0.000	0.000
Southbound Left	1	1600	104	262	0	0	104	262	0.065	0.164
Southbound Through	2	3200	156	433	5	1	161	434	0.050*	0.136*
Southbound Right	1	1600	105	258	0	0	105	258	0.066	0.161
Eastbound Left	1	1600	227	166	0	0	227	166	0.142*	0.104*
Eastbound Through	2	3200	340	289	0	0	340	289	0.106	0.090
Eastbound Right	1	1600	239	144	4	0	243	144	0.152	0.090
Westbound Left	1	1600	21	80	0	0	21	80	0.013	0.050
Westbound Through	2	3200	289	458	0	0	289	458	0.090*	0.143*
Westbound Right	1	1600	97	223	0	0	97	223	0.061	0.139
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.016*	0.025*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.522	0.671
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

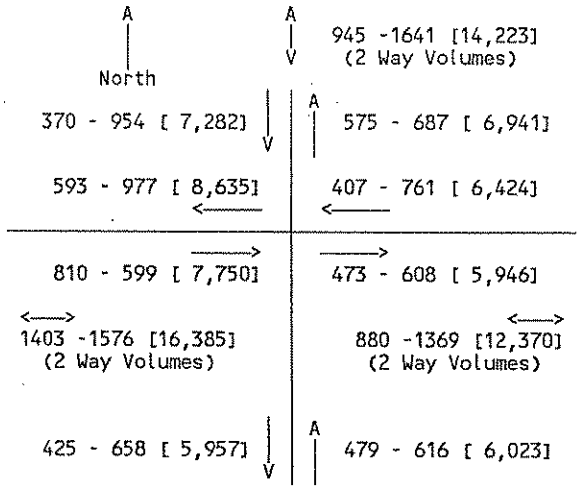
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

904 -1274 [11,979]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	8 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

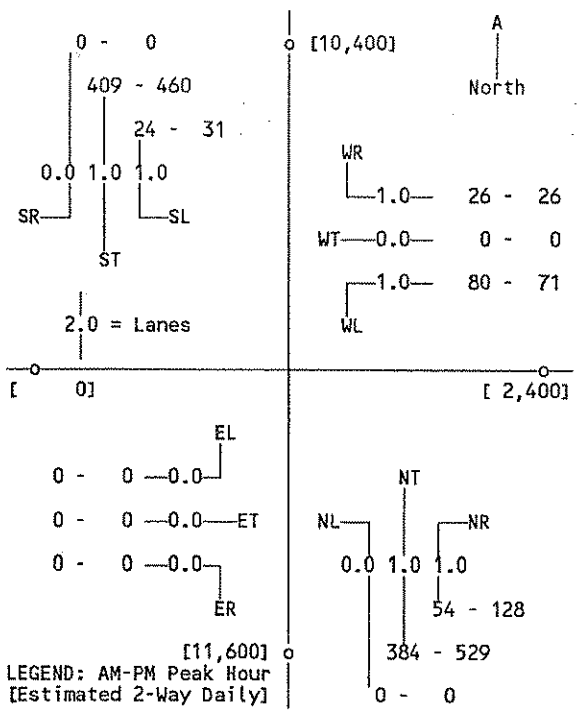
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

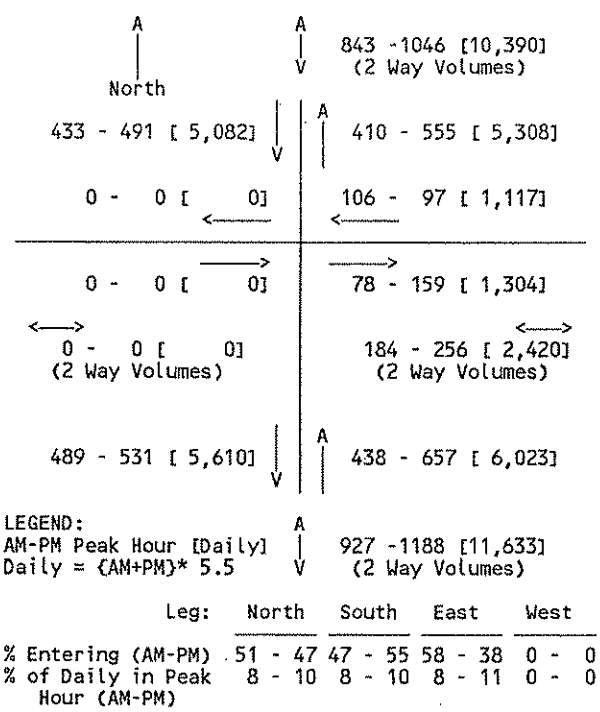
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	375	521	9	8	384	529	0.240	0.331*
Northbound Right	1	1600	53	127	1	1	54	128	0.034	0.080
Southbound Left	1	1600	24	31	0	0	24	31	0.015	0.019*
Southbound Through	1	1600	400	459	9	1	409	460	0.256*	0.288
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	79	71	1	0	80	71	0.050*	0.044*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	26	26	0	0	26	26	0.016	0.016

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.406	0.494
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

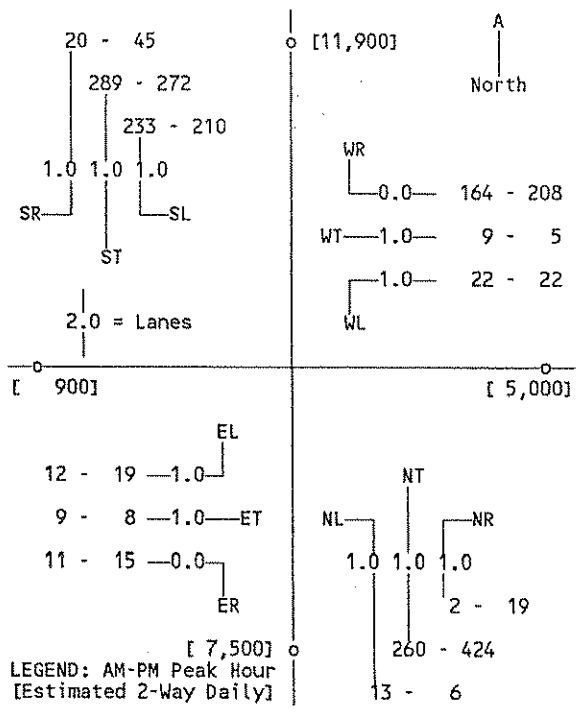
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	5	5	8	1	13	6	0.008	0.004
Northbound Through	1	1600	260	424	0	0	260	424	0.163*	0.265*
Northbound Right	1	1600	2	19	0	0	2	19	0.001	0.012
Southbound Left	1	1600	233	210	0	0	233	210	0.146*	0.131*
Southbound Through	1	1600	289	272	0	0	289	272	0.181	0.170
Southbound Right	1	1600	10	44	10	1	20	45	0.013	0.028
Eastbound Left	1	1600	1	10	11	9	12	19	0.008*	0.012*
Eastbound Through	1	1600	1	1	8	7	9	8	0.013	0.014
Eastbound Right	0	0	3	8	8	7	11	15	0.000	0.000
Westbound Left	1	1600	22	22	0	0	22	22	0.014	0.014
Westbound Through	1	1600	1	4	8	1	9	5	0.108*	0.133*
Westbound Right	0	0	164	208	0	0	164	208	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.525	0.641
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

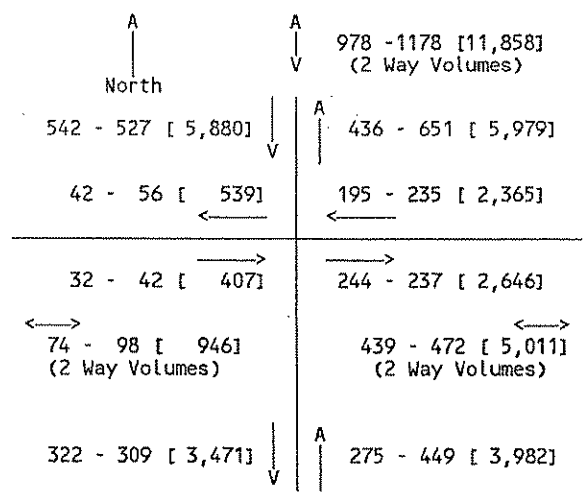
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
597 - 758 [7,453]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 45	46 - 59	44 - 50	43 - 43
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 9	8 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

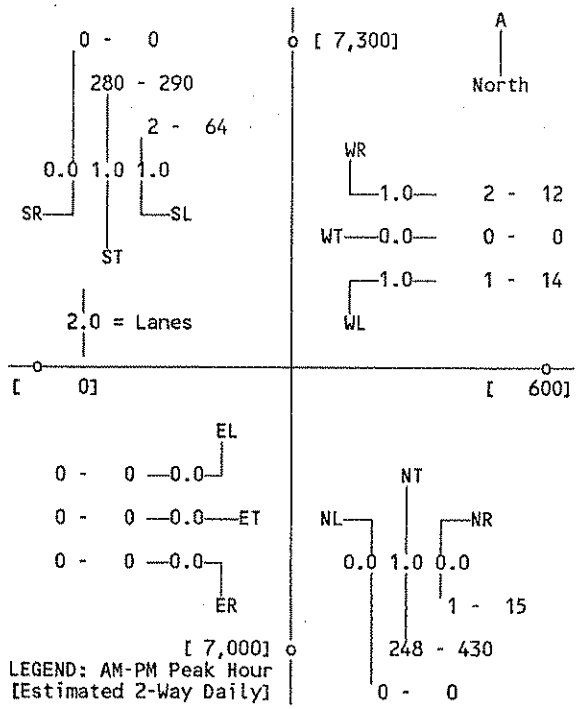
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	240	429	8	1	248	430	0.156	0.278*
Northbound Right	0	0	1	15	0	0	1	15	0.000	0.000
Southbound Left	1	1600	2	64	0	0	2	64	0.001	0.040*
Southbound Through	1	1600	272	283	8	7	280	290	0.175*	0.181
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	14	0	0	1	14	0.001*	0.009*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	2	12	0	0	2	12	0.001	0.008
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.276	0.427
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

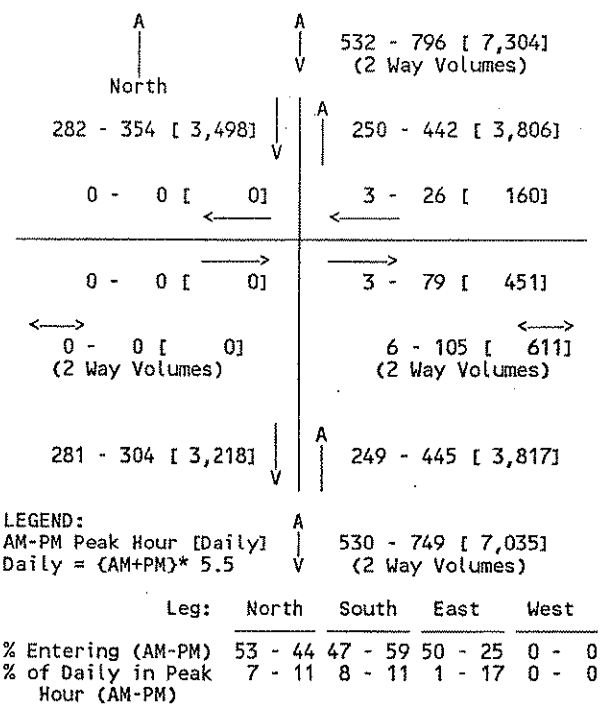
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
530 - 749 [7,035]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 59	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	8 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

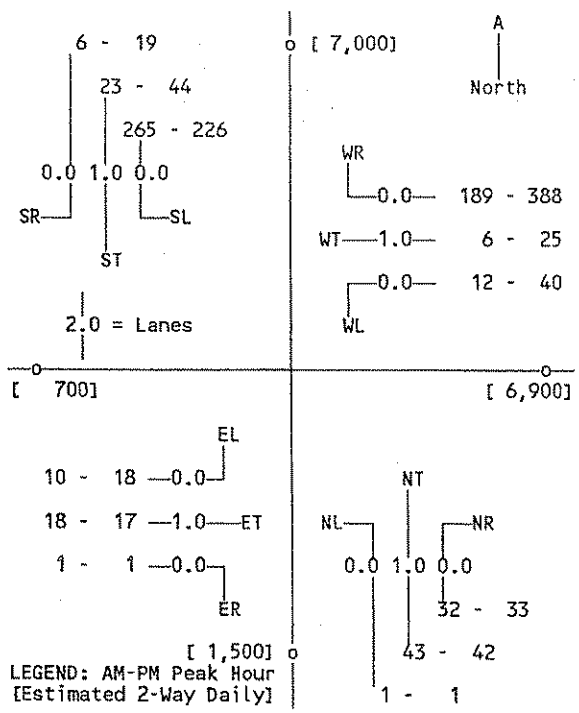
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	42	42	1	0	43	42	0.048	0.048
Northbound Right	0	0	32	33	0	0	32	33	0.000	0.000
Southbound Left	0	0	258	220	7	6	265	226	0.000	0.000
Southbound Through	1	1600	22	43	1	1	23	44	0.184*	0.181*
Southbound Right	0	0	6	19	0	0	6	19	0.000	0.000
Eastbound Left	0	0	10	18	0	0	10	18	0.000*	0.000*
Eastbound Through	1	1600	18	17	0	0	18	17	0.018	0.023
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	12	40	0	0	12	40	0.000	0.000
Westbound Through	1	1600	6	25	0	0	6	25	0.129*	0.283*
Westbound Right	0	0	183	387	6	1	189	388	0.000	0.000

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.413	0.564
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 47	40 - 62	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 11	7 - 11	8 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

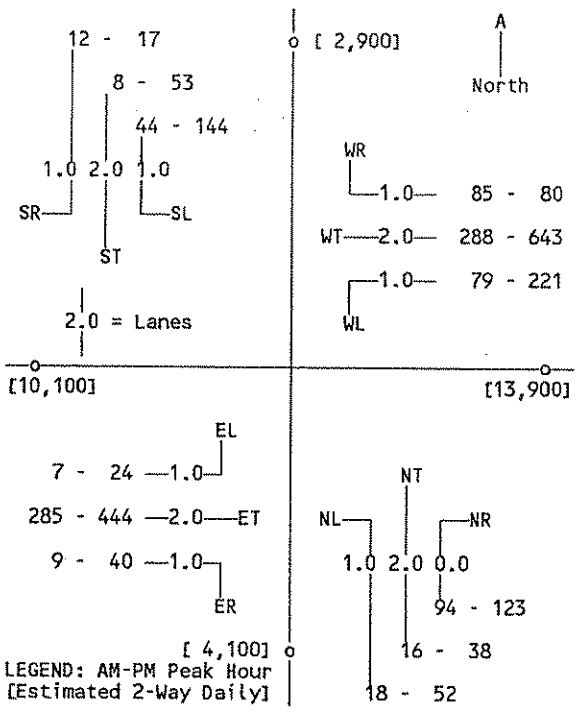
INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-13-02
GEOMETRICS: Existing

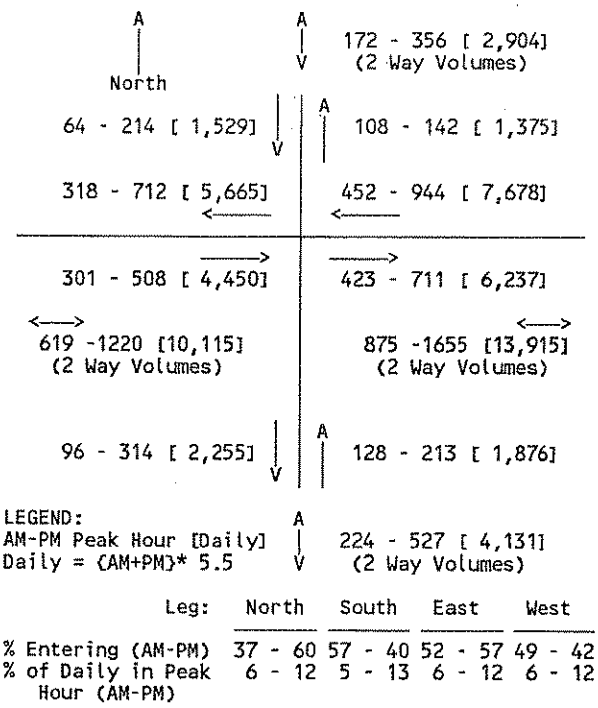
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	18	52	0	0	18	52	0.011	0.033
Northbound Through	2	3200	16	38	0	0	16	38	0.034*	0.050*
Northbound Right	0	0	93	122	1	1	94	123	0.000	0.000
Southbound Left	1	1600	44	144	0	0	44	144	0.028*	0.090*
Southbound Through	2	3200	8	53	0	0	8	53	0.003	0.017
Southbound Right	1	1600	12	17	0	0	12	17	0.008	0.011
Eastbound Left	1	1600	7	24	0	0	7	24	0.004	0.015
Eastbound Through	2	3200	285	444	0	0	285	444	0.089*	0.139*
Eastbound Right	1	1600	9	40	0	0	9	40	0.006	0.025
Westbound Left	1	1600	78	221	1	0	79	221	0.049*	0.138*
Westbound Through	2	3200	288	643	0	0	288	643	0.090	0.201
Westbound Right	1	1600	85	80	0	0	85	80	0.053	0.050
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.300	0.517
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

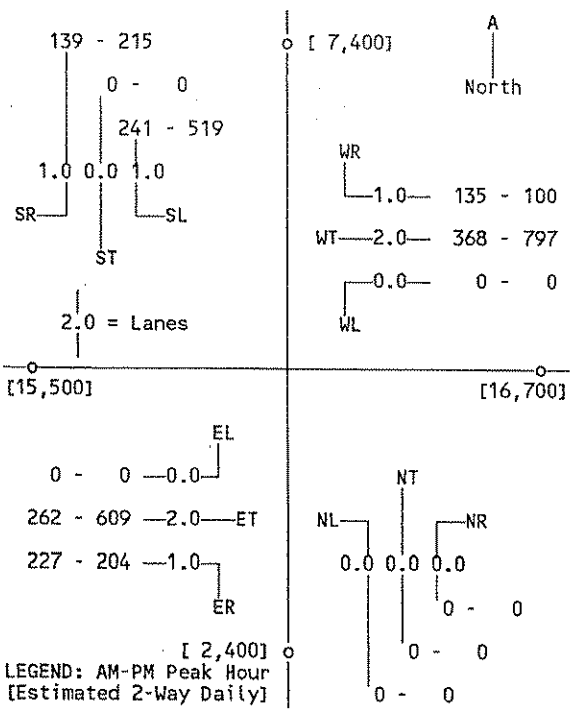
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

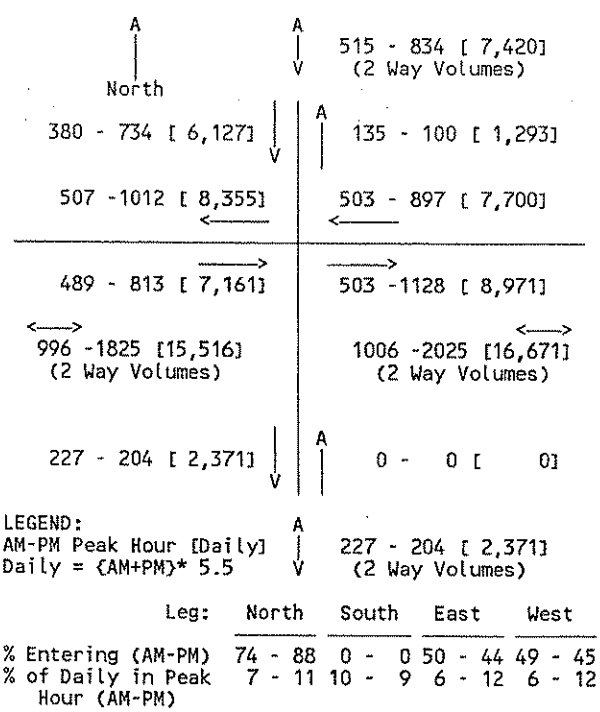
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	241	519	0	0	241	519	0.151*	0.324*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	138	215	1	0	139	215	0.087	0.134
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	261	608	1	1	262	609	0.082	0.190
Eastbound Right	Free 1	1600	227	204	0	0	227	204	0.142	0.128
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	368	797	0	0	368	797	0.115*	0.249*
Westbound Right	Free 1	1600	135	100	0	0	135	100	0.084	0.063
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.366	0.673
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

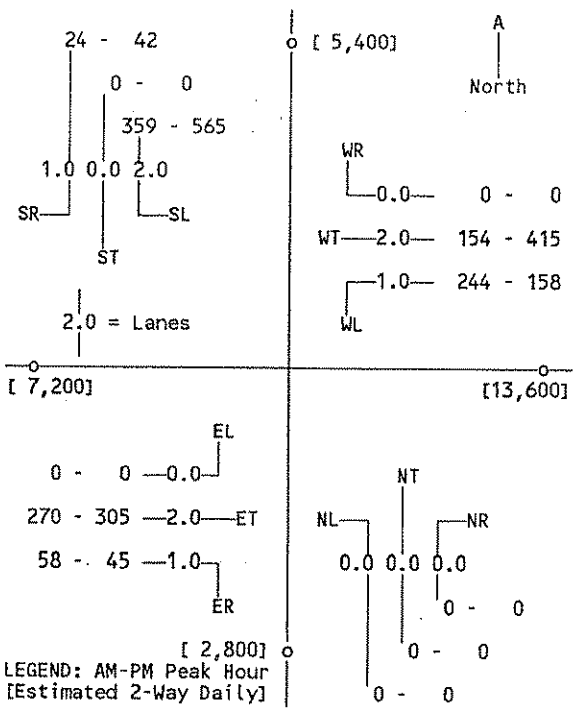
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	359	565	0	0	359	565	0.125*	0.196*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	24	42	0	0	24	42	0.015	0.026
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	266	302	4	3	270	305	0.084*	0.095*
Eastbound Right	Free 1	1600	55	43	3	2	58	45	0.036	0.028
Westbound Left	1	1600	244	158	0	0	244	158	0.153*	0.099*
Westbound Through	2	3200	148	414	6	1	154	415	0.048	0.130
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.462	0.490
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

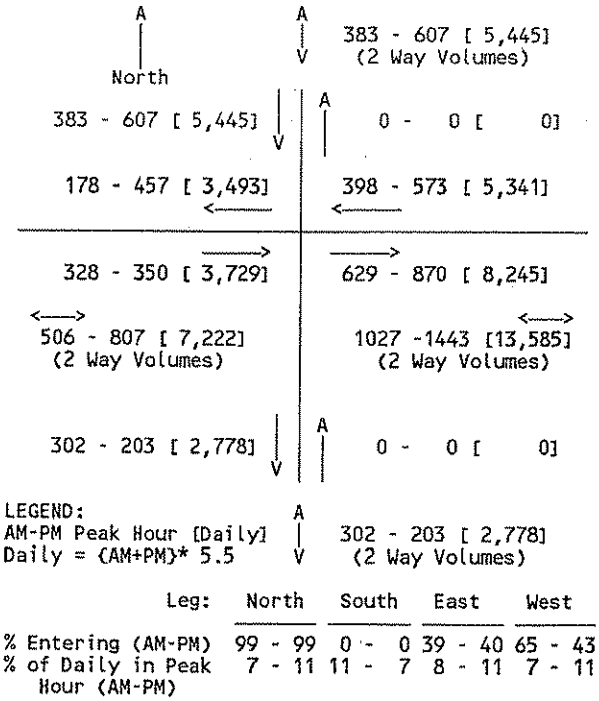
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
302 - 203 [2,778]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

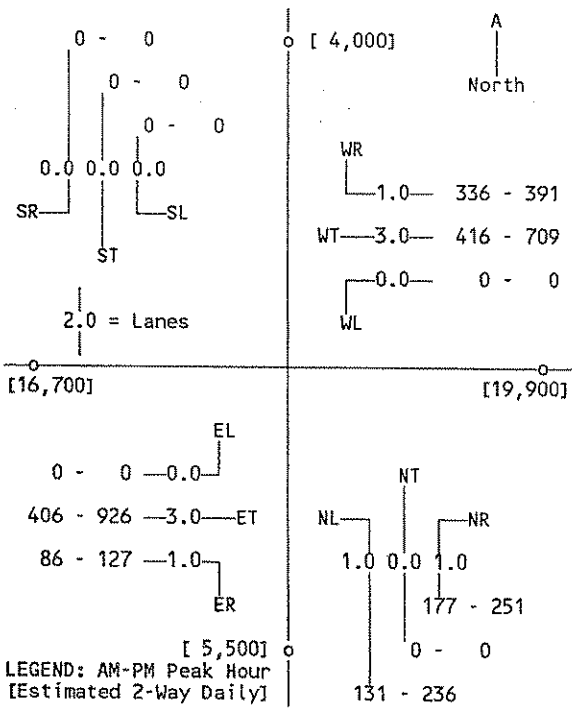
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	131	236	0	0	131	236	0.082*	0.147*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	177	251	0	0	177	251	0.111	0.157
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	406	926	0	0	406	926	0.085	0.193*
Eastbound Right	Free 1	1600	85	126	1	1	86	127	0.054	0.079
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	416	709	0	0	416	709	0.087*	0.148
Westbound Right	Free 1	1600	336	391	0	0	336	391	0.210	0.244
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.269	0.440
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

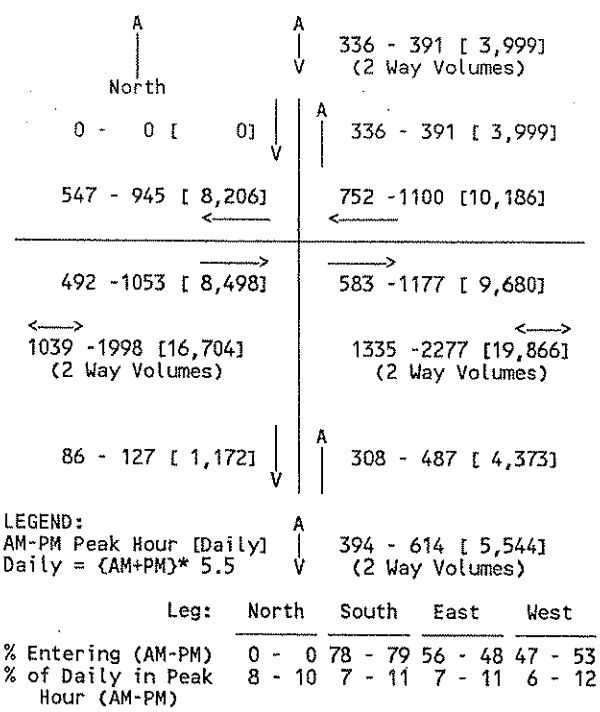
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

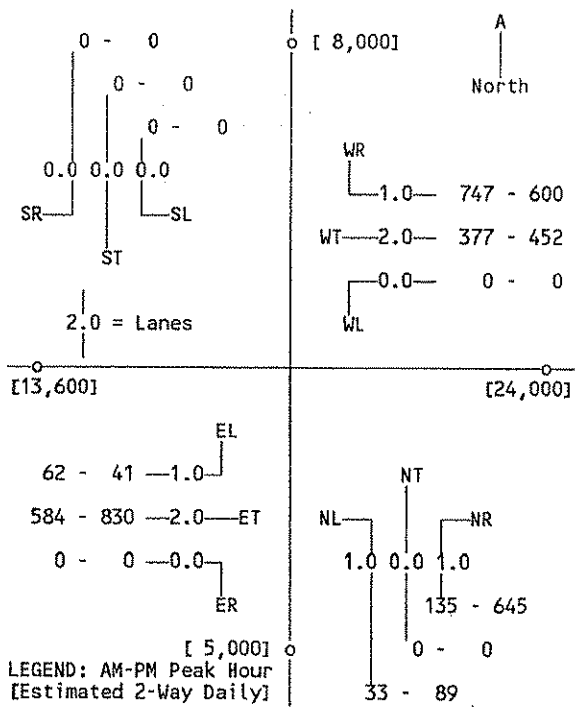
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	30	89	3	0	33	89	0.021*	0.056*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	135	645	0	0	135	645	0.084	0.403
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	62	41	0	0	62	41	0.039	0.026
Eastbound Through	2	3200	580	827	4	3	584	830	0.183*	0.259*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	373	452	4	0	377	452	0.118	0.141
Westbound Right	Free 1	1600	747	600	0	0	747	600	0.467	0.375

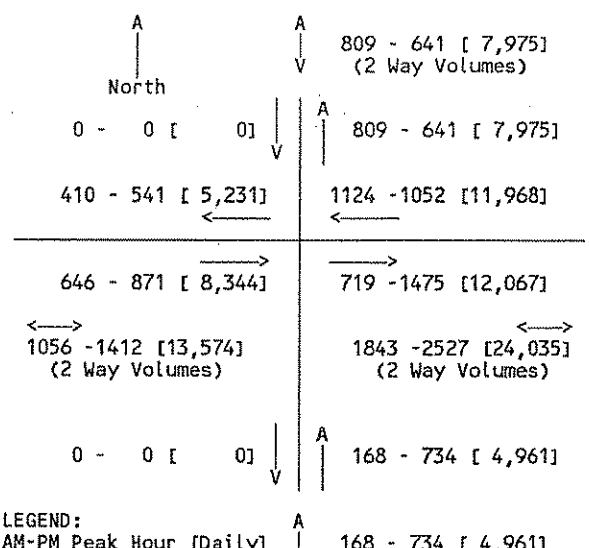
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)		0.304	0.415
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
168 - 734 [4,961]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

Year 2007 With Project
(Avergae Inflow of Material, 3,613 Tons per Day)

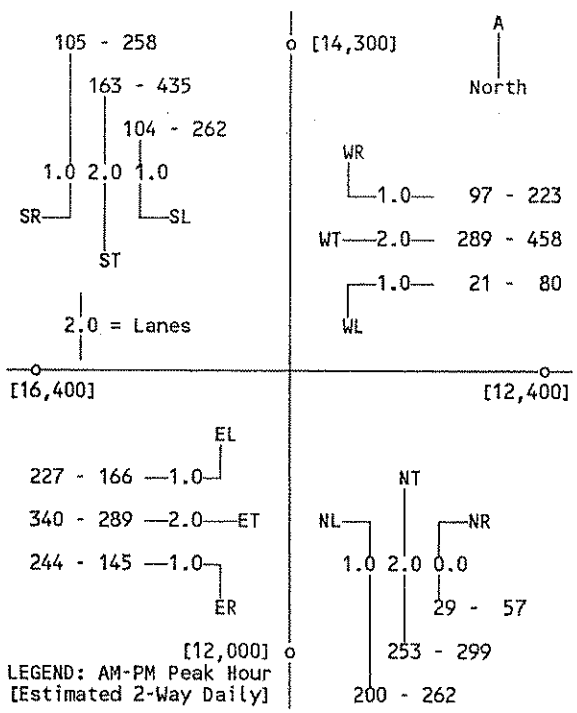
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

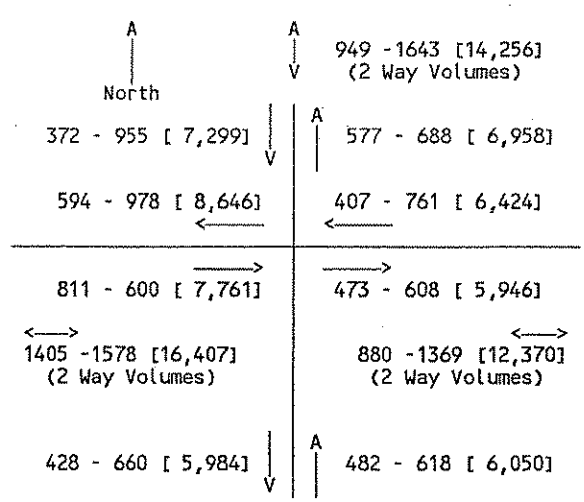
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	195	258	5	4	200	262	0.125*	0.164*
Northbound Through	2	3200	246	294	7	5	253	299	0.088	0.111
Northbound Right	0	0	29	57	0	0	29	57	0.000	0.000
Southbound Left	1	1600	104	262	0	0	104	262	0.065	0.164
Southbound Through	2	3200	156	433	7	2	163	435	0.051*	0.136*
Southbound Right	1	1600	105	258	0	0	105	258	0.066	0.161
Eastbound Left	1	1600	227	166	0	0	227	166	0.142*	0.104*
Eastbound Through	2	3200	340	289	0	0	340	289	0.106	0.090
Eastbound Right	1	1600	239	144	5	1	244	145	0.153	0.091
Westbound Left	1	1600	21	80	0	0	21	80	0.013	0.050
Westbound Through	2	3200	289	458	0	0	289	458	0.090*	0.143*
Westbound Right	1	1600	97	223	0	0	97	223	0.061	0.139
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.015*	0.025*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.523	0.672
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
910 -1278 [12,034]
V
(2 Way Volumes)

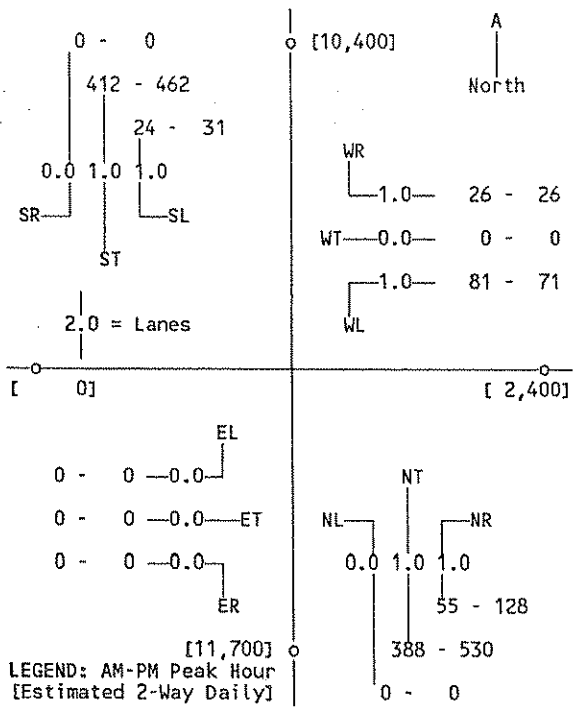
Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	8 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

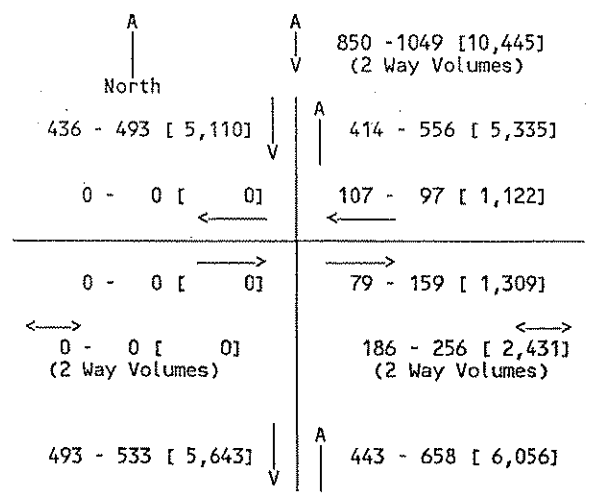
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW) — COUNT DATE: 11-12-02
LAND USE: EXISTING PLUS PROJECT — GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	375	521	13	9	388	530	0.243	0.331*
Northbound Right	1	1600	53	127	2	1	55	128	0.034	0.080
Southbound Left	1	1600	24	31	0	0	24	31	0.015	0.019*
Southbound Through	1	1600	400	459	12	3	412	462	0.258*	0.289
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	79	71	2	0	81	71	0.051*	0.044*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	26	26	0	0	26	26	0.016	0.016
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.409	0.494
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

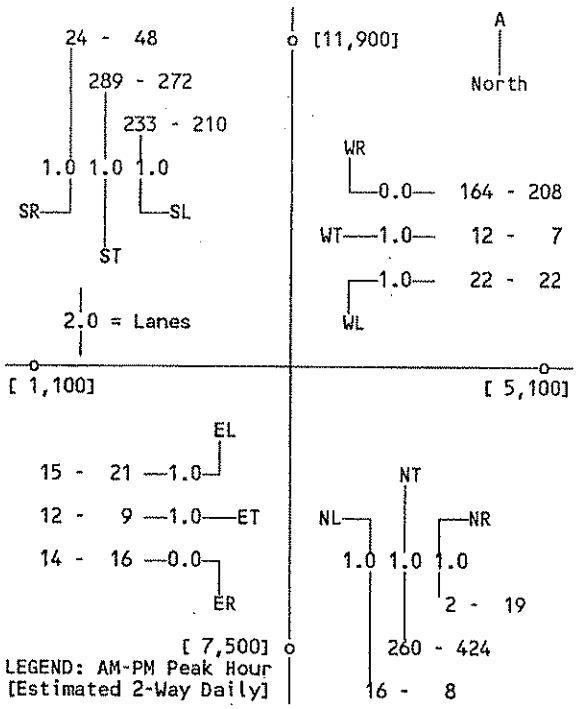
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	5	5	11	3	16	8	0.010	0.005
Northbound Through	1	1600	260	424	0	0	260	424	0.163*	0.265*
Northbound Right	1	1600	2	19	0	0	2	19	0.001	0.012
Southbound Left	1	1600	233	210	0	0	233	210	0.146*	0.131*
Southbound Through	1	1600	289	272	0	0	289	272	0.181	0.170
Southbound Right	1	1600	10	44	14	4	24	48	0.015	0.030
Eastbound Left	1	1600	1	10	14	11	15	21	0.009*	0.013*
Eastbound Through	1	1600	1	1	11	8	12	9	0.016	0.016
Eastbound Right	0	0	3	8	11	8	14	16	0.000	0.000
Westbound Left	1	1600	22	22	0	0	22	22	0.014	0.014
Westbound Through	1	1600	1	4	11	3	12	7	0.110*	0.134*
Westbound Right	0	0	164	208	0	0	164	208	0.000	0.000

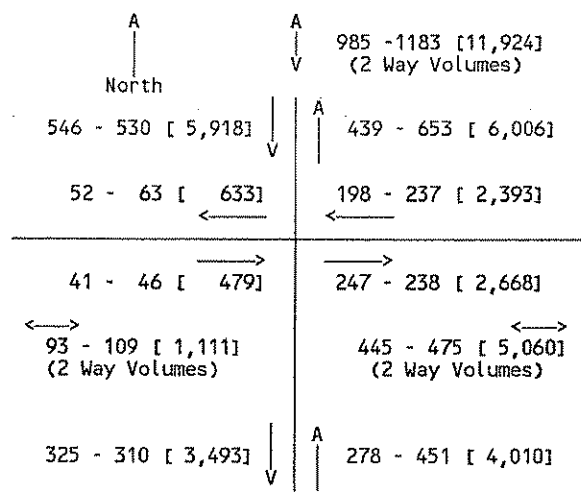
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.528	0.643
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily] — A — 603 - 761 [7,502]
Daily = (AM+PM)* 5.5 — (2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 45	46 - 59	44 - 50	44 - 42
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 9	8 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW)
LAND USE: EXISTING PLUS PROJECT

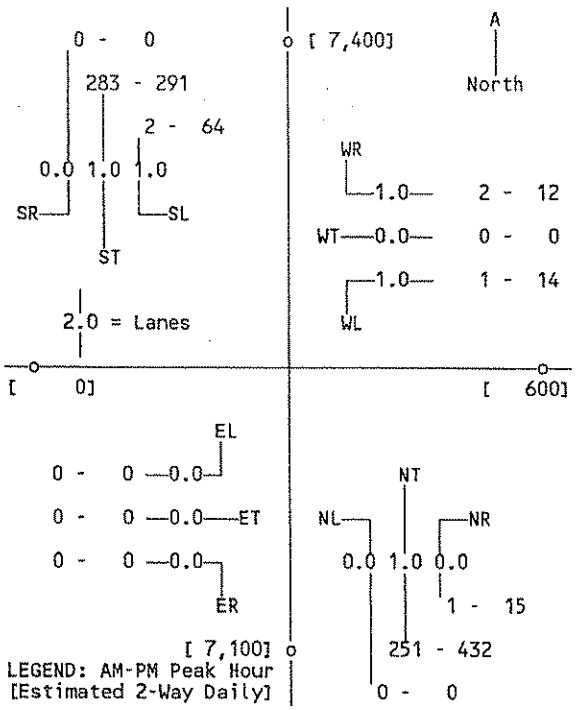
COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	240	429	11	3	251	432	0.158	0.279*
Northbound Right	0	0	1	15	0	0	1	15	0.000	0.000
Southbound Left	1	1600	2	64	0	0	2	64	0.001	0.040*
Southbound Through	1	1600	272	283	11	8	283	291	0.177*	0.182
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	14	0	0	1	14	0.001*	0.009*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	2	12	0	0	2	12	0.001	0.008

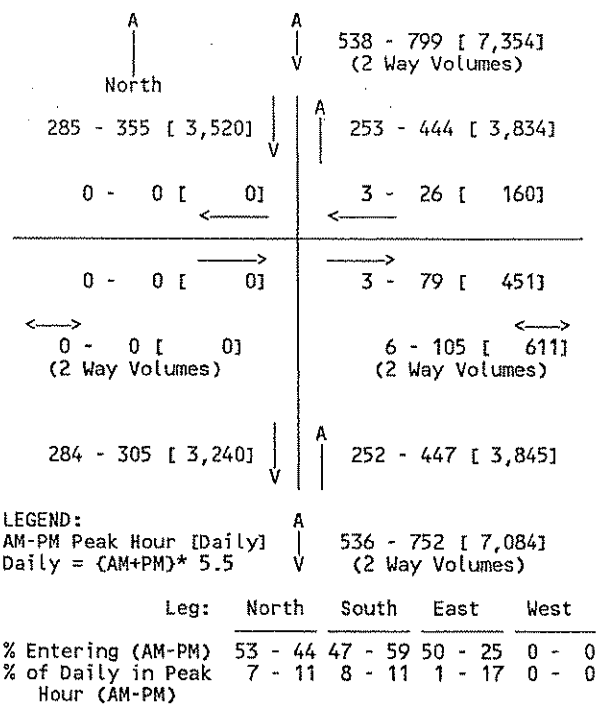
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*

INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>	0.278	0.428
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)	A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 59	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	8 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

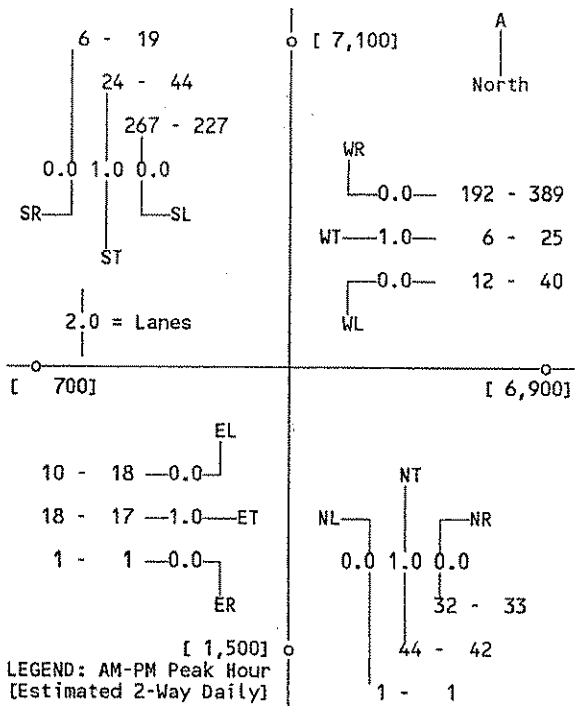
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

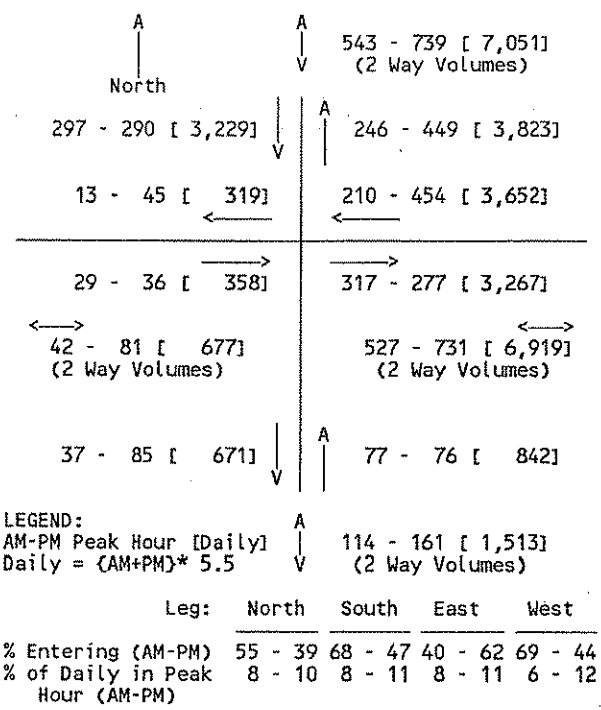
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	42	42	2	0	44	42	0.048	0.048
Northbound Right	0	0	32	33	0	0	32	33	0.000	0.000
Southbound Left	0	0	258	220	9	7	267	227	0.000	0.000
Southbound Through	1	1600	22	43	2	1	24	44	0.186*	0.181*
Southbound Right	0	0	6	19	0	0	6	19	0.000	0.000
Eastbound Left	0	0	10	18	0	0	10	18	0.000*	0.000*
Eastbound Through	1	1600	18	17	0	0	18	17	0.018	0.023
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	12	40	0	0	12	40	0.000	0.000
Westbound Through	1	1600	6	25	0	0	6	25	0.131*	0.284*
Westbound Right	0	0	183	387	9	2	192	389	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.417	0.565
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 47	40 - 62	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 11	8 - 11	6 - 12

Kunzman Associates

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

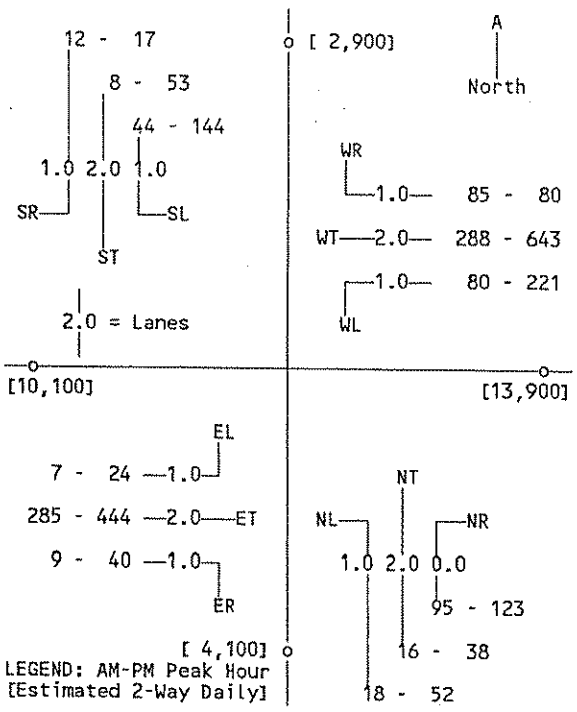
INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-13-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	18	52	0	0	18	52	0.011	0.033
Northbound Through	2	3200	16	38	0	0	16	38	0.035*	0.050*
Northbound Right	0	0	93	122	2	1	95	123	0.000	0.000
Southbound Left	1	1600	44	144	0	0	44	144	0.028*	0.090*
Southbound Through	2	3200	8	53	0	0	8	53	0.003	0.017
Southbound Right	1	1600	12	17	0	0	12	17	0.008	0.011
Eastbound Left	1	1600	7	24	0	0	7	24	0.004	0.015
Eastbound Through	2	3200	285	444	0	0	285	444	0.089*	0.139*
Eastbound Right	1	1600	9	40	0	0	9	40	0.006	0.025
Westbound Left	1	1600	78	221	2	0	80	221	0.050*	0.138*
Westbound Through	2	3200	288	643	0	0	288	643	0.090	0.201
Westbound Right	1	1600	85	80	0	0	85	80	0.053	0.050
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.302	0.517
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

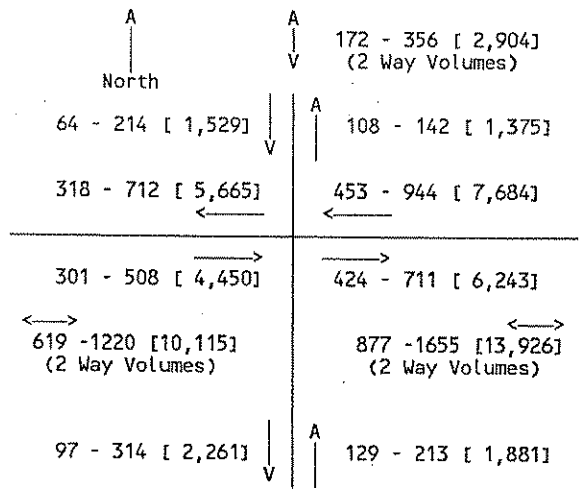
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
226 - 527 [4,142]
V
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

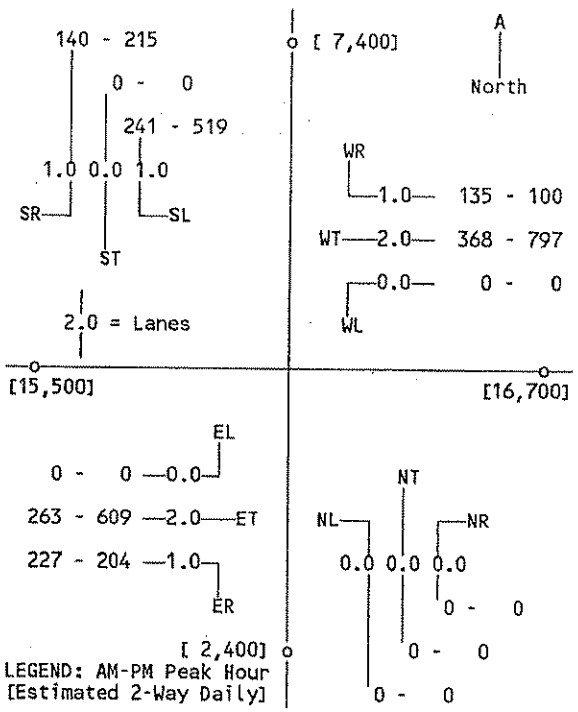
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

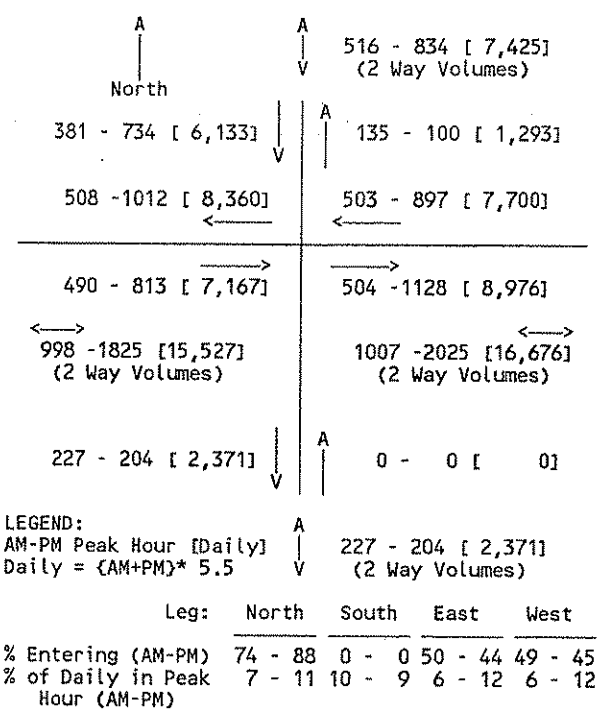
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	241	519	0	0	241	519	0.151*	0.324*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	138	215	2	0	140	215	0.088	0.134
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	261	608	2	1	263	609	0.082	0.190
Eastbound Right	Free 1	1600	227	204	0	0	227	204	0.142	0.128
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	368	797	0	0	368	797	0.115*	0.249*
Westbound Right	Free 1	1600	135	100	0	0	135	100	0.084	0.063
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.366	0.673
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

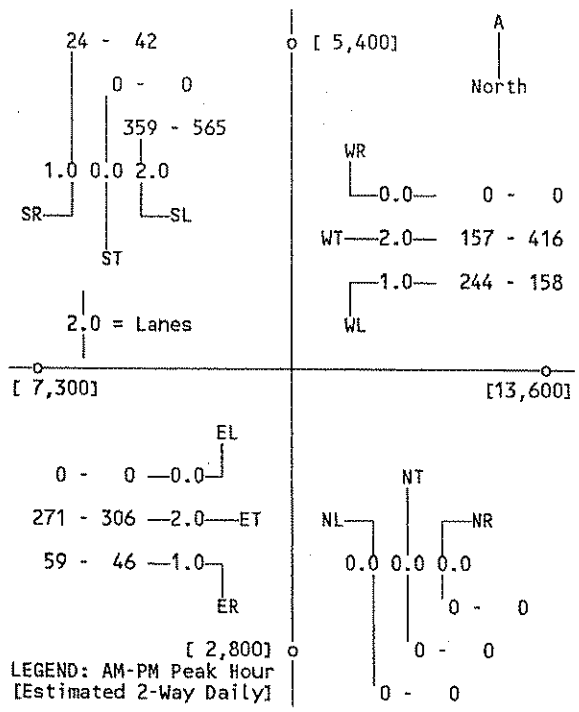
COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	359	565	0	0	359	565	0.125*	0.196*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	24	42	0	0	24	42	0.015	0.026
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	266	302	5	4	271	306	0.085*	0.096*
Eastbound Right	Free 1	1600	55	43	4	3	59	46	0.037	0.029
Westbound Left	1	1600	244	158	0	0	244	158	0.153*	0.099*
Westbound Through	2	3200	148	414	9	2	157	416	0.049	0.130
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*

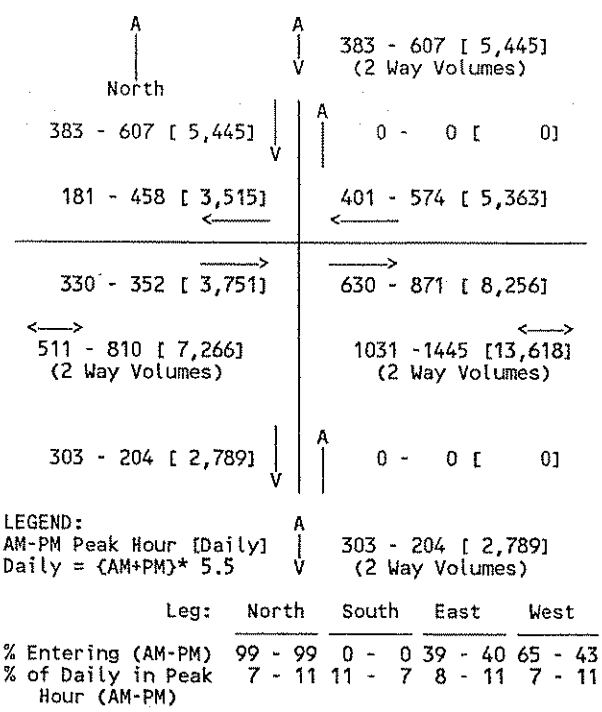
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>	0.463	0.491
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)	A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
303 - 204 [2,789]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

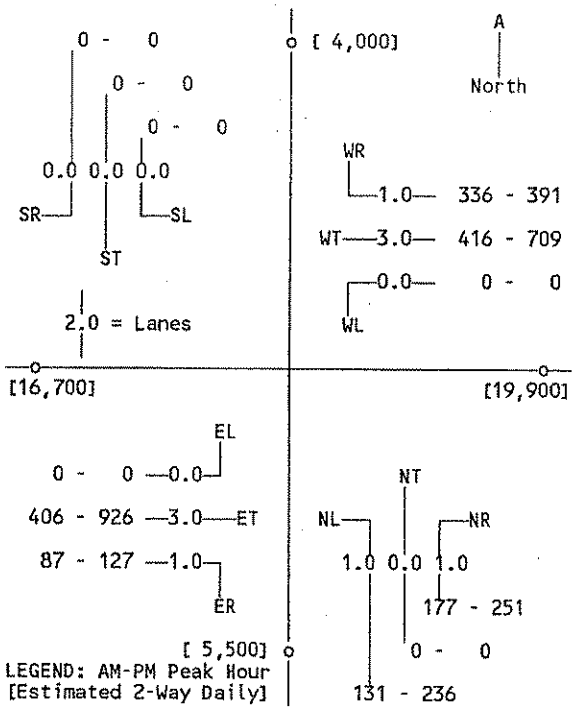
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	131	236	0	0	131	236	0.082*	0.147*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	177	251	0	0	177	251	0.111	0.157
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	406	926	0	0	406	926	0.085	0.193*
Eastbound Right	Free 1	1600	85	126	2	1	87	127	0.054	0.079
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	416	709	0	0	416	709	0.087*	0.148
Westbound Right	Free 1	1600	336	391	0	0	336	391	0.210	0.244
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.269	0.440
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

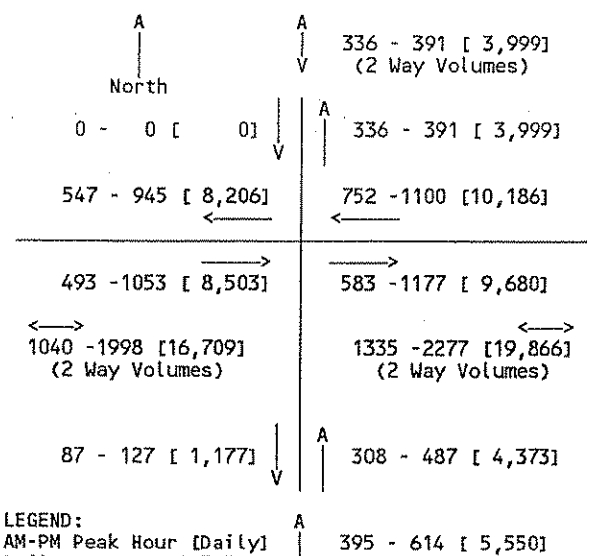
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

Kunzman Associates

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

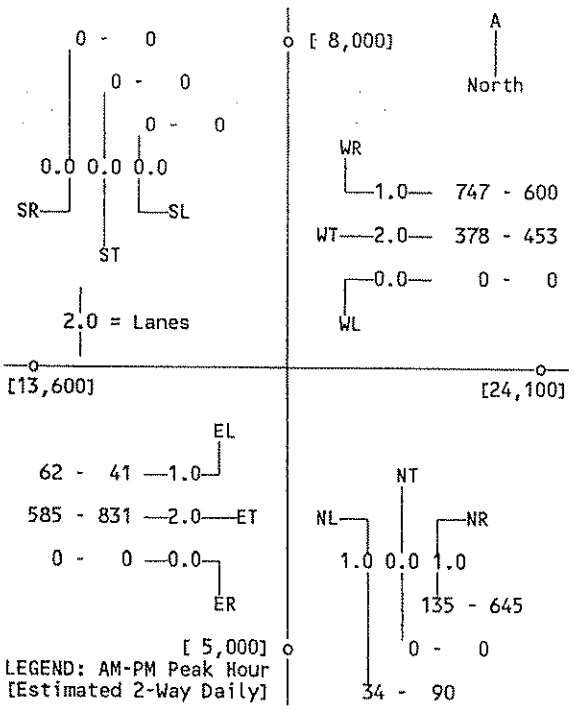
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: EXISTING PLUS PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	30	89	4	1	34	90	0.021*	0.056*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	135	645	0	0	135	645	0.084	0.403
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	62	41	0	0	62	41	0.039	0.026
Eastbound Through	2	3200	580	827	5	4	585	831	0.183*	0.260*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	373	452	5	1	378	453	0.118	0.142
Westbound Right	Free 1	1600	747	600	0	0	747	600	0.467	0.375
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.304	0.416
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

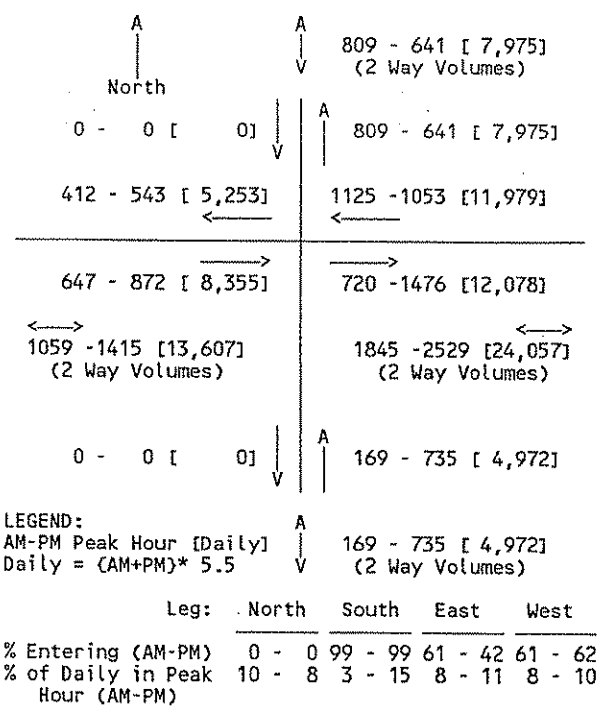
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

Year 2007 Without Project

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

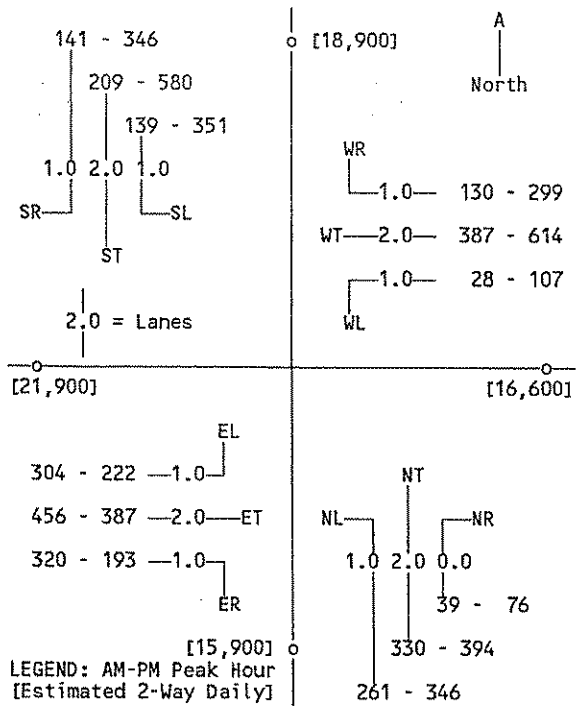
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

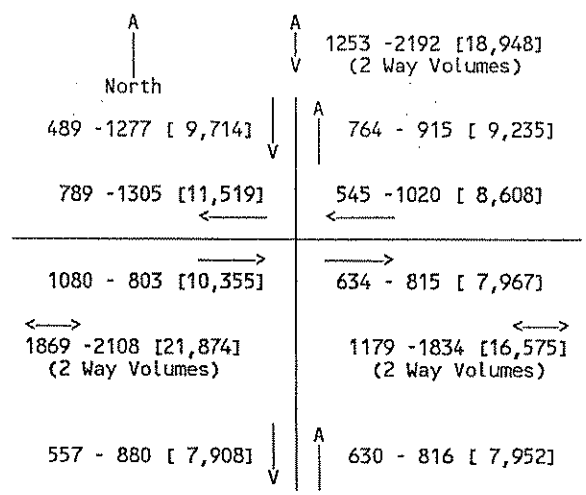
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	261	346	0	0	261	346	0.163*	0.216*
Northbound Through	2	3200	330	394	0	0	330	394	0.115	0.147
Northbound Right	0	0	39	76	0	0	39	76	0.000	0.000
Southbound Left	1	1600	139	351	0	0	139	351	0.087	0.219
Southbound Through	2	3200	209	580	0	0	209	580	0.065*	0.181*
Southbound Right	1	1600	141	346	0	0	141	346	0.088	0.216
Eastbound Left	1	1600	304	222	0	0	304	222	0.190*	0.139*
Eastbound Through	2	3200	456	387	0	0	456	387	0.142	0.121
Eastbound Right	1	1600	320	193	0	0	320	193	0.200	0.121
Westbound Left	1	1600	28	107	0	0	28	107	0.018	0.067
Westbound Through	2	3200	387	614	0	0	387	614	0.121*	0.192*
Westbound Right	1	1600	130	299	0	0	130	299	0.081	0.187
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.023*	0.035*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.662	0.863
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	7 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

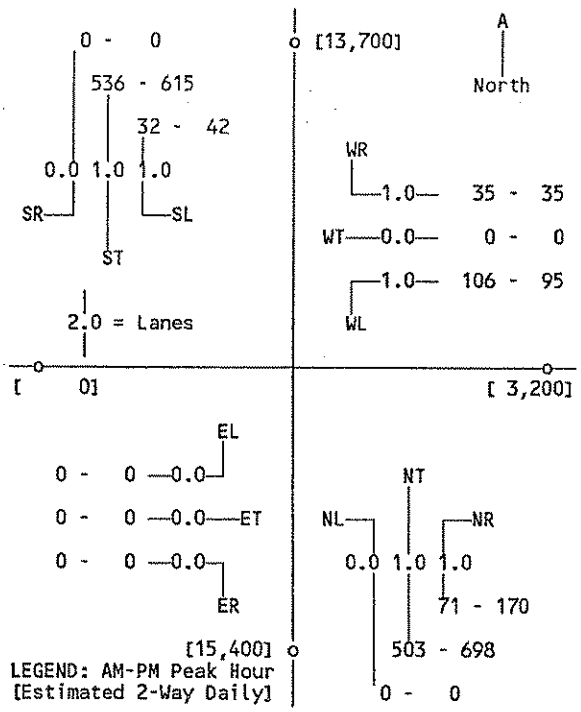
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	503	698	0	0	503	698	0.314	0.436*
Northbound Right	1	1600	71	170	0	0	71	170	0.044	0.106
Southbound Left	1	1600	32	42	0	0	32	42	0.020	0.026*
Southbound Through	1	1600	536	615	0	0	536	615	0.335*	0.384
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	106	95	0	0	106	95	0.066*	0.059*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	35	35	0	0	35	35	0.022	0.022

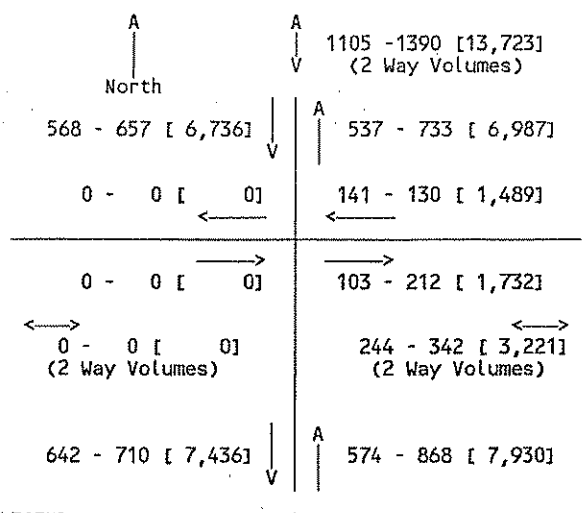
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.501	0.621
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
1215 -1579 [15,366]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

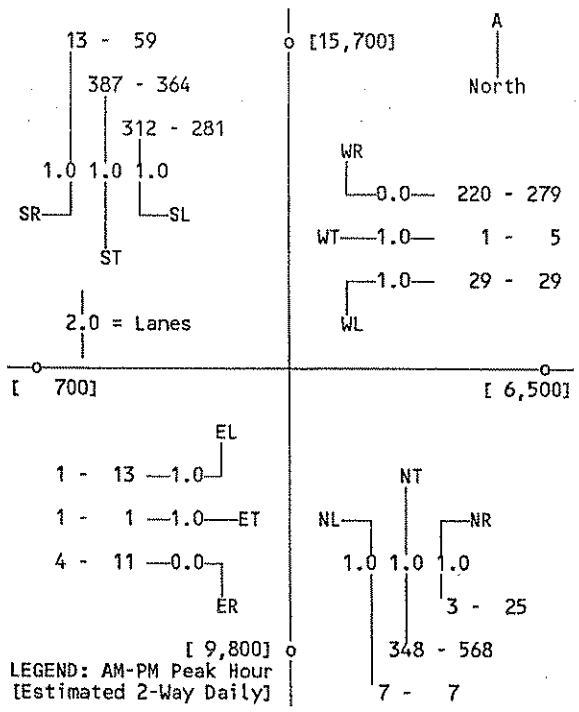
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	7	7	0	0	7	7	0.004	0.004
Northbound Through	1	1600	348	568	0	0	348	568	0.218*	0.355*
Northbound Right	1	1600	3	25	0	0	3	25	0.002	0.016
Southbound Left	1	1600	312	281	0	0	312	281	0.195*	0.176*
Southbound Through	1	1600	387	364	0	0	387	364	0.242	0.228
Southbound Right	1	1600	13	59	0	0	13	59	0.008	0.037
Eastbound Left	1	1600	1	13	0	0	1	13	0.001*	0.008*
Eastbound Through	1	1600	1	1	0	0	1	1	0.003	0.008
Eastbound Right	0	0	4	11	0	0	4	11	0.000	0.000
Westbound Left	1	1600	29	29	0	0	29	29	0.018	0.018
Westbound Through	1	1600	1	5	0	0	1	5	0.138*	0.178*
Westbound Right	0	0	220	279	0	0	220	279	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.652	0.817
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

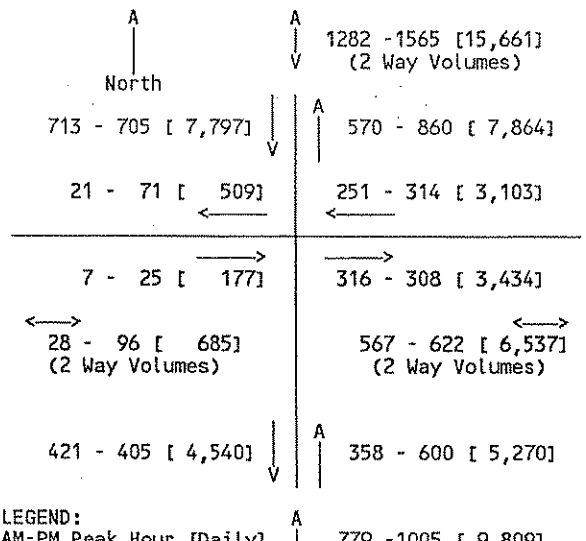
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	56 - 45	46 - 60	44 - 50	24 - 26
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 10	4 - 14

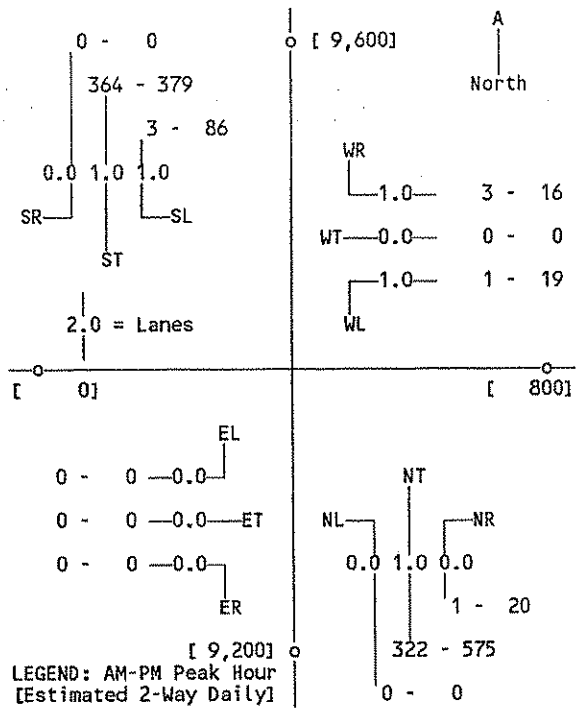
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW) — COUNT DATE: 11-12-02
LAND USE: YEAR 2007 WITHOUT PROJECT — GEOMETRICS: Improved

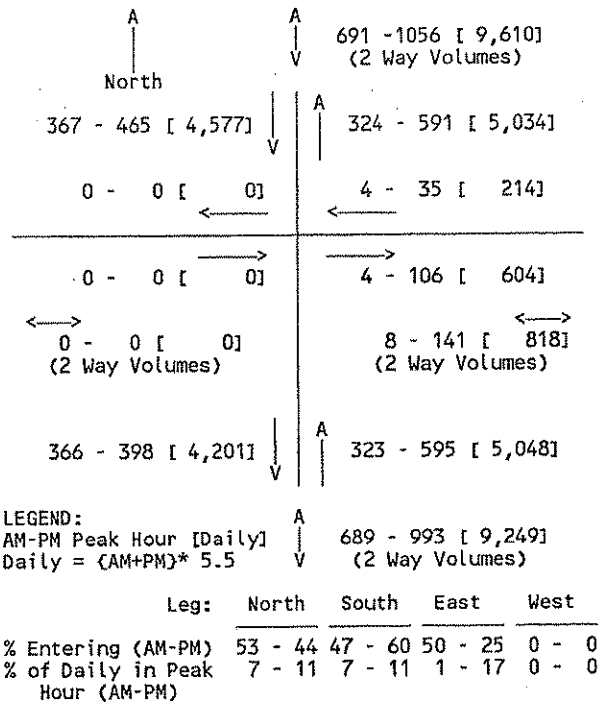
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	322	575	0	0	322	575	0.202	0.372*
Northbound Right	0	0	1	20	0	0	1	20	0.000	0.000
Southbound Left	1	1600	3	86	0	0	3	86	0.002	0.054*
Southbound Through	1	1600	364	379	0	0	364	379	0.228*	0.237
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	19	0	0	1	19	0.001*	0.012*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	3	16	0	0	3	16	0.002	0.010

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.001*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.330	0.538
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 60	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	7 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

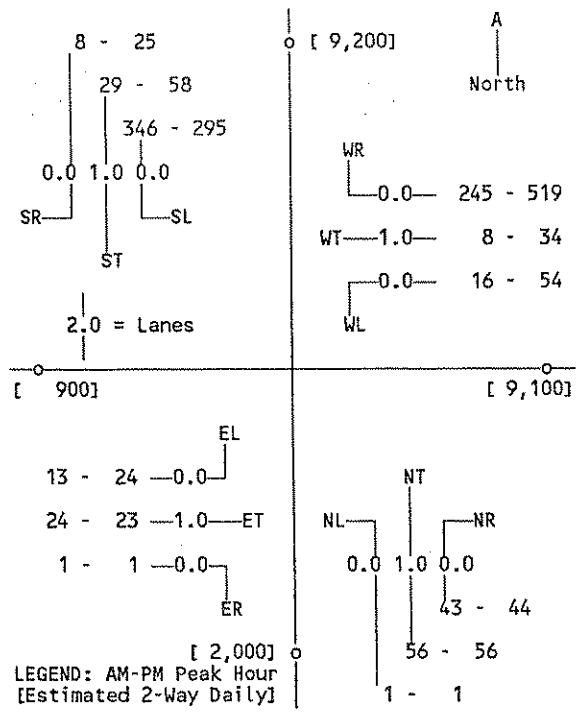
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

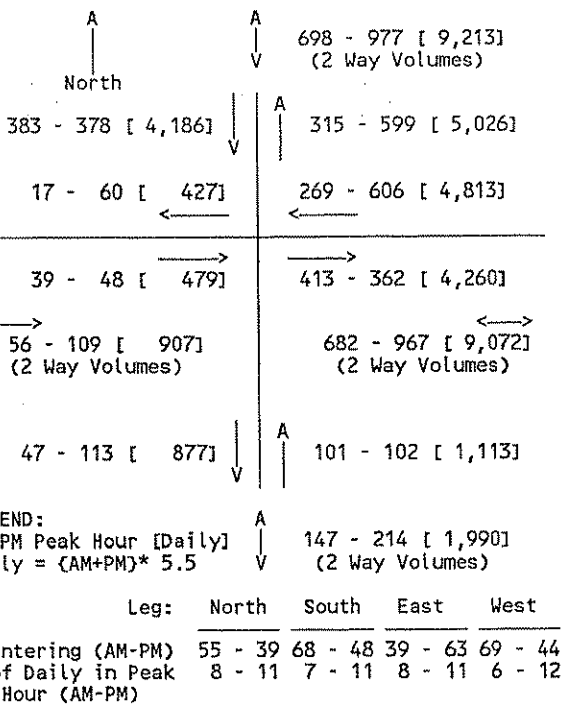
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	56	56	0	0	56	56	0.063	0.064
Northbound Right	0	0	43	44	0	0	43	44	0.000	0.000
Southbound Left	0	0	346	295	0	0	346	295	0.000	0.000
Southbound Through	1	1600	29	58	0	0	29	58	0.240*	0.236*
Southbound Right	0	0	8	25	0	0	8	25	0.000	0.000
Eastbound Left	0	0	13	24	0	0	13	24	0.000*	0.000*
Eastbound Through	1	1600	24	23	0	0	24	23	0.024	0.030
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	16	54	0	0	16	54	0.000	0.000
Westbound Through	1	1600	8	34	0	0	8	34	0.168*	0.379*
Westbound Right	0	0	245	519	0	0	245	519	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.508	0.715
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	C

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 48	39 - 63	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 11	7 - 11	8 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

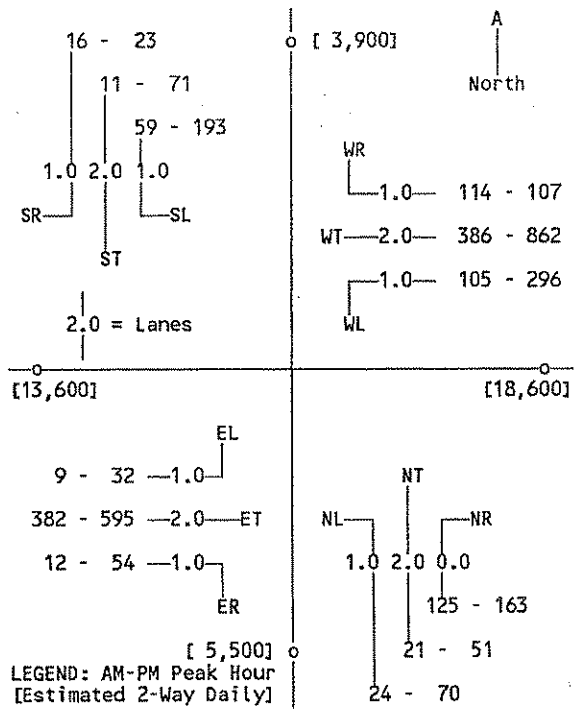
INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-13-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	24	70	0	0	24	70	0.015	0.044
Northbound Through	2	3200	21	51	0	0	21	51	0.046*	0.067*
Northbound Right	0	0	125	163	0	0	125	163	0.000	0.000
Southbound Left	1	1600	59	193	0	0	59	193	0.037*	0.121*
Southbound Through	2	3200	11	71	0	0	11	71	0.003	0.022
Southbound Right	1	1600	16	23	0	0	16	23	0.010	0.014
Eastbound Left	1	1600	9	32	0	0	9	32	0.006	0.020
Eastbound Through	2	3200	382	595	0	0	382	595	0.119*	0.186*
Eastbound Right	1	1600	12	54	0	0	12	54	0.008	0.034
Westbound Left	1	1600	105	296	0	0	105	296	0.065*	0.185*
Westbound Through	2	3200	386	862	0	0	386	862	0.121	0.269
Westbound Right	1	1600	114	107	0	0	114	107	0.071	0.067
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.367	0.659
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

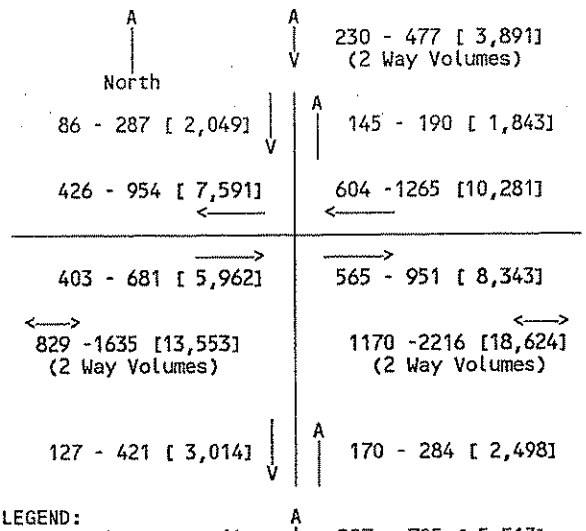
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
297 - 705 [5,513]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

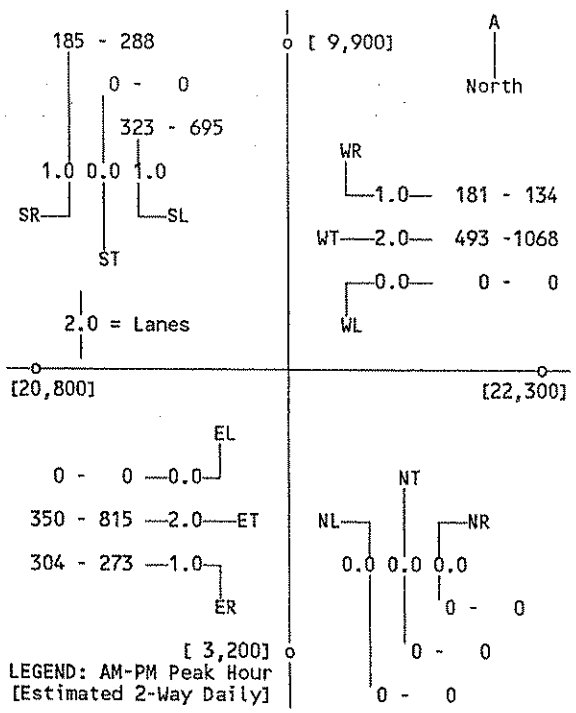
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	323	695	0	0	323	695	0.202*	0.435*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	185	288	0	0	185	288	0.116	0.180
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	350	815	0	0	350	815	0.109	0.255
Eastbound Right	Free 1	1600	304	273	0	0	304	273	0.190	0.171
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	493	1068	0	0	493	1068	0.154*	0.334*
Westbound Right	Free 1	1600	181	134	0	0	181	134	0.113	0.084

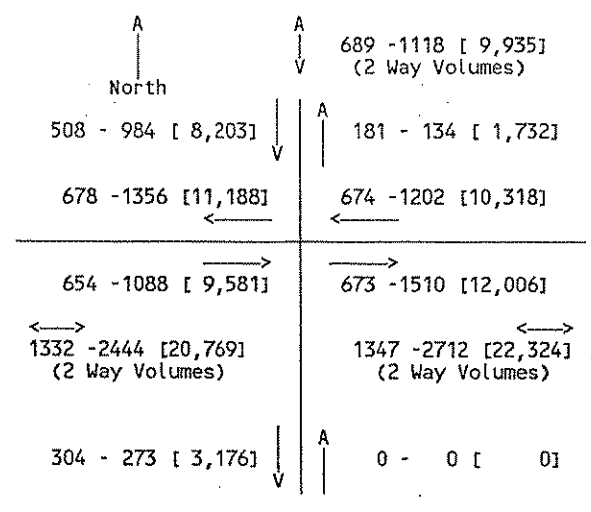
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.456	0.869
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	D

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
304 - 273 [3,176]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

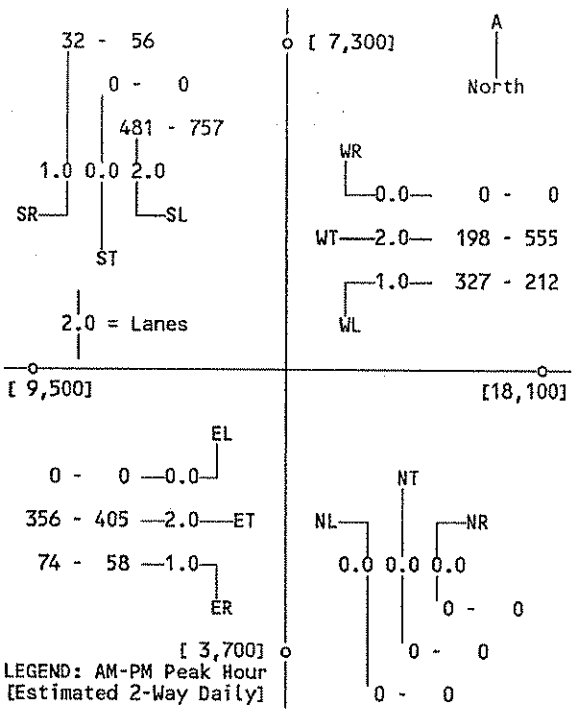
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	481	757	0	0	481	757	0.167*	0.263*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	32	56	0	0	32	56	0.020	0.035
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	356	405	0	0	356	405	0.111*	0.126*
Eastbound Right	Free 1	1600	74	58	0	0	74	58	0.046	0.036
Westbound Left	1	1600	327	212	0	0	327	212	0.204*	0.132*
Westbound Through	2	3200	198	555	0	0	198	555	0.062	0.173
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000

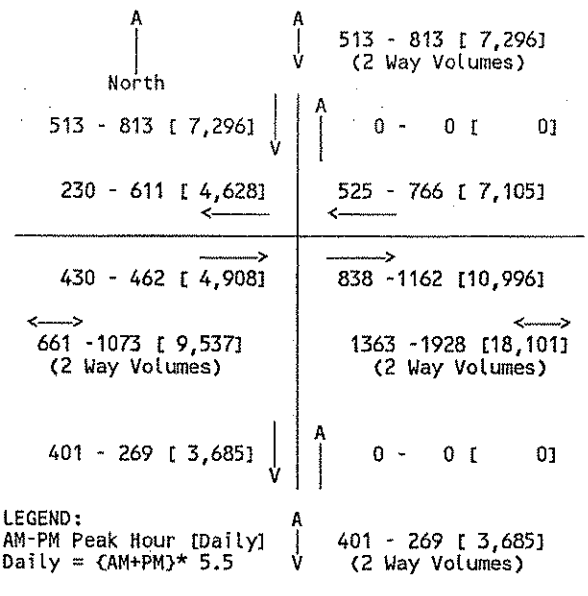
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.582	0.621
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
401 - 269 [3,685]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

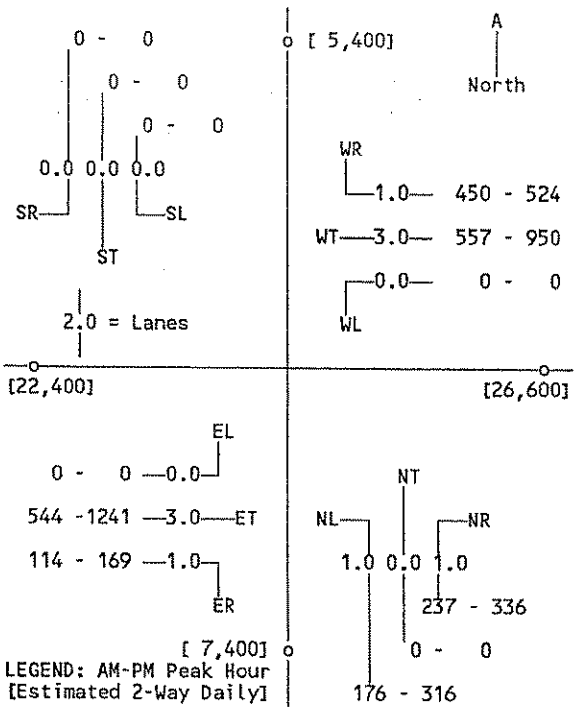
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	176	316	0	0	176	316	0.110*	0.198*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	237	336	0	0	237	336	0.148	0.210
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	544	1241	0	0	544	1241	0.113	0.259*
Eastbound Right	Free 1	1600	114	169	0	0	114	169	0.071	0.106
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	557	950	0	0	557	950	0.116*	0.198
Westbound Right	Free 1	1600	450	524	0	0	450	524	0.281	0.327
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.326	0.557
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

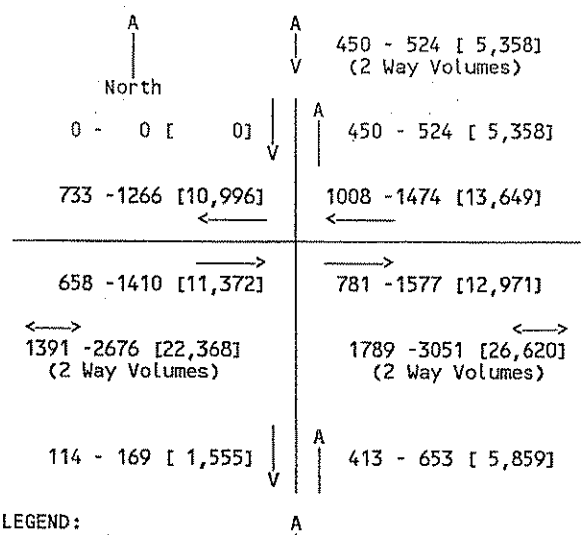
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
527 - 821 [7,414]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

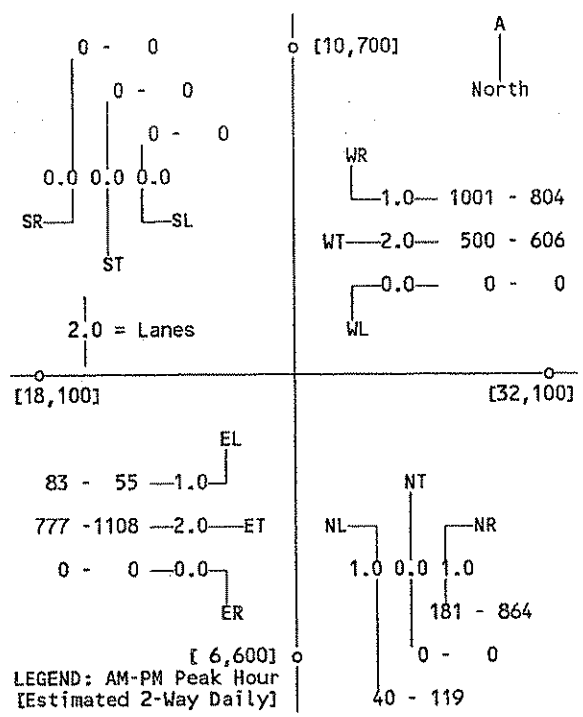
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITHOUT PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	40	119	0	0	40	119	0.025*	0.075*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	181	864	0	0	181	864	0.113	0.540
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	83	55	0	0	83	55	0.052	0.034
Eastbound Through	2	3200	777	1108	0	0	777	1108	0.243*	0.346*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	500	606	0	0	500	606	0.156	0.189
Westbound Right	Free 1	1600	1001	804	0	0	1001	804	0.626	0.503

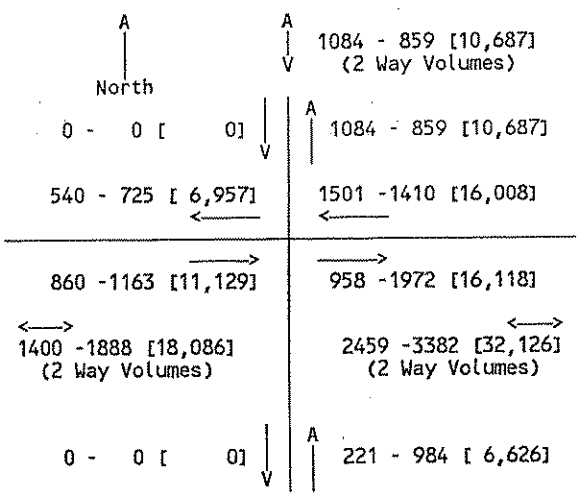
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.368	0.521
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
221 - 984 [6,626]
V
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

Year 2007 With Project
(Avergae Inflow of Material, 3,613 Tons per Day)

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

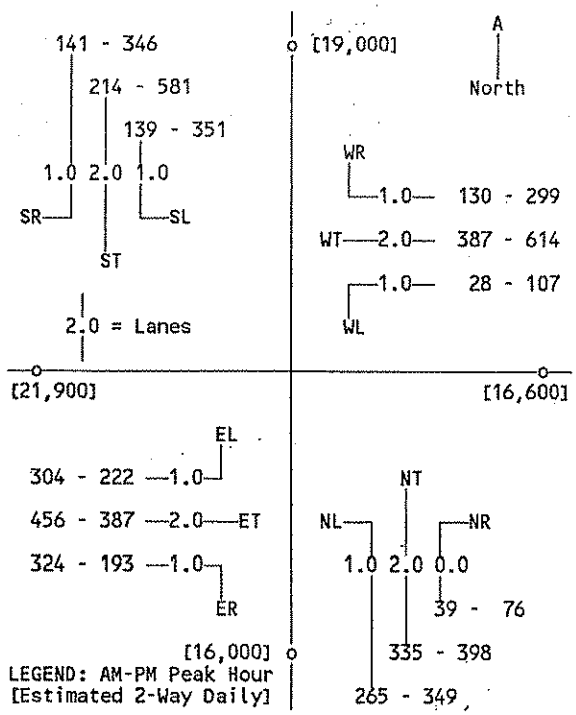
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	261	346	4	3	265	349	0.166*	0.218*
Northbound Through	2	3200	330	394	5	4	335	398	0.117	0.148
Northbound Right	0	0	39	76	0	0	39	76	0.000	0.000
Southbound Left	1	1600	139	351	0	0	139	351	0.087	0.219
Southbound Through	2	3200	209	580	5	1	214	581	0.067*	0.182*
Southbound Right	1	1600	141	346	0	0	141	346	0.088	0.216
Eastbound Left	1	1600	304	222	0	0	304	222	0.190*	0.139*
Eastbound Through	2	3200	456	387	0	0	456	387	0.142	0.121
Eastbound Right	1	1600	320	193	4	0	324	193	0.203	0.121
Westbound Left	1	1600	28	107	0	0	28	107	0.018	0.067
Westbound Through	2	3200	387	614	0	0	387	614	0.121*	0.192*
Westbound Right	1	1600	130	299	0	0	130	299	0.081	0.187
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.021*	0.034*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.665	0.865
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

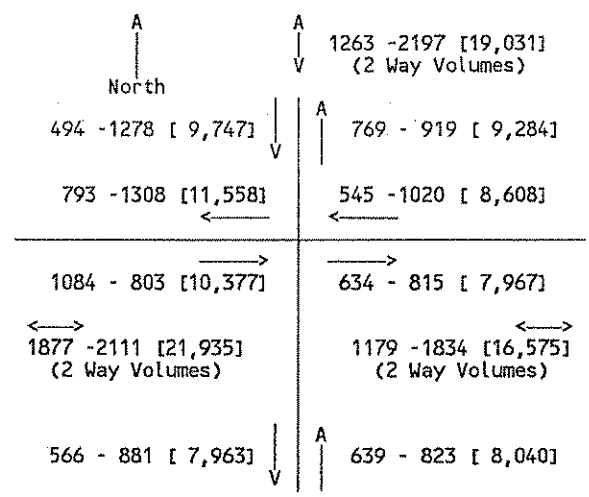
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
V
1205 -1704 [16,003]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	8 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

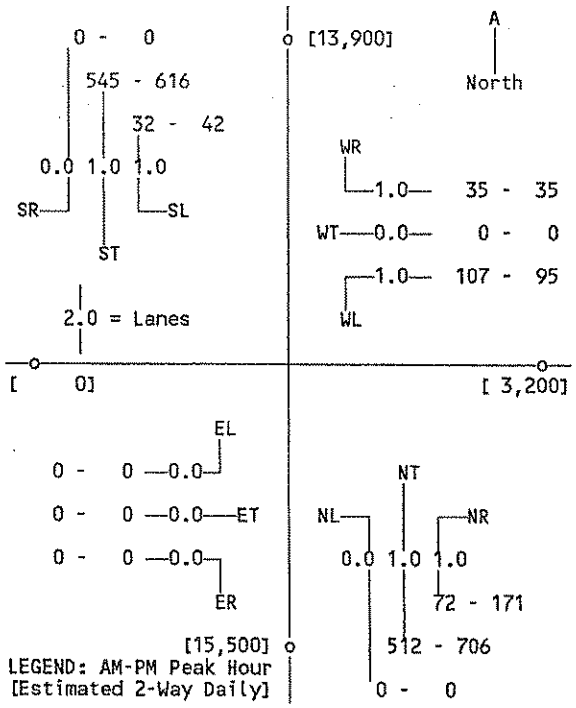
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

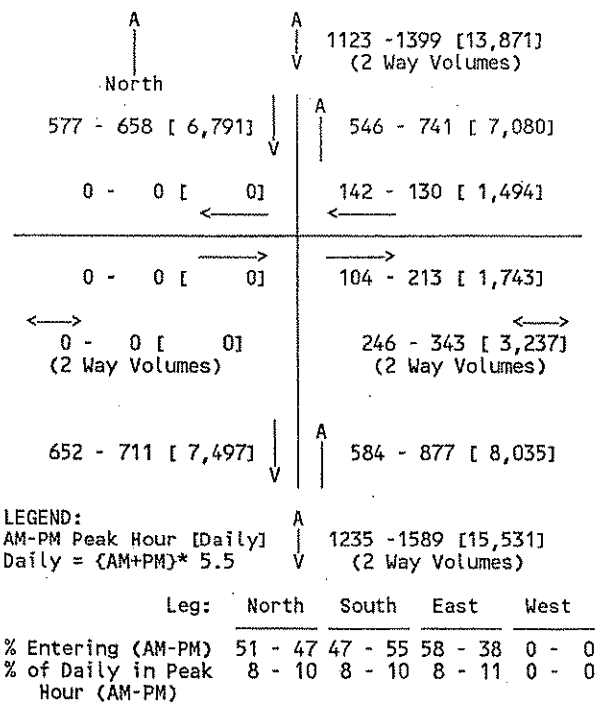
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	503	698	9	8	512	706	0.320	0.441*
Northbound Right	1	1600	71	170	1	1	72	171	0.045	0.107
Southbound Left	1	1600	32	42	0	0	32	42	0.020	0.026*
Southbound Through	1	1600	536	615	9	1	545	616	0.341*	0.385
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	106	95	1	0	107	95	0.067*	0.059*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	35	35	0	0	35	35	0.022	0.022

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.508	0.626
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

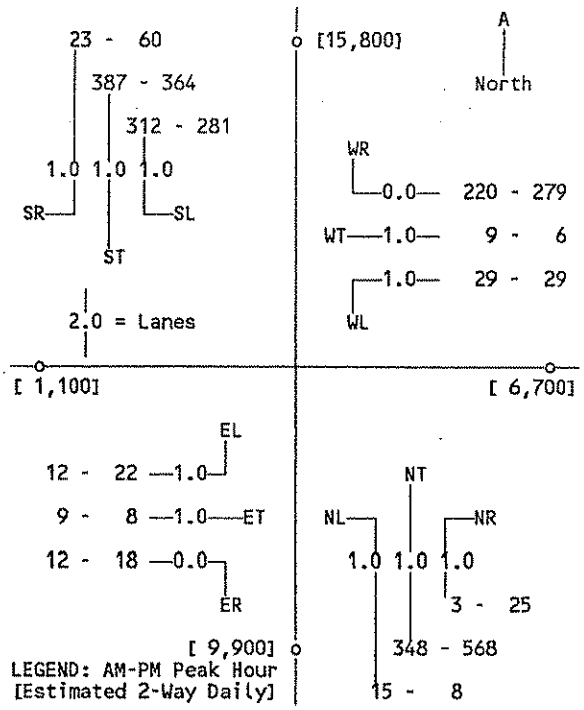
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	7	7	8	1	15	8	0.009	0.005
Northbound Through	1	1600	348	568	0	0	348	568	0.218*	0.355*
Northbound Right	1	1600	3	25	0	0	3	25	0.002	0.016
Southbound Left	1	1600	312	281	0	0	312	281	0.195*	0.176*
Southbound Through	1	1600	387	364	0	0	387	364	0.242	0.228
Southbound Right	1	1600	13	59	10	1	23	60	0.015	0.037
Eastbound Left	1	1600	1	13	11	9	12	22	0.008*	0.014*
Eastbound Through	1	1600	1	1	8	7	9	8	0.013	0.016
Eastbound Right	0	0	4	11	8	7	12	18	0.000	0.000
Westbound Left	1	1600	29	29	0	0	29	29	0.018	0.018
Westbound Through	1	1600	1	5	8	1	9	6	0.143*	0.178*
Westbound Right	0	0	220	279	0	0	220	279	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.664	0.823
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

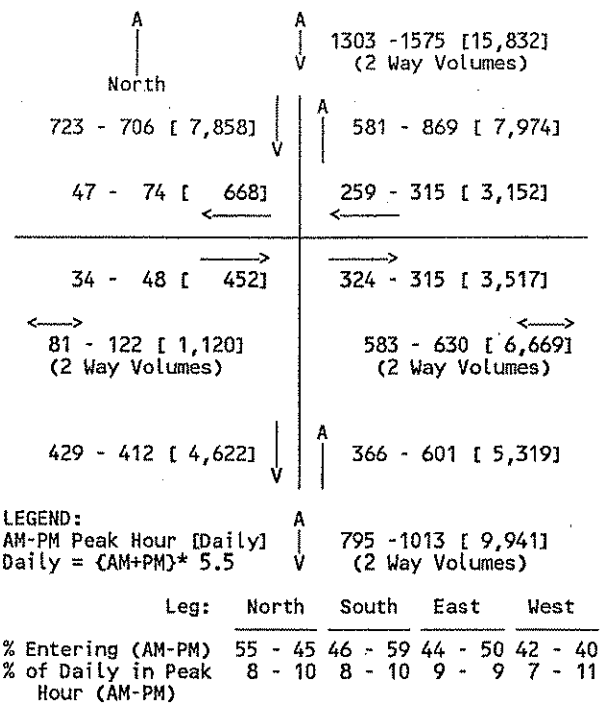
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 45	46 - 59	44 - 50	42 - 40
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 9	7 - 11

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

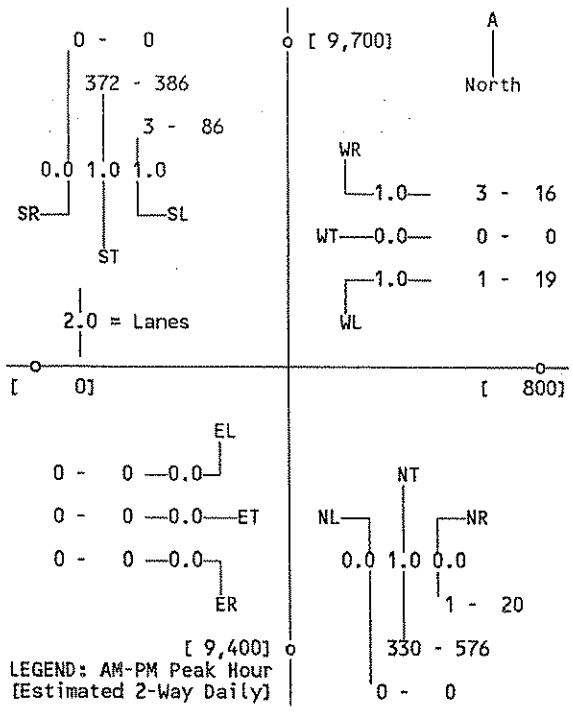
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

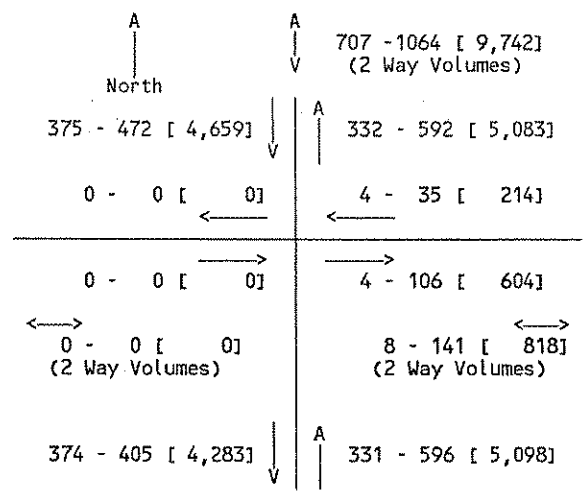
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	322	575	8	1	330	576	0.207	0.372*
Northbound Right	0	0	1	20	0	0	1	20	0.000	0.000
Southbound Left	1	1600	3	86	0	0	3	86	0.002	0.054*
Southbound Through	1	1600	364	379	8	7	372	386	0.233*	0.241
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	19	0	0	1	19	0.001*	0.012*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	3	16	0	0	3	16	0.002	0.010
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.001*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.335	0.538
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 60	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	8 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

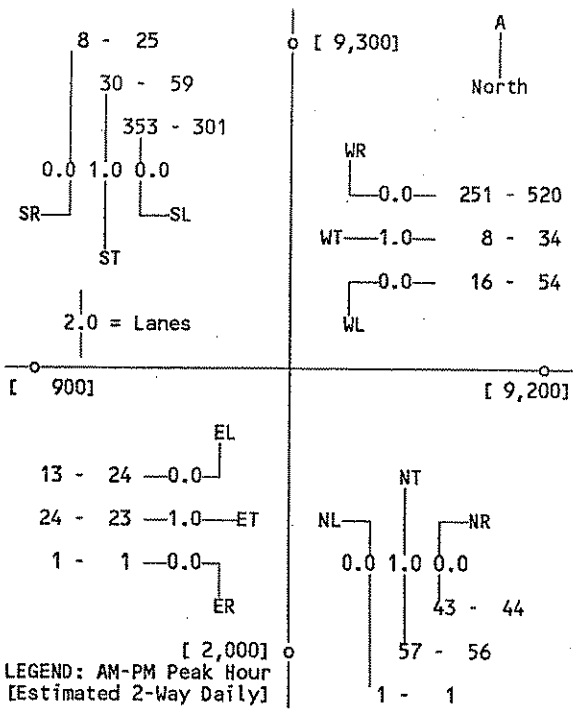
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

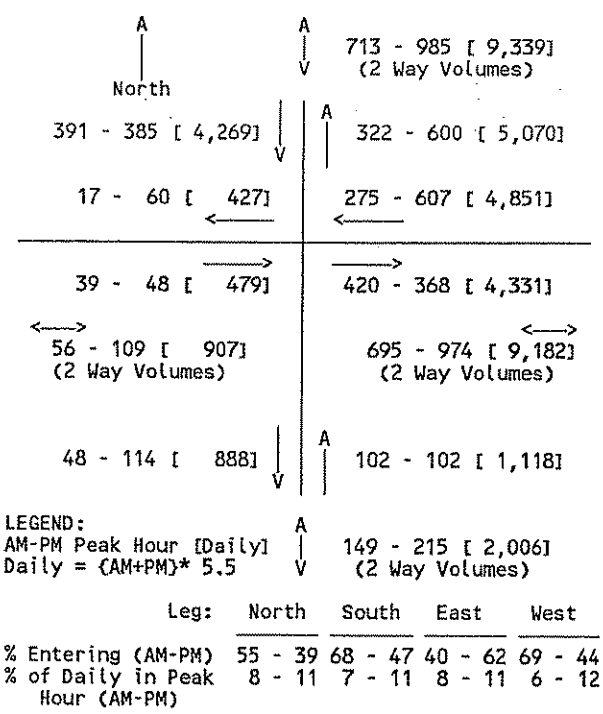
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	56	56	1	0	57	56	0.063	0.064
Northbound Right	0	0	43	44	0	0	43	44	0.000	0.000
Southbound Left	0	0	346	295	7	6	353	301	0.000	0.000
Southbound Through	1	1600	29	58	1	1	30	59	0.245*	0.241*
Southbound Right	0	0	8	25	0	0	8	25	0.000	0.000
Eastbound Left	0	0	13	24	0	0	13	24	0.000*	0.000*
Eastbound Through	1	1600	24	23	0	0	24	23	0.024	0.030
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	16	54	0	0	16	54	0.000	0.000
Westbound Through	1	1600	8	34	0	0	8	34	0.172*	0.379*
Westbound Right	0	0	245	519	6	1	251	520	0.000	0.000

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.517	0.720
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	C

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 47	40 - 62	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 11	7 - 11	8 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

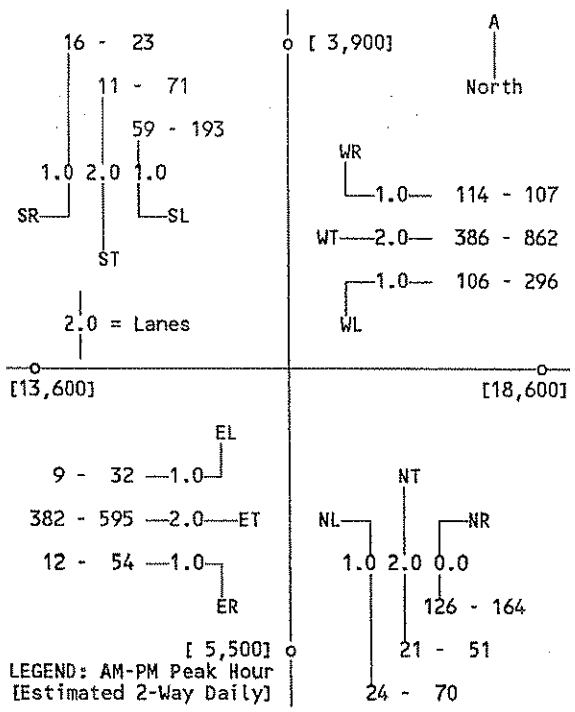
INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-13-02
GEOMETRICS: Existing

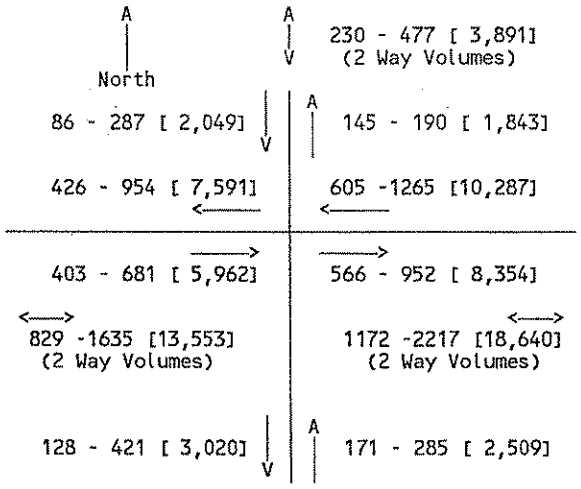
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	24	70	0	0	24	70	0.015	0.044
Northbound Through	2	3200	21	51	0	0	21	51	0.046*	0.067*
Northbound Right	0	0	125	163	1	1	126	164	0.000	0.000
Southbound Left	1	1600	59	193	0	0	59	193	0.037*	0.121*
Southbound Through	2	3200	11	71	0	0	11	71	0.003	0.022
Southbound Right	1	1600	16	23	0	0	16	23	0.010	0.014
Eastbound Left	1	1600	9	32	0	0	9	32	0.006	0.020
Eastbound Through	2	3200	382	595	0	0	382	595	0.119*	0.186*
Eastbound Right	1	1600	12	54	0	0	12	54	0.008	0.034
Westbound Left	1	1600	105	296	1	0	106	296	0.066*	0.185*
Westbound Through	2	3200	386	862	0	0	386	862	0.121	0.269
Westbound Right	1	1600	114	107	0	0	114	107	0.071	0.067

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)		0.368	0.659
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

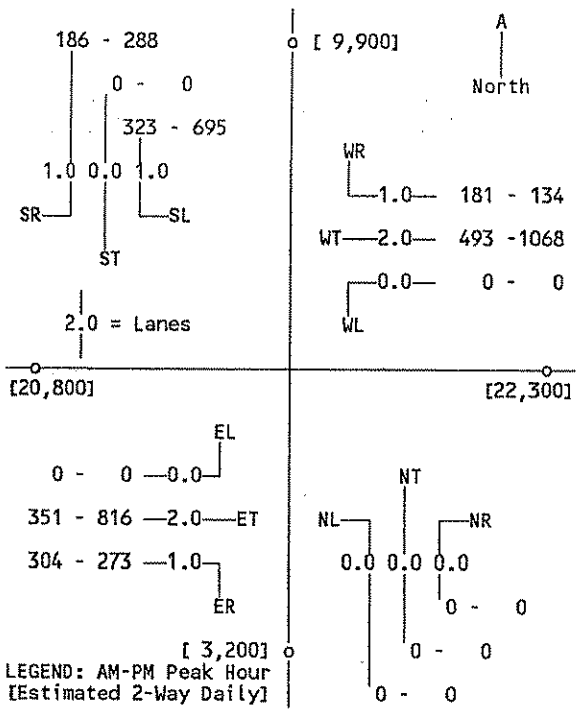
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

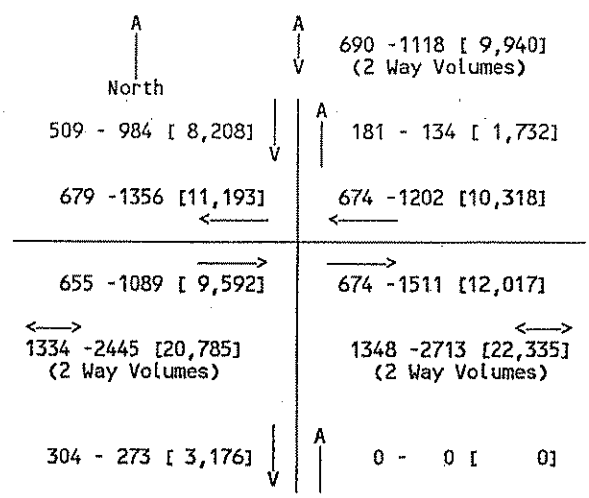
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	323	695	0	0	323	695	0.202*	0.435*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	185	288	1	0	186	288	0.116	0.180
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	350	815	1	1	351	816	0.110	0.255
Eastbound Right	Free 1	1600	304	273	0	0	304	273	0.190	0.171
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	493	1068	0	0	493	1068	0.154*	0.334*
Westbound Right	Free 1	1600	181	134	0	0	181	134	0.113	0.084

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.456	0.869
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	D

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
304 - 273 [3,176]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

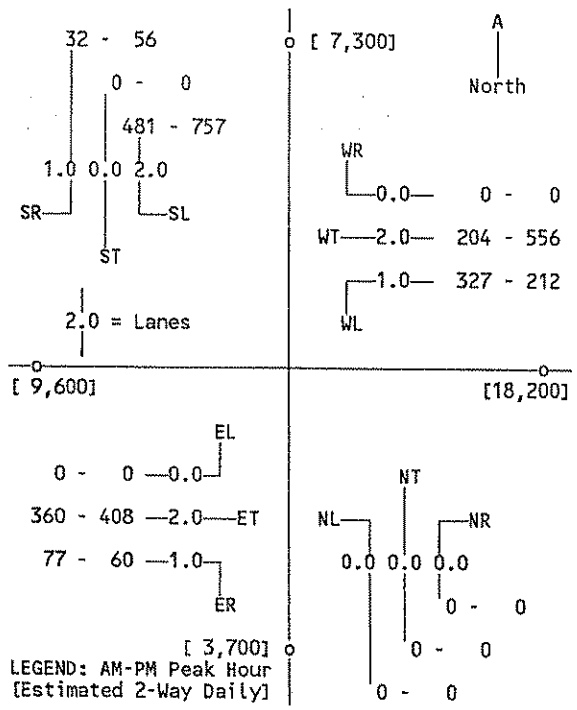
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

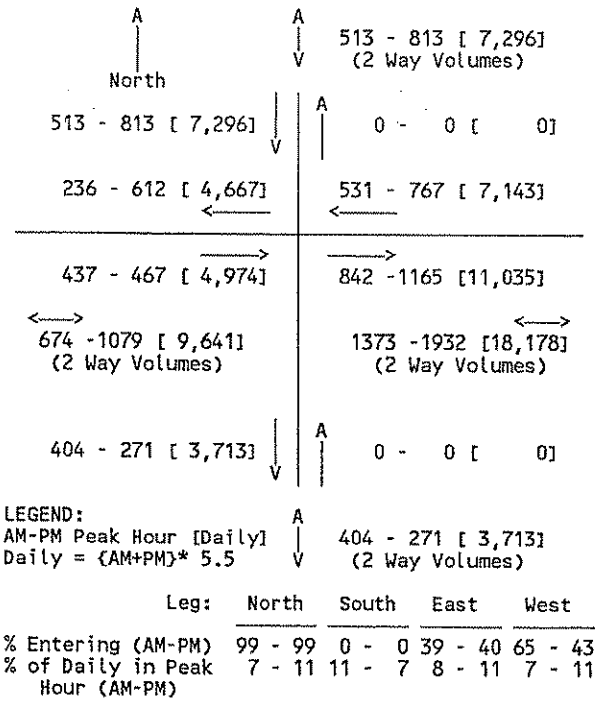
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	481	757	0	0	481	757	0.167*	0.263*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	32	56	0	0	32	56	0.020	0.035
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	356	405	4	3	360	408	0.113*	0.127*
Eastbound Right	Free 1	1600	74	58	3	2	77	60	0.048	0.037
Westbound Left	1	1600	327	212	0	0	327	212	0.204*	0.132*
Westbound Through	2	3200	198	555	6	1	204	556	0.064	0.174
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.584	0.622
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

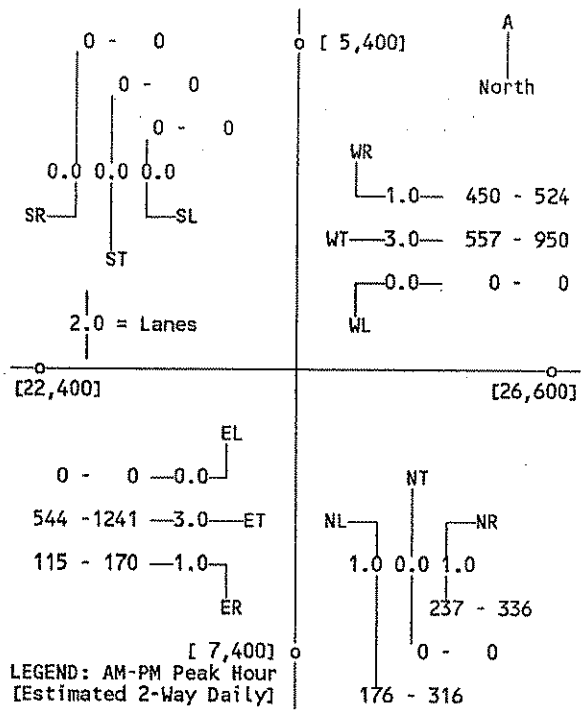
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

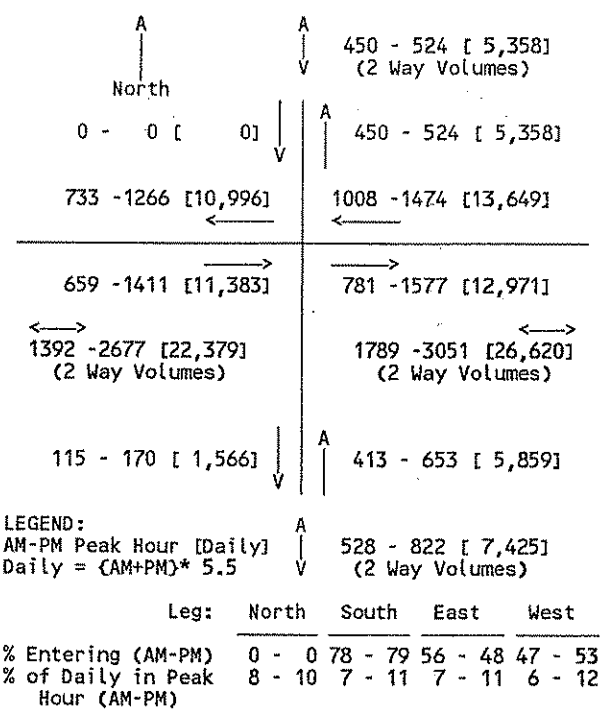
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	176	316	0	0	176	316	0.110*	0.198*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	237	336	0	0	237	336	0.148	0.210
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	544	1241	0	0	544	1241	0.113	0.259*
Eastbound Right	Free 1	1600	114	169	1	1	115	170	0.072	0.106
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	557	950	0	0	557	950	0.116*	0.198
Westbound Right	Free 1	1600	450	524	0	0	450	524	0.281	0.327
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>									0.326	0.557
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

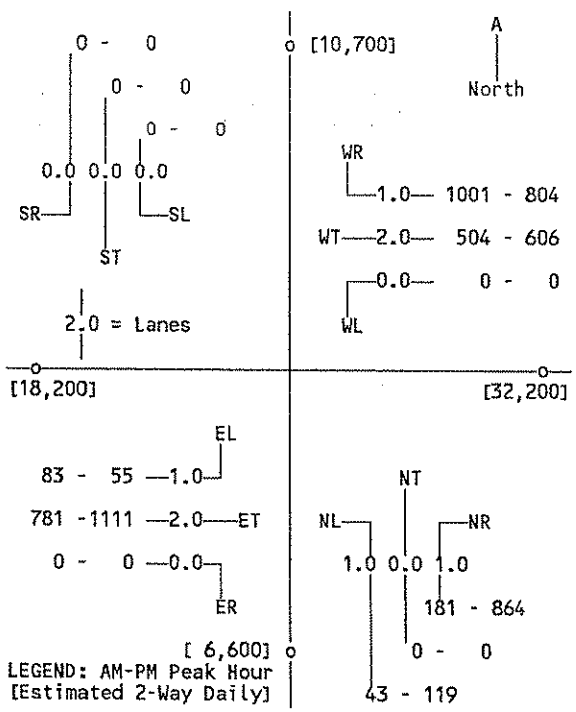
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

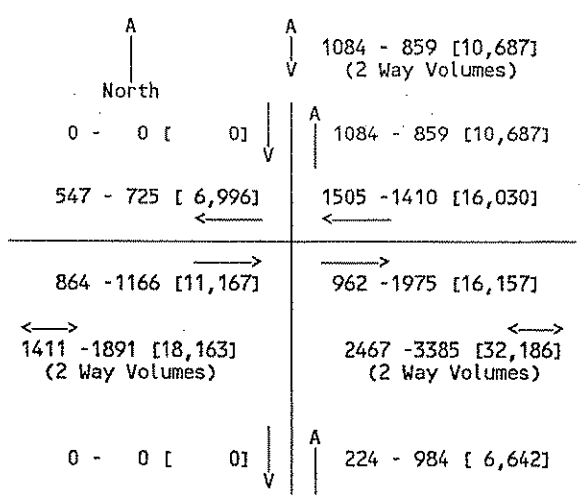
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	40	119	3	0	43	119	0.027*	0.075*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	181	864	0	0	181	864	0.113	0.540
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	83	55	0	0	83	55	0.052	0.034
Eastbound Through	2	3200	777	1108	4	3	781	1111	0.244*	0.347*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	500	606	4	0	504	606	0.157	0.189
Westbound Right	Free 1	1600	1001	804	0	0	1001	804	0.626	0.503

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.371	0.522
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

Existing Plus Project
(Peak Inflow of Material, 5,548 Tons per Day)

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

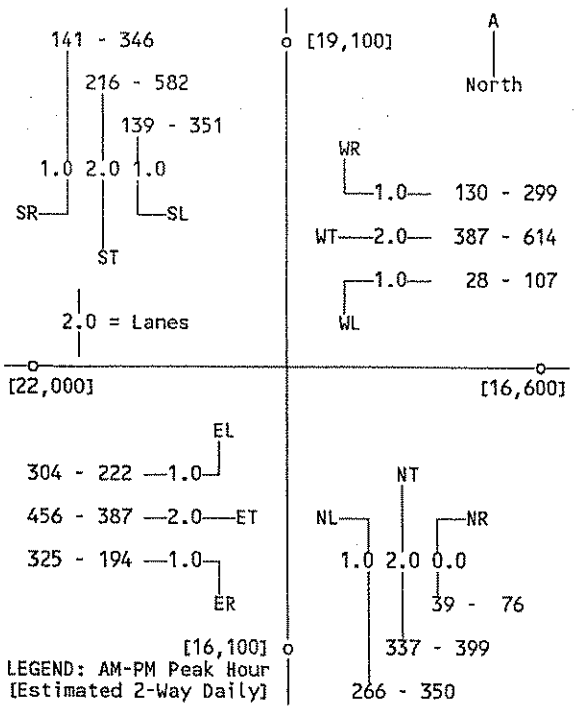
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	261	346	5	4	266	350	0.166*	0.219*
Northbound Through	2	3200	330	394	7	5	337	399	0.117	0.149
Northbound Right	0	0	39	76	0	0	39	76	0.000	0.000
Southbound Left	1	1600	139	351	0	0	139	351	0.087	0.219
Southbound Through	2	3200	209	580	7	2	216	582	0.068*	0.182*
Southbound Right	1	1600	141	346	0	0	141	346	0.088	0.216
Eastbound Left	1	1600	304	222	0	0	304	222	0.190*	0.139*
Eastbound Through	2	3200	456	387	0	0	456	387	0.142	0.121
Eastbound Right	1	1600	320	193	5	1	325	194	0.203	0.121
Westbound Left	1	1600	28	107	0	0	28	107	0.018	0.067
Westbound Through	2	3200	387	614	0	0	387	614	0.121*	0.192*
Westbound Right	1	1600	130	299	0	0	130	299	0.081	0.187
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.020*	0.034*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.665	0.866
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

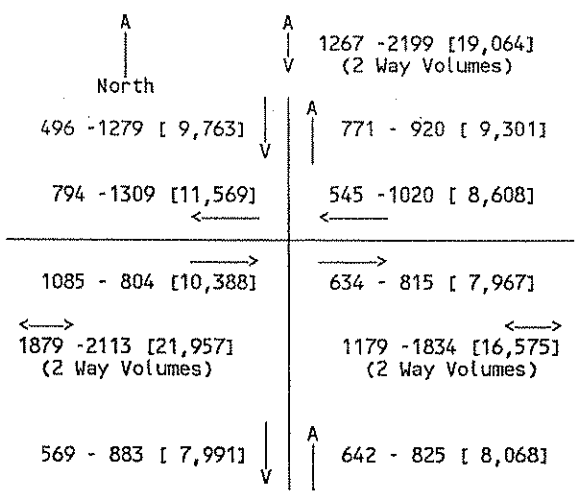
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

1211 -1708 [16,058]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	39 - 58	53 - 48	46 - 56	58 - 38
% of Daily in Peak Hour (AM-PM)	7 - 12	8 - 11	7 - 11	9 - 10

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

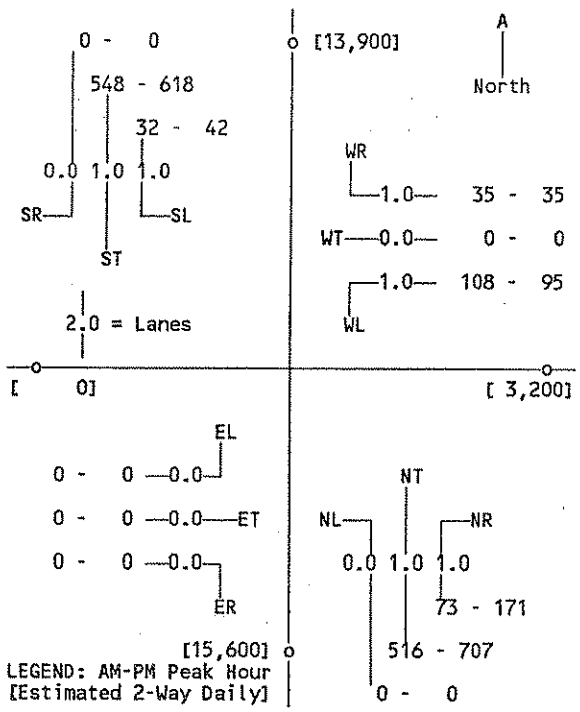
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and 5TH STREET WEST (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

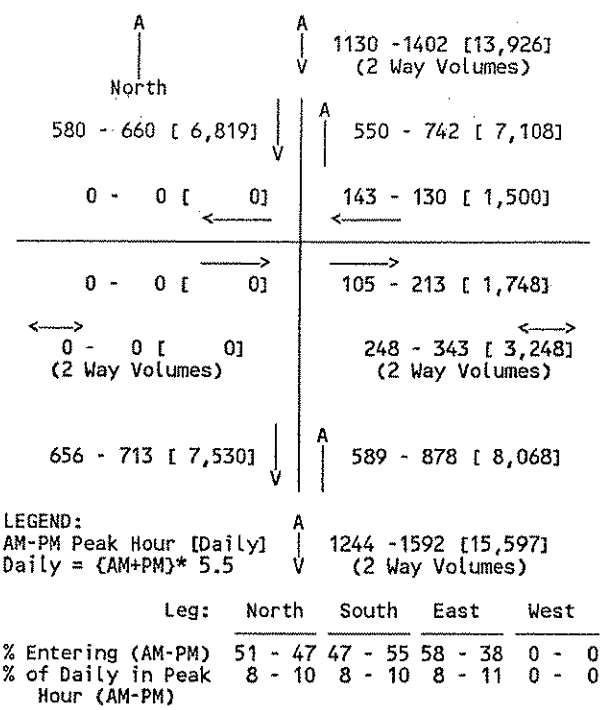
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	503	698	13	9	516	707	0.322	0.442*
Northbound Right	1	1600	71	170	2	1	73	171	0.046	0.107
Southbound Left	1	1600	32	42	0	0	32	42	0.020	0.026*
Southbound Through	1	1600	536	615	12	3	548	618	0.343*	0.386
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	106	95	2	0	108	95	0.067*	0.059*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	35	35	0	0	35	35	0.022	0.022
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.510	0.627
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	51 - 47	47 - 55	58 - 38	0 - 0
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	8 - 11	0 - 0

Kunzman Associates

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

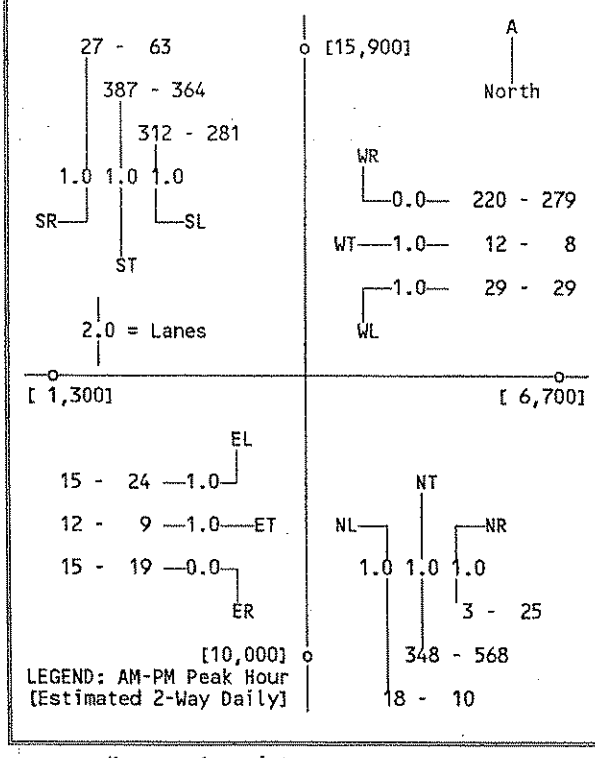
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and RAYBURN ROAD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

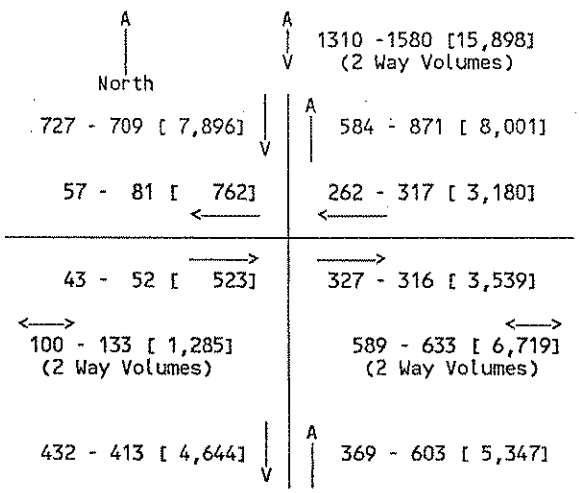
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	7	7	11	3	18	10	0.011	0.006
Northbound Through	1	1600	348	568	0	0	348	568	0.218*	0.355*
Northbound Right	1	1600	3	25	0	0	3	25	0.002	0.016
Southbound Left	1	1600	312	281	0	0	312	281	0.195*	0.176*
Southbound Through	1	1600	387	364	0	0	387	364	0.242	0.228
Southbound Right	1	1600	13	59	14	4	27	63	0.017	0.039
Eastbound Left	1	1600	1	13	14	11	15	24	0.010*	0.015*
Eastbound Through	1	1600	1	1	11	8	12	9	0.017	0.018
Eastbound Right	0	0	4	11	11	8	15	19	0.000	0.000
Westbound Left	1	1600	29	29	0	0	29	29	0.018	0.018
Westbound Through	1	1600	1	5	11	3	12	8	0.145*	0.179*
Westbound Right	0	0	220	279	0	0	220	279	0.000	0.000
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.668	0.825
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									B	D

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	55 - 45	46 - 59	44 - 50	43 - 39
% of Daily in Peak Hour (AM-PM)	8 - 10	8 - 10	9 - 9	8 - 10

Kunzman Associates

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

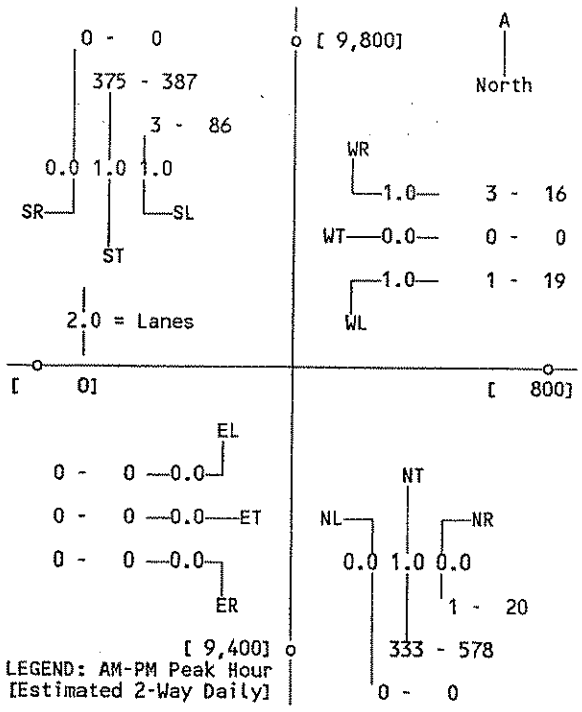
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and CITY RANCH ROAD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Improved

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Northbound Through	1	1600	322	575	11	3	333	578	0.209	0.374*
Northbound Right	0	0	1	20	0	0	1	20	0.000	0.000
Southbound Left	1	1600	3	86	0	0	3	86	0.002	0.054*
Southbound Through	1	1600	364	379	11	8	375	387	0.235*	0.242
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	1	1600	1	19	0	0	1	19	0.001*	0.012*
Westbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Right	1	1600	3	16	0	0	3	16	0.002	0.010
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.001*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.337	0.540
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

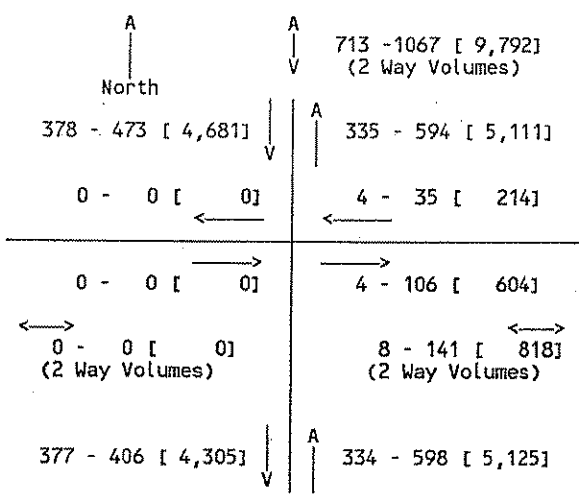
None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily] — A 711 -1004 [9,431]
Daily = (AM+PM)* 5.5 — (2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	53 - 44	47 - 60	50 - 25	0 - 0
% of Daily in Peak Hour (AM-PM)	7 - 11	8 - 11	1 - 17	0 - 0

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

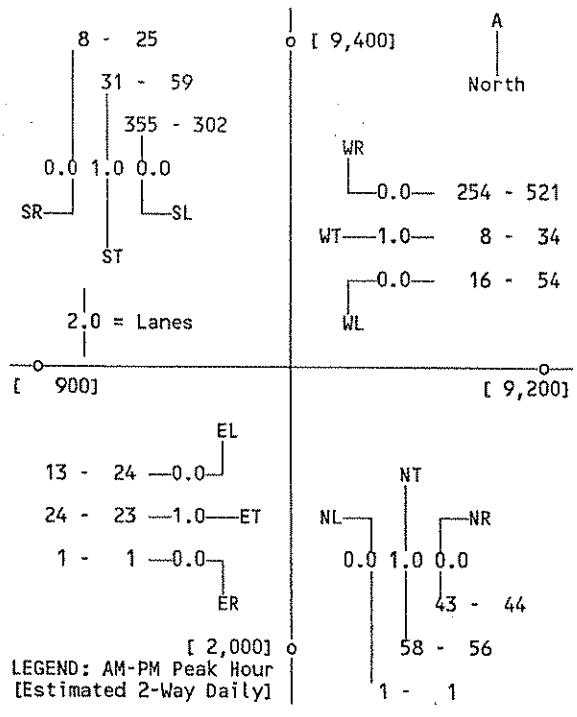
INTERSECTION: TIERRA SUBIDA AVENUE (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-14-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	1	1	0	0	1	1	0.000*	0.000*
Northbound Through	1	1600	56	56	2	0	58	56	0.064	0.064
Northbound Right	0	0	43	44	0	0	43	44	0.000	0.000
Southbound Left	0	0	346	295	9	7	355	302	0.000	0.000
Southbound Through	1	1600	29	58	2	1	31	59	0.246*	0.241*
Southbound Right	0	0	8	25	0	0	8	25	0.000	0.000
Eastbound Left	0	0	13	24	0	0	13	24	0.000*	0.000*
Eastbound Through	1	1600	24	23	0	0	24	23	0.024	0.030
Eastbound Right	0	0	1	1	0	0	1	1	0.000	0.000
Westbound Left	0	0	16	54	0	0	16	54	0.000	0.000
Westbound Through	1	1600	8	34	0	0	8	34	0.174*	0.380*
Westbound Right	0	0	245	519	9	2	254	521	0.000	0.000

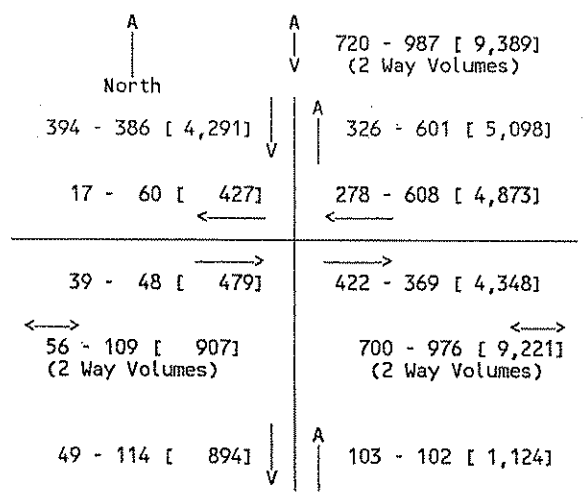
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)		0.520	0.721
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	C

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

Leg:	North	South	East	West
% Entering (AM-PM)	55 - 39	68 - 47	40 - 62	69 - 44
% of Daily in Peak Hour (AM-PM)	8 - 11	8 - 11	8 - 11	6 - 12

Kunzman Associates

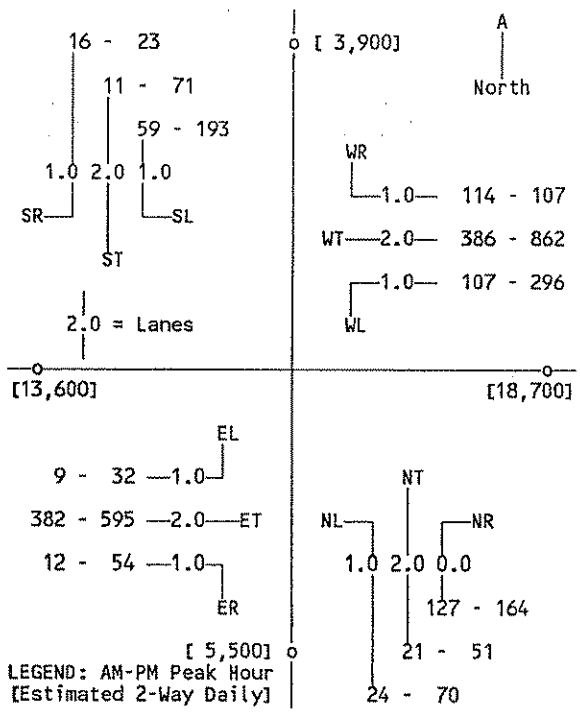
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: 5TH STREET WEST (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-13-02
GEOMETRICS: Existing

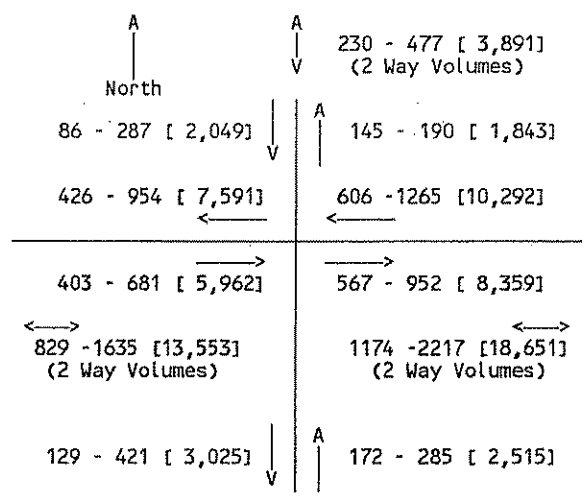
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	24	70	0	0	24	70	0.015	0.044
Northbound Through	2	3200	21	51	0	0	21	51	0.046*	0.067*
Northbound Right	0	0	125	163	2	1	127	164	0.000	0.000
Southbound Left	1	1600	59	193	0	0	59	193	0.037*	0.121*
Southbound Through	2	3200	11	71	0	0	11	71	0.003	0.022
Southbound Right	1	1600	16	23	0	0	16	23	0.010	0.014
Eastbound Left	1	1600	9	32	0	0	9	32	0.006	0.020
Eastbound Through	2	3200	382	595	0	0	382	595	0.119*	0.186*
Eastbound Right	1	1600	12	54	0	0	12	54	0.008	0.034
Westbound Left	1	1600	105	296	2	0	107	296	0.067*	0.185*
Westbound Through	2	3200	386	862	0	0	386	862	0.121	0.269
Westbound Right	1	1600	114	107	0	0	114	107	0.071	0.067
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.369	0.659
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily] A
Daily = (AM+PM)* 5.5 V

301 - 706 [5,540]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	37 - 60	57 - 40	52 - 57	49 - 42
% of Daily in Peak Hour (AM-PM)	6 - 12	5 - 13	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

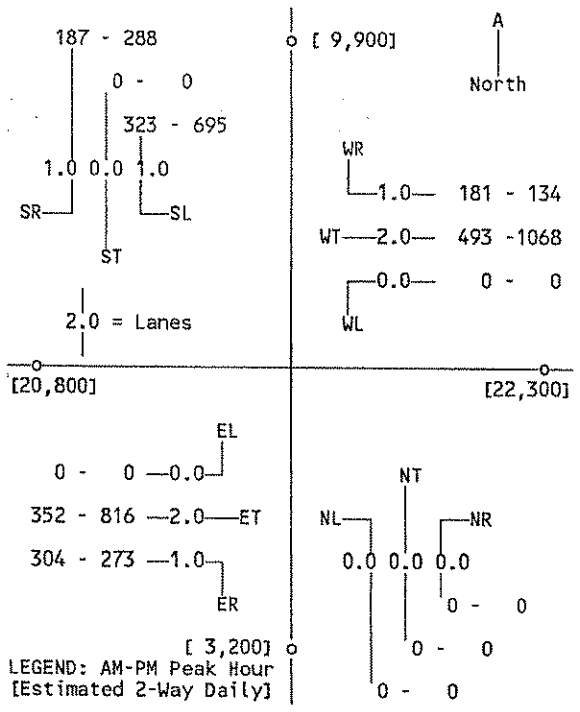
INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

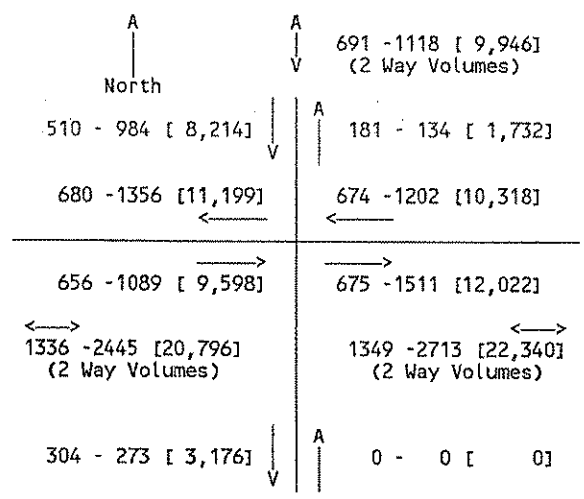
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	1	1600	323	695	0	0	323	695	0.202*	0.435*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	Free 1	1600	185	288	2	0	187	288	0.117	0.180
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Eastbound Through	2	3200	350	815	2	1	352	816	0.110	0.255
Eastbound Right	Free 1	1600	304	273	0	0	304	273	0.190	0.171
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Through	2	3200	493	1068	0	0	493	1068	0.154*	0.334*
Westbound Right	Free 1	1600	181	134	0	0	181	134	0.113	0.084
Northbound Right Turn Adjustment									0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.456	0.869
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	D

None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
304 - 273 [3,176]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	74 - 88	0 - 0	50 - 44	49 - 45
% of Daily in Peak Hour (AM-PM)	7 - 11	10 - 9	6 - 12	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY SB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

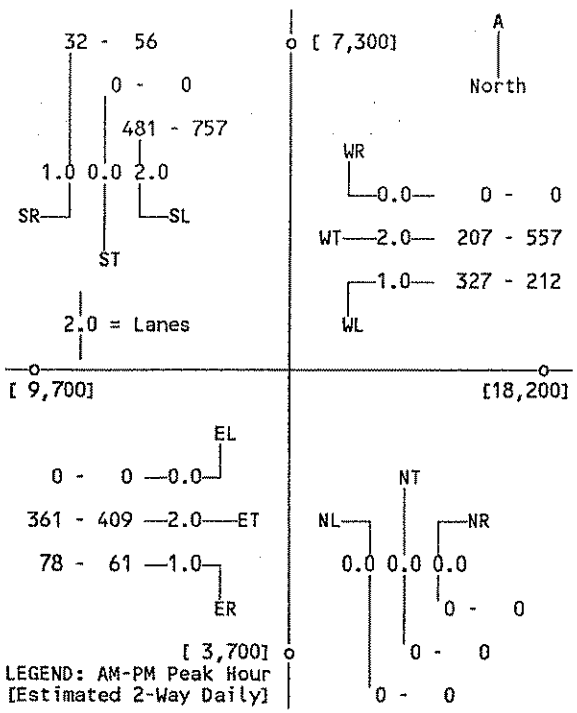
COUNT DATE: 11-12-02
GEOMETRICS: Existing

MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Northbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Left	2	2880	481	757	0	0	481	757	0.167*	0.263*
Southbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Right	1	1600	32	56	0	0	32	56	0.020	0.035
Eastbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Through	2	3200	356	405	5	4	361	409	0.113*	0.128*
Eastbound Right	Free 1	1600	74	58	4	3	78	61	0.049	0.038
Westbound Left	1	1600	327	212	0	0	327	212	0.204*	0.132*
Westbound Through	2	3200	198	555	9	2	207	557	0.065	0.174
Westbound Right	0	0	0	0	0	0	0	0	0.000	0.000

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*

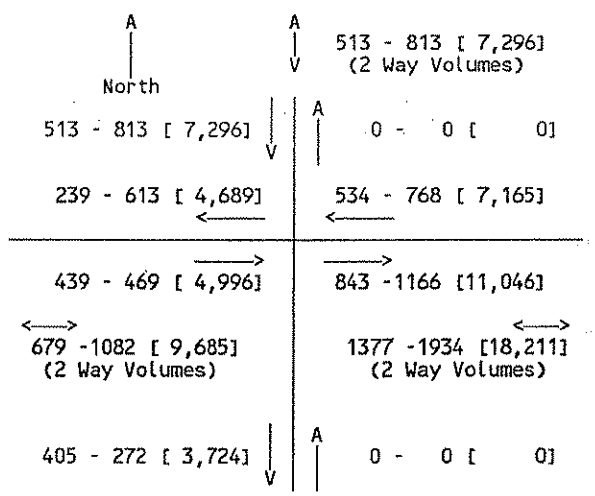
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>	0.584	0.623
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)	A	B

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
405 - 272 [3,724]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	99 - 99	0 - 0	39 - 40	65 - 43
% of Daily in Peak Hour (AM-PM)	7 - 11	11 - 7	8 - 11	7 - 11

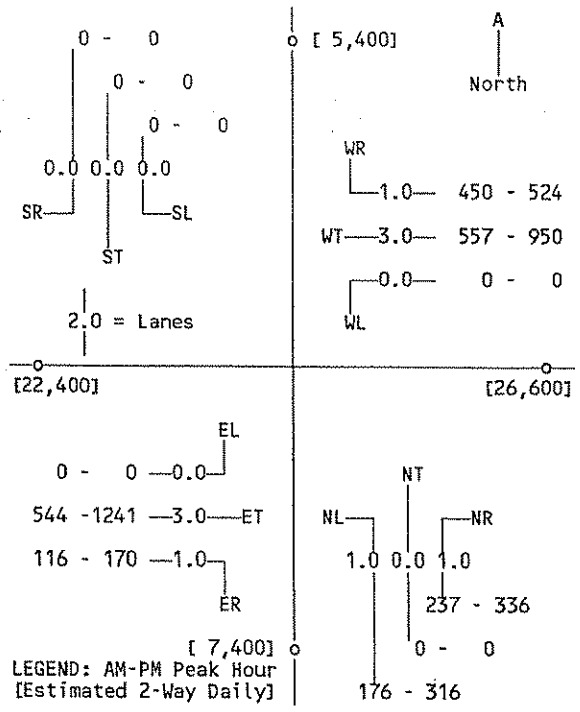
INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and PALMDALE BOULEVARD (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

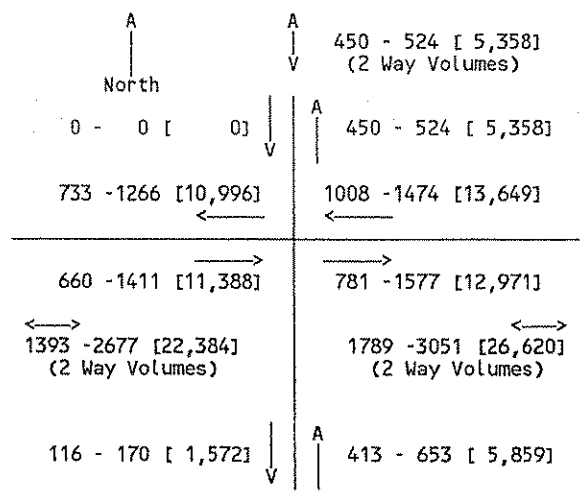
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	176	316	0	0	176	316	0.110*	0.198*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	237	336	0	0	237	336	0.148	0.210
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	0	0	0	0	0	0	0	0	0.000*	0.000
Eastbound Through	3	4800	544	1241	0	0	544	1241	0.113	0.259*
Eastbound Right	Free 1	1600	114	169	2	1	116	170	0.072	0.106
Westbound Left	0	0	0	0	0	0	0	0	0.000	0.000*
Westbound Through	3	4800	557	950	0	0	557	950	0.116*	0.198
Westbound Right	Free 1	1600	450	524	0	0	450	524	0.281	0.327
Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.								0.000*	0.000*
Southbound Right Turn Adjustment									0.000*	0.000*
Eastbound Right Turn Adjustment									0.000*	0.000*
Westbound Right Turn Adjustment									0.000*	0.000*
Clearance Interval									0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *)									0.326	0.557
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)									A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



LEGEND: AM-PM Peak Hour
[Estimated 2-Way Daily]

PLOT OF INTERSECTION LEG VOLUMES



LEGEND:
AM-PM Peak Hour [Daily]
Daily = (AM+PM)* 5.5

A
529 - 822 [7,431]
(2 Way Volumes)

Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	78 - 79	56 - 48	47 - 53
% of Daily in Peak Hour (AM-PM)	8 - 10	7 - 11	7 - 11	6 - 12

INTERSECTION VOLUMES, LANES, AND INTERSECTION CAPACITY UTILIZATION CALCULATION

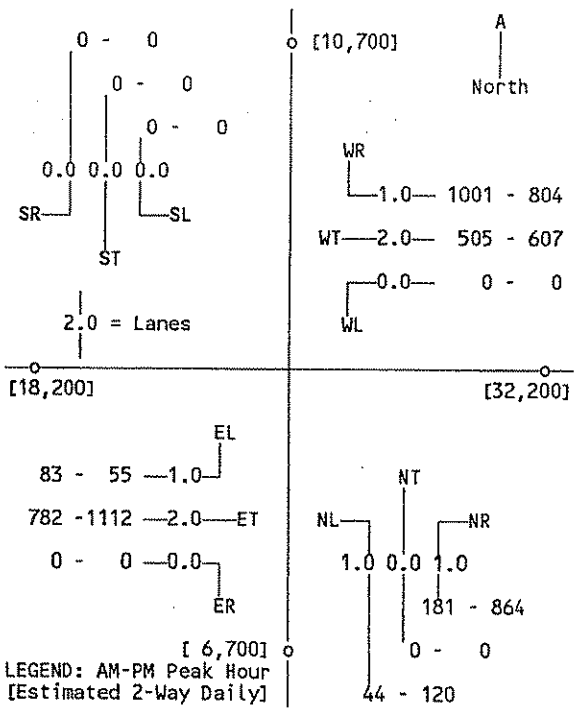
INTERSECTION: SR-14 FREEWAY NB RAMPS (NS) and AVENUE S (EW)
LAND USE: YEAR 2007 WITH PROJECT

COUNT DATE: 11-12-02
GEOMETRICS: Existing

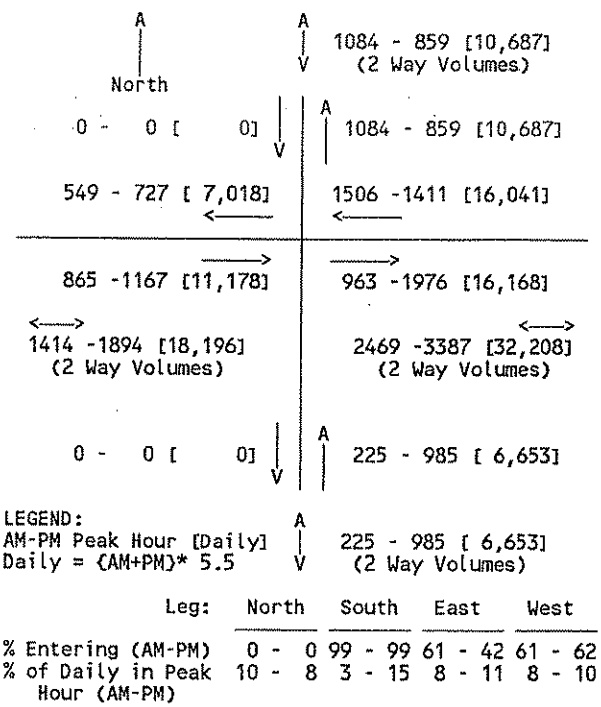
MOVEMENT	LANES	CAPACITY	BASE VOLUME (AM)	BASE VOLUME (PM)	ADDED VOLUME (AM)	ADDED VOLUME (PM)	TOTAL VOLUME (AM)	TOTAL VOLUME (PM)	VOLUME TO CAPACITY RATIO (AM)	VOLUME TO CAPACITY RATIO (PM)
Northbound Left	1	1600	40	119	4	1	44	120	0.028*	0.075*
Northbound Through	0	0	0	0	0	0	0	0	0.000	0.000
Northbound Right	Free 1	1600	181	864	0	0	181	864	0.113	0.540
Southbound Left	0	0	0	0	0	0	0	0	0.000	0.000
Southbound Through	0	0	0	0	0	0	0	0	0.000*	0.000*
Southbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Eastbound Left	1	1600	83	55	0	0	83	55	0.052	0.034
Eastbound Through	2	3200	777	1108	5	4	782	1112	0.244*	0.348*
Eastbound Right	0	0	0	0	0	0	0	0	0.000	0.000
Westbound Left	0	0	0	0	0	0	0	0	0.000*	0.000*
Westbound Through	2	3200	500	606	5	1	505	607	0.158	0.190
Westbound Right	Free 1	1600	1001	804	0	0	1001	804	0.626	0.503

Northbound Right Turn Adjustment	None of right turns (RT) are assumed to occur on red light when there is separate RT lane & when movement is permitted.	0.000*	0.000*
Southbound Right Turn Adjustment		0.000*	0.000*
Eastbound Right Turn Adjustment		0.000*	0.000*
Westbound Right Turn Adjustment		0.000*	0.000*
Clearance Interval		0.100*	0.100*
INTERSECTION CAPACITY UTILIZATION, ICU (Sum of Components with *) ——>		0.372	0.523
LEVEL OF SERVICE (A=.000-.6 ICU; B=.601-.7; C=.701-.8; D=.801-.9; E=.901-1.0; F=1.001+)		A	A

PLOT OF PEAK HOUR TURNING VOLUMES AND LANES



PLOT OF INTERSECTION LEG VOLUMES



Leg:	North	South	East	West
% Entering (AM-PM)	0 - 0	99 - 99	61 - 42	61 - 62
% of Daily in Peak Hour (AM-PM)	10 - 8	3 - 15	8 - 11	8 - 10

APPENDIX D

Traffic Signal Warrant Worksheets

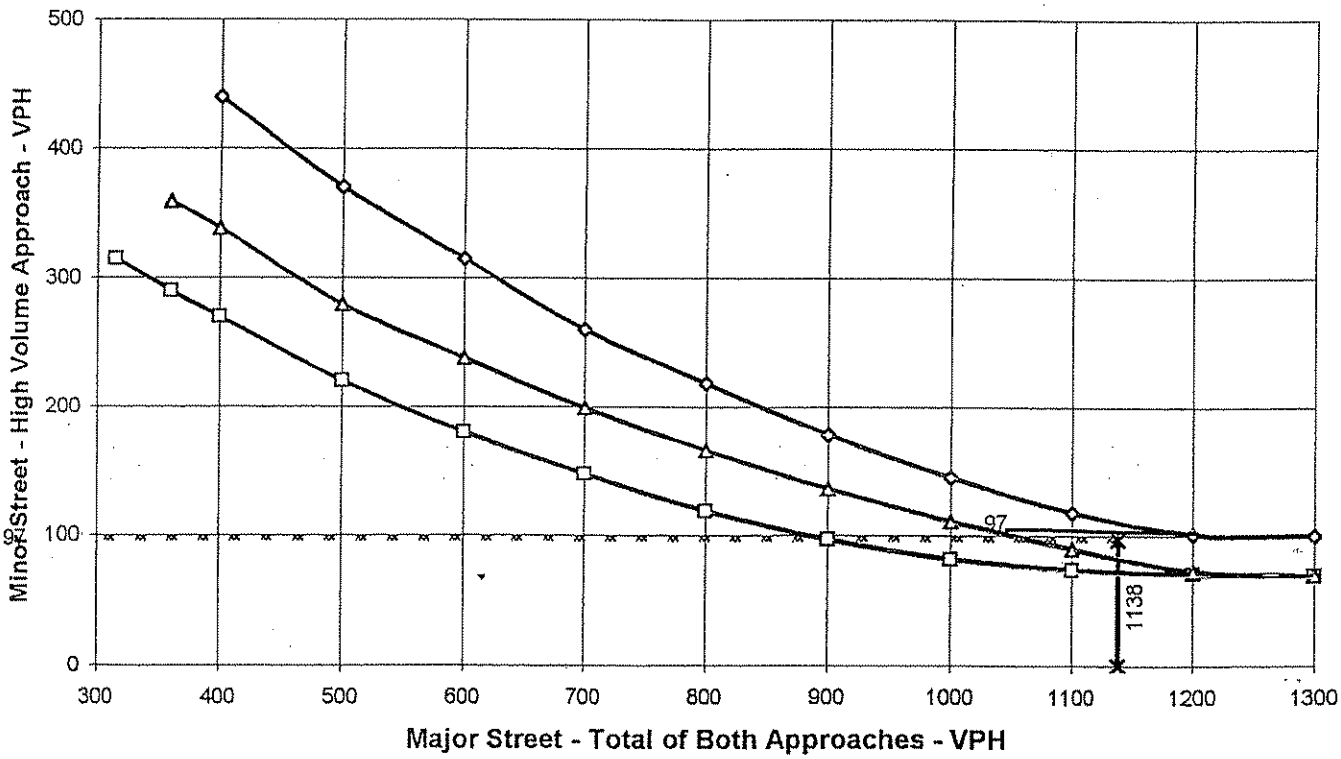
PEAK HOUR VOLUME WARRANT
(Rural Areas)

Existing

Major Street Name = **Tierra Subida Avenue** Total of Both Approaches (VPH) = **1138**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **5th Street West** High Volume Approach (VPH) = **97**
Number of Approach Lanes Minor Street = **1**

WARRANTED FOR A SIGNAL



- 1 Lane (Major) & 1 Lane (Minor)
- 2+ Lanes (Major) & 1 Lane (Minor) OR 1 Lane (Major) & 2+ Lanes (Minor)
- 2+ Lanes (Major) & 2+ Lanes (Minor)
- Major Street Approaches
- Minor Street Approaches

** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

PEAK HOUR VOLUME WARRANT
(Rural Areas)

Existing

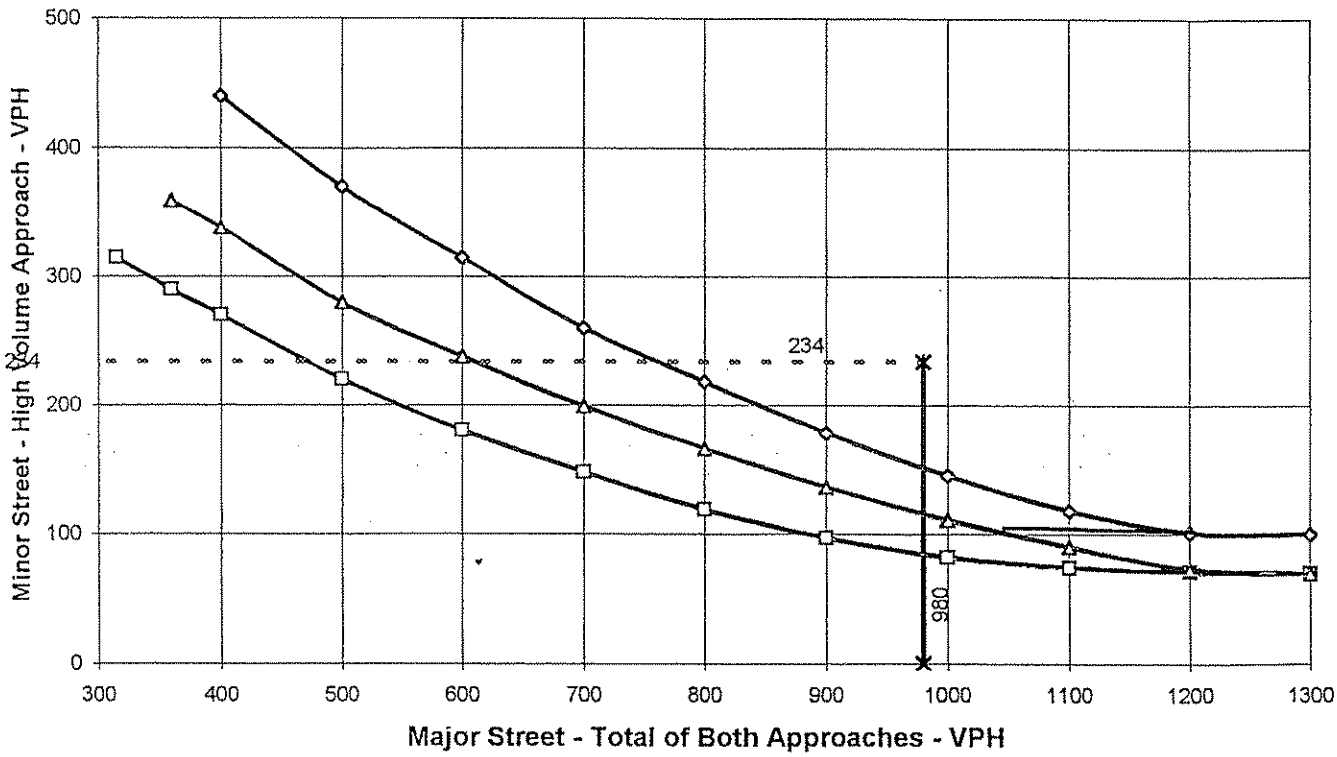
Major Street Name = **Tierra Subida Avenue** Total of Both Approaches (VPH) = **980**

Number of Approach Lanes Major Street = **1**

Minor Street Name = **Rayburn Road** High Volume Approach (VPH) = **234**

Number of Approach Lanes Minor Street = **1**

WARRANTED FOR A SIGNAL



1 Lane (Major) & 1 Lane (Minor)

2+ Lanes (Major) & 1 Lane (Minor) OR 1 Lane (Major) & 2+ Lanes (Minor)

2+ Lanes (Major) & 2+ Lanes (Minor)

Major Street Approaches

Minor Street Approaches

** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

PEAK HOUR VOLUME WARRANT
(Rural Areas)

Existing

Major Street Name = **Avenue S**

Total of Both Approaches (VPH) = **488**

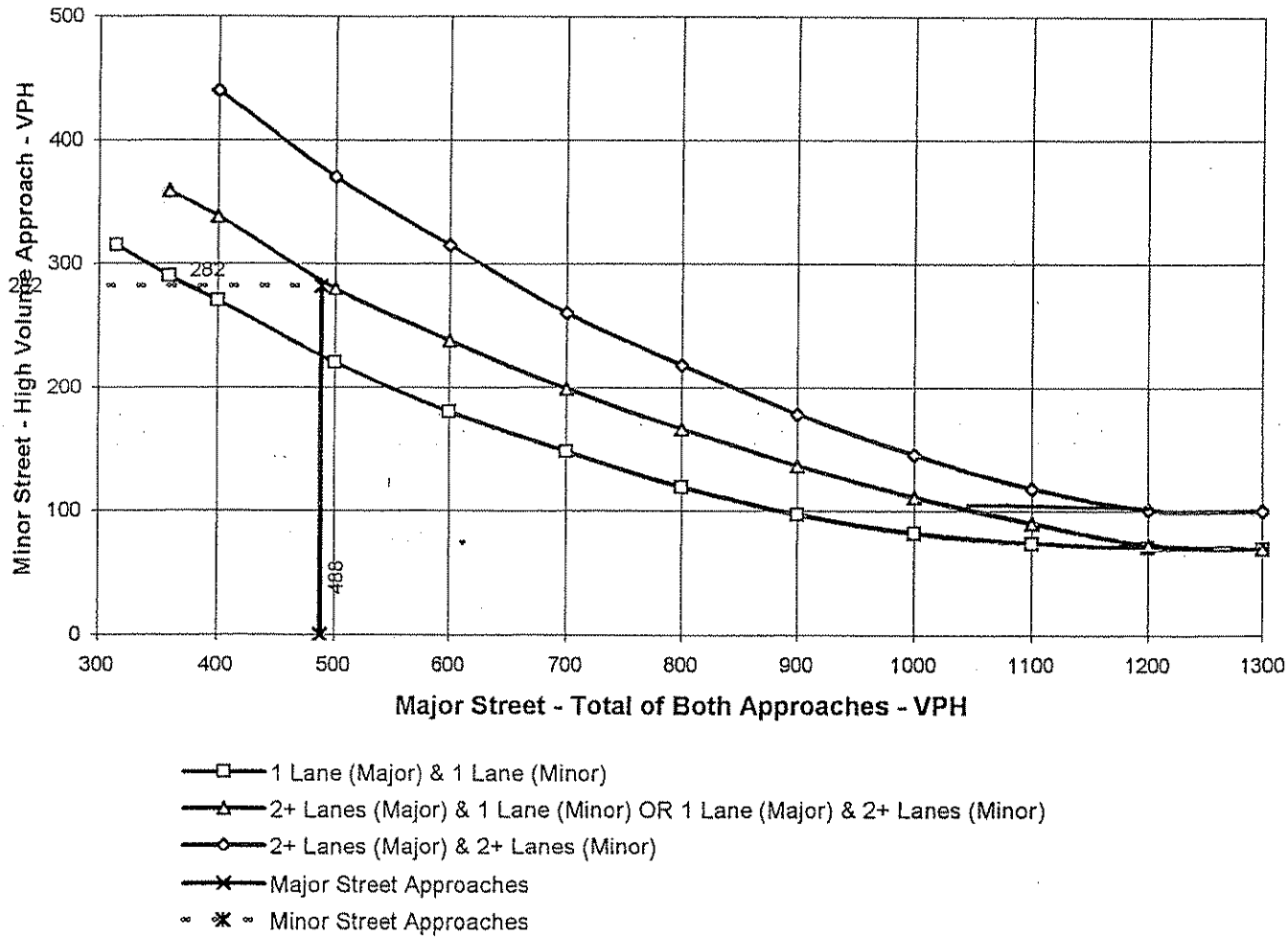
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Tierra Subida Avenue**

High Volume Approach (VPH) = **282**

Number of Approach Lanes Minor Street = **1**

WARRANTED FOR A SIGNAL



** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

APPENDIX E

Approved County CUP #93041 September, 1993
Supplemental Traffic Analysis of 3,564 Tons per Day at AVPL

September 7, 1993

EDAW

Mr. Joaquin Herrera
L.A. County Public Works
900 South Fremont
Alhambra, California 91803-1331

Landscape Architecture
Planning
Urban Design
Environmental Analysis
Site Engineering
Graphic Design

RE: Antelope Valley Landfill - Modification to Conditional Use Permit #86162 (CUP #93041)

Dear: Mr. Herrera:

I am forwarding additional traffic information related to the Supplemental Traffic analysis (Revised April, 1993) Antelope Valley Public Landfill Expansion. My enclosed letter to Dick Frazier summarizes what this informatin is and why it was generated. Although our traffic engineer said that no additional mitigation measures are necessary as a result of the analysis, Dick would like you to review your May 20th, 1993 memo and confirm that this is the case. I would appreciate it if you could prepare another memo to Dick Frazier after you have completed your review of the enclosed information and let him know that your recommendations still apply.

EDAW, Inc.
1920 Main Street, Suite 450
Irvine, CA 92714
714 660-8044
FAX 714 660-1046

Additionally, we would like further clarification added to the end of the recommendation presented on page 2 of your 5/20/93 memo. Per the note listed on page 3 of the April 1993 traffic study, we requested that the following wording be added to the recommendations on page 2 of your memo: "Prior to the payment of prorata contributions listed above, the applicant shall have the traffic conditions re-evaluated after the installation of Palmdale Boulevard signals in order to confirm the need for the mitigations listed above." This additional clarification is important since the traffic analysis concludes that the future signals on Palmdale Boulevard at SR-14 may significantly reduce existing traffic on Avenue S at SR-14. The analysis also points out that a continued slow housing market may result in less than the projected traffic increases.

As you can probably guess, this is on a tight time schedule. Could you please let me know when you can get Dick Frazier a response. I can be reached at (714) 660-8044.

Very Truly Yours,

Jayna Morgan

Jayna Morgan
Senior Associate

Enclosure

cc Project Team

San Francisco
Alexandria
Atlanta
Fort Collins/Denver
Irvine
Seattle
Phoenix
Sydney, Australia

EDAW

September 7, 1993

Landscape Architecture
Planning
Urban Design
Environmental Analysis
Site Engineering
Graphic Design

Mr. Richard Frazier, Regional Planner II
Zoning Permits Section
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

RE: Antelope Valley Landfill - Modification to Conditional Use Permit #86162 (CUP #93041)

EDAW, Inc.
1920 Main Street, Suite 450
Irvine, CA 92714
714 660-8044
FAX 714 660-1046

Dear Dick:

At our meeting August 26th, we discussed wording condition 10d consistent with the previous CUP (ie. net vs gross). You indicated that in order for you to change this condition, the traffic analysis prepared by Kunzman Associates needs to contain the same scenario which was included in the DKS traffic study. I am forwarding this additional traffic scenario prepared by Kunzman Associates last week. Per your direction, I have also sent a copy to Mr. Joaquin Herrera of Traffic and Lighting.

Per my review of the enclosed tables and discussions with Mr. Gary Hansen of Kunzman Associates, this analysis *does not* result in the need for any additional mitigation measures. The measures suggested in the original Kunzman Associates study (~~March~~ April, 1993) and required by the Traffic and Lighting Division in their My 20, 1993 Memorandum are still applicable. I am sure Traffic and Lighting will confirm this conclusion.

It should be noted that Table 9 compares the 2010 condition presented in the DKS report (1,188 tons/day) to the new condition we discussed at our 8/26 meeting (3,564 tons/day). The original conclusion from the DKS study was as follows:

> "As shown in Table 4-12, the proposed project traffic contributes to less than 1% of the intersection capacity utilization at the study intersection. The maximum capacity of the proposed project for a worst case daily waste stream of 1,188 tons, therefore, would not result in a significant impact on the area circulation system..."

San Francisco
Alexandria
Atlanta
Fort Collins/Denver
Irvine
Seattle
Phoenix
Sydney, Australia

Per conversations with Mr. Gary Hansen, he indicated that under the new scenario, proposed project traffic contributes less than 2% of the intersection capacity unitization at the study intersections. Therefore the original conclusion of the DKS study would remain unchanged.

I will let you know when you can expect a buy-off from Traffic and Lighting. Hopefully they can prepare an additional memo confirming their requirements in their May 20, 1993 memo by the end of this week. You indicated once you receive their buy-off we can reschedule this item for Planning Commission hearing.

Please give me a call if you have any questions regarding this information.

Very Truly Yours,

Jayna Morgan

Jayna Morgan

cc: Project Team
Joaquin Herrera

Table 4

ESTIMATED PROJECT TRAFFIC GENERATION

Scenario	Morning Peak Hour		Evening Peak Hour		Daily
	In	Out	In	Out	
EXISTING - 1993					
Material (600 tons/day)	10	10	10	10	190
Employees (130)	10	*	10	10	280
Total	20	10	20	20	470
POTENTIAL EXPANSION					
Material (3,564 tons/day)	70	40	70	70	1,100
Employees (170)	20	*	10	10	360
Total	90	40	80	80	1,460

Note: Trips generated are rounded to nearest 10.

* Nominal (i.e. less than 5)

Table 7

YEAR 1996 CUMULATIVE INTERSECTION LEVELS OF SERVICE
(WITH RECEIPT OF 3,564 TONS/DAY)

Intersection	Traffic Control Device	Morning/Evening Peak Hour		
		Delay (sec/veh)	Reserve Capacity	Level of Service
Tierra Subida Avenue (NS) at Palmdale Blvd. (EW)	Signal	17.6/22.2		C/C
City Ranch Rd. (EW)	Two-Way Stop			
Northbound Left			498/439	A/A
Eastbound Right			534/388	A/B
Eastbound Left			94/-42	E/F
	(All-Way Stop)		(1130-1190)/ 1380-1190)	(*/**)
Avenue S (EW)	All-Way Stop		1330-1010/ 1680-1090	**/**
Palmdale Blvd. (EW) at SR-14 SB Off Ramp (NS)	Signal	9.9/9.4		B/B
SR-14 NB Off Ramp (NS)	Signal	9.5/11.1		B/B
Avenue S (EW) at SR-14 SB Ramps (NS)	All-Way Stop		(1380-1570)/ (1890-1720)	*/**
SR-14 NB Ramps (NS)	All-Way Stop		(1430-1530)/ (2000-1600)	*/**
Intersection	**Traffic Control Device**	**ICU*** **		**Level of Service**
Avenue S (EW) at SR-14 SB Ramps	Signal	53/74		A/C
SR-14 NB Ramps	Signal	46/66		A/B

NS = North-South
EW = East-West
NB = Northbound
SB = Southbound

(volume entering - Level of Service C capacity)

* Level of Service C or better

** Worse than Level of Service C

*** Intersection Capacity Utilization

Table 8

COMPARISON OF YEAR 2010 PROJECT TRAFFIC GENERATION

Scenario	Morning Peak Hour		Evening Peak Hour		Daily
	In	Out	In	Out	
4/91 REPORT					
Material Hauling (1,188 tons/day)	20	10	20	20	370
Employee Traffic	20	*	10	10	330
Total	40	10	30	30	700
TABLE 4					
Material Hauling (3,564 tons/day)	70	40	70	60	1,100
Employee Traffic	20	*	10	10	360
Total	90	40	80	80	1,460
NET INCREASE					
Material Hauling	50	30	50	50	730
Employee Traffic	--	--	--	--	30
Total	50	30	50	50	760

Note: Trips generated are rounded to nearest 10.

* Nominal (i.e. less than 5)

Table 9

COMPARISON OF YEAR 2010 INTERSECTION LEVELS OF SERVICE

Intersection	AM Peak						PM Peak					
	Without Project		1,188 Tons/Day		3,564 Tons/Day		Without Project		1,188 Tons/Day		3,564 Tons/Day	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Palmdale Rd./ Tierra Subida Ave. (1)	21.2	C	21.0	C	20.8	C	27.7	D	28.2	D	29.2	D
SR-14 SB Off Ramp/ Palmdale Blvd.	18.8	C	18.8	C	19.1	C	24.3	C	24.6	C	26.2	D
SR-14 NB Off Ramp/ Palmdale Blvd.	4.1	A	4.1	A	4.1	A	15.4	C	15.4	C	15.5	C
Intersection	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
City Ranch Rd./ Tierra Subida Ave.	0.77	C	0.78	C	0.83	D	0.89	D	0.89	D	0.90	D
Avenue S/Tierra Subida Ave.	0.89	D	0.89	D	0.90	D	0.89	D	0.89	D	0.89	D
SR-14 SB Ramps/ Avenue S	0.24	A	0.24	A	0.36	A	0.81	D	0.81	D	0.91	E
SR-14 NB Ramps/ Avenue S	0.33	A	0.33	A	0.41	A	0.87	D	0.87	D	0.90	D

(1) With southbound free right turn

SB = southbound
NB = northbound

Appendix G-1

Evaluation of Sight Distances at Existing Access to Waste Management Site, JT Engineering
March 2010

JT ENGINEERING
33336 N. AGUA DULCE CYN. RD. #103
AGUA DULCE, CA. 91390
TEL: (661) 268-8899 FAX: (661) 268-1936

EVALUATION OF SIGHT DISTANCES AT EXISTING ACCESS TO WASTE MANAGEMENT SITE

AT THE INTERSECTION OF
CITY RANCH ROAD & TIERRA SUBIDA AVENUE
CITY OF PALMDALE

WASTE MANAGEMENT - PALMDALE SITE
1200 W. CITY RANCH ROAD
Palmdale, CA 93550

March 24, 2010

Prepared for:
Waste Management
c/o Christian Sapong
9081 Tujunga Avenue
Sun Valley, CA 91352

Plate of Subject Intersection:

PURPOSE

The purpose of this report is to evaluate the existing-condition sight distances for the existing driveway access located at the intersection of Tierra Subida Avenue and City Ranch Road and make recommendations for alternative solutions to mitigate any deficiencies.

BASIS and ASSUMPTIONS

1. AASHTO policy for intersection sight distances, stopping sight distances, and superelevation;

2. 60 MPH design speed for Tierra Subida Avenue, per City of Palmdale Traffic;

3. 57-foot ultimate half-width right-of-way on the west side of Tierra Subida;

4. Construction drawings for the proposed widening of Tierra Subida Avenue between City Ranch Road and Cactus Drive, City of Palmdale project number 482.

FINDINGS

Study Scenario #1

Study scenario #1 analyzes the intersection sight distances for a stopped passenger car located at the existing City Ranch Road driveway attempting a left turn onto northbound Tierra Subida, a right turn onto southbound Tierra Subida, or a through-movement across the arterial. The approaching vehicle in the major road is selected to be a combination truck in accordance with the AASHTO definition.

For the three studied movements, the intersection sight distance (ISD) is calculated to be approximately 1015 feet, measured from the City Ranch Road access, either northerly along the southbound through-lane or southerly along the northbound through-lane in Tierra Subida. The decision point for the minor-road driver is set at 15 feet from the major-road nearest edge of traveled way. A straight line connecting the decision point with the far end point of the ISD represents the third leg of the so-called departure intersection sight triangle (IST) within which limits there shall be no sight obstructions for drivers in Tierra Subida and at the driveway access at City Ranch Road. Thus, two departure IST's exist for the departing vehicle at the driveway access—one for viewing traffic approaching from the left, the other for viewing traffic approaching traffic from the right.

Study findings with respect to the IST for viewing traffic approaching from the left i.e., from the north. *Refer to* ***Exhibits 1 through 4****:*

1. *With respect to horizontal alignment*, the existing conditions do not provide for adequate sight distance within this IST. The hill located west of Tierra Subida and north of City Ranch Road presents a sight obstruction within the IST.

   While City Project 482 calls for the cutting of this hill, the proposed cut will not be sufficient to provide the required clear sight triangle. It is anticipated that an additional cut of the hill to effect a maximum horizontal shift of 15 feet further west of the proposed toe of slope, will resolve the sight distance issue with respect to horizontal alignment.

   The additional cut will require additional right-of-way—which translates to additional acquisition from APN 3004-015-009 and -003 beyond what the City has already acquired under Project 482. **Exhibit 7** illustrates the minimum additional right-of-way needed for this purpose. The areas of the additional acquisition are estimated at 1,500 SF from -009 and 12,000 SF from -003.

2. *With respect to vertical alignment*, the existing conditions do not provide for adequate sight distance within this IST. Tierra Subida Avenue was constructed with a series of crest and sag vertical curves which, together with the existing hill on the west side, limit visibility within the IST.

   City Project 482 calls for a wide shoulder to be constructed beyond the new west pavement edge along the first 500 feet north of the City Ranch Road intersection. Based on the Street Improvement Plans, the shoulder in profile will still present a sight obstruction within this IST. It is anticipated that the required sight distance can be achieved by modifying the shoulder construction in conjunction with implementing the additional cut discussed in Item 1 of Scenario #1 above. The shoulder modification entails construction of a minimum 6% down slope from the new pavement edge (in lieu of the 2% up slope indicated on City Project 482 plans) across the expanded width as required by said Item 1. **Exhibits 1 through 4** illustrate various line-of-sight profiles from the decision point, along with approximate ground profiles that incorporate the stated 6%-down-slope shoulder.

Study findings with respect to the IST for viewing traffic approaching from the right i.e., from the south. *Refer to* ***Exhibit 5.***

1. Based on the existing topography of Tierra Subida Avenue south of City Ranch Road as suggested by aerial survey provided on City Project 482 plans, adequate intersection sight distances are available within this IST with respect to both horizontal and vertical alignments. No corrective work is recommended within this IST for the existing condition.

Study Scenario #2

In study scenario #2, a stopped passenger car queued within the northbound left-turn lane of Tierra Subida attempts a movement onto westbound City Ranch Road while a southbound Tierra Subida passenger car with the right-of-way approaches the intersection. Sight distances for both vehicles are analyzed.

The stopping sight distance for the southbound vehicle is calculated to be 620 feet. This distance is understood to be measured along the traveled lane. When measured from the location of the queued vehicle in the northbound left-turn lane, this distance places the southbound vehicle at about Station 59+15 per City Project 482 plans, just south of the Rayburn Road intersection. Due to the horizontal curvature of the roadway, the straight line-of-sight that connects the two vehicles passes through the new west edge of pavement. Refer to **Exhibit 6** for additional information.

1. *With respect to horizontal alignment*, there are no sight obstructions for either vehicle.

2. *With respect to vertical alignment,* the road surface presents an obstruction in the line of sight.

   Within this segment of roadway, City Project 482 calls for pavement widening and cold mill and overlay over the existing portions. These proposed improvements do not address sight distance concerns. It is anticipated, then, that the required clear sight distance can be achieved by lowering the roadway surface by a maximum of 15 inches across two-thirds of this segment of roadway. By so doing, it is anticipated that the driver in the southbound vehicle will be able to see the left-turning vehicle, and vice versa, from a distance that will allow the vehicle to come to a stop, at a comfortable deceleration rate, before conflict.

RECOMMENDATIONS

The following are potential alternatives to mitigate the sight distance deficiencies discussed in the preceding pages.

Alternative #1 – Consisting of all of the following mitigation measures, this alternative solution seeks to minimize impact on existing street improvements.

A. Lower the Tierra Subida roadway surface by a maximum of 15 inches across a length of about 400 feet centered at about the location known as Station 56+00 on City Project 482 plans; together with,

B. Construct a shoulder with a down grade on the order of 6% from the new (west) edge of pavement. This shoulder should extend the length from City Ranch Road to Rayburn Road. The width of this shoulder should be extended further west to Line-of-Sight 'O1-A' shown on Exhibit 1; together with,

C. The cut slopes and terraces proposed on sheet 22 of ST 06-41 of City Project 482 need to be adjusted to incorporate a toe-of-slope alignment along said Line-of-Sight 'O1-A' and edge of shoulder of Item B above.

   In lieu of shifting the slopes, a retaining wall may be constructed along said Line-of-Sight 'O1-A'. The retaining condition varies from 1 foot high to 15 feet high. The wall will be about 500 feet long; together with,

D. Acquire additional right-of-way from APN 3004-015-009 and -003. Minimum acquisition should account for the new toe-of-slope or retaining wall. The areas of the additional acquisition are estimated at 1,500 SF from -009 and 12,000 SF from -003.

Alternative #2 – Consisting of all of the following mitigation measures, this alternative solution seeks to avoid impacting the existing water mains and force sewer line in the street:

A. Raise the Tierra Subida Avenue / City Ranch Road intersection by 2.5 feet and transition back down to existing improvements along all four approaches; together with,

B. The cut slopes and terraces proposed on sheet 22 of ST 06-41 of City Project 482 need to be adjusted to incorporate a toe-of-slope alignment along Line-of-Sight 'O1-A' shown on Exhibit 1.

   In lieu of shifting the slopes, a retaining wall may be constructed along said Line-of-Sight 'O1-A'. The wall would be about 300 feet long, beginning at the point

where the south property line of APN 3004-015-009 intersects the existing right-of-way, and extending in the northerly direction, ending at a point inside APN 3004-015-003. The retaining condition varies from 1 foot high to 12 feet high; together with,

C. Acquire additional right-of-way from APN 3004-015-009 and -003. Minimum acquisition should account for the retaining wall. The areas of the additional acquisition are estimated at 1,500 SF from -009 and 12,000 SF from -003.

Alternative #3 – This alternative proposes a compromise between the first two alternatives and seeks to avoid impacting the existing water mains and force sewer line. Alternative #3 consists of all of the following mitigation measures:

A. Raise the Tierra Subida / City Ranch Road intersection by about 6 inches and transition back down to existing improvements along the south, east, and west approaches; together with,

B. Lower the Tierra Subida roadway surface by a maximum of 6 inches across a length of about 300 feet centered at about the location known as Station 56+00 on City Project 482 plans; together with,

C. Raise the Tierra Subida / Rayburn Road intersection by about 9 inches and transition back down to existing improvements along the north and east approaches; together with,

D. Construct a shoulder with a down grade on the order of 6% from the new (west) edge of pavement. This shoulder should extend the length from City Ranch Road to Rayburn Road. The width of this shoulder should be extended further west to Line-of-Sight 'O1-A' shown on Exhibit 1; together with,

E. The cut slopes and terraces proposed on sheet 22 of ST 06-41 of City Project 482 need to be adjusted to incorporate a toe-of-slope alignment along said Line-of-Sight 'O1-A' and edge of shoulder of Item D above.

   In lieu of shifting the slopes, a retaining wall may be constructed along said Line-of-Sight 'O1-A'. The retaining condition varies from 1 foot high to 15 feet high. The wall will be about 500 feet long; together with,

F. Acquire additional right-of-way from APN 3004-015-009 and -003. Minimum acquisition should account for the new toe-of-slope or retaining wall. The areas of the additional acquisition are estimated at 1,500 SF from -009 and 12,000 SF from -003.

Alternative #4 – Close off City Ranch Road at Tierra Subida. Construct Avenue R-5 from the Waste Management property line and a frontage road that will intersect Tierra Subida at Rayburn Road, and create a 4-way signalized intersection. Preliminary design calls for a 40-foot roadway measured from curb to curb, with an 8-foot sidewalk adjacent to the west curb and a 10-foot-minimum buffer between the east curb and the ultimate location of the west sidewalk of Tierra Subida proper.

Refer to **Exhibits 8A, 8B, and 8C** for additional information. Since the alignment of the frontage road encroaches significantly onto APN 3004-015-041, -009, and -003, it may be an option for consideration to acquire only the predominantly 56-foot-wide strip for right-of-way and leave the properties as divided parcels.

SUPPLEMENT

Evaluation of the Existing Northbound Left-Turn Lane at the intersection of Tierra Subida Avenue with City Ranch Road:

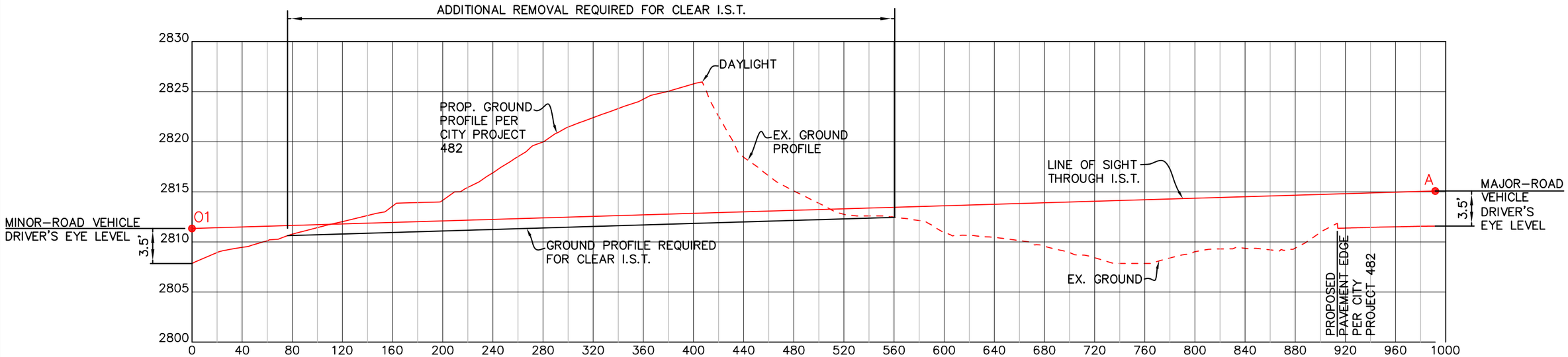
General design considerations call for the length of the turning lane to be sum of the entering taper, the deceleration length, and the storage length. According to AASHTO, it is common practice to accept some amount of deceleration within the through lanes and to consider the taper length as a part of the deceleration within the through lanes. A 10-mph differential in design speed between the turning lane and the through lane is commonly considered acceptable on arterial roadways. Therefore it will suffice to incorporate the AASHTO-recommended *deceleration length* of **410 feet** for the turning-lane design speed of 50 mph, given the design speed for the through-lane is 60 mph.

At unsignalized intersections, the storage length may be based on the number of turning vehicles likely to arrive in an average two-minute period within the peak hour. Based on the Traffic Impact Analysis prepared by Kunzman Associates, revised September 20, 2005, the traffic counts noted there was a maximum of 2 vehicles making subject left-turn movement within any given 15-minute period within the peak hour. In accordance with AASHTO recommendations, the storage length, then, is the space for 2 vehicles (or 1 passenger car and 1 truck if the percentage truck traffic is greater than 10%, which is the case per said traffic study). The assumption of 25 feet and 75 feet is used for the storage length of a passenger car and a truck, respectively. Thus, the *storage length* for subject left-turn lane is **100 feet**.

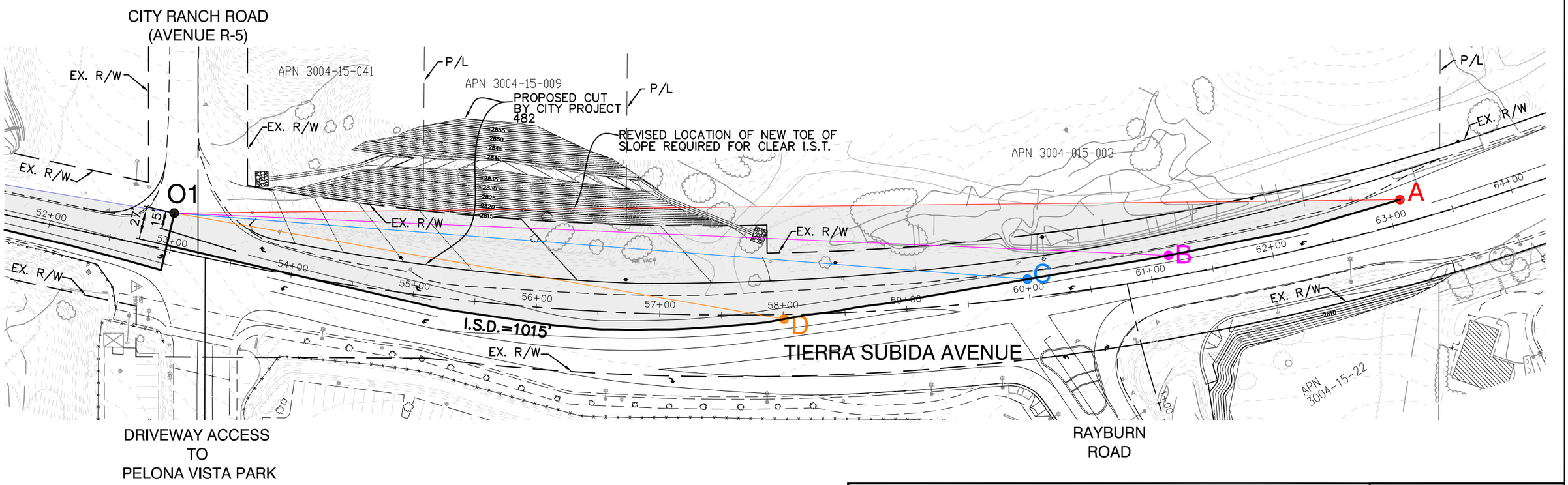
Therefore the length of the turning lane should be **510 feet**.

Existing Condition: Based on the aerial survey provided with the construction plans for City Project 482, subject left-turn lane measures about 200 feet in length, not including a 120-foot taper (which consists of a 65-foot transition and a 55-foot opening). The total of 320 feet falls short of the AASHTO recommended length.

Recommendation: It is recommended that the subject left-turn lane be extended south to at least the recommended length as discussed above. Based on the aerial survey for City Project 482 plans, the new length can be accommodated by re-striping and without pavement modification. Refer to **Exhibit 9** for the proposed striping. The revised taper should begin at the same location as the start of the opening for the southbound left-turn lane onto Pelona Vista Park at Avenue R-8. It is anticipated that the taper length of 120 feet is adequate. This will provide for a full-width left-turn lane length of 410 feet, which is sufficient to accommodate the balance of the deceleration portion (410 - 120 = 290 feet) and the storage length (410 – 290 = 120 feet > 100 feet).

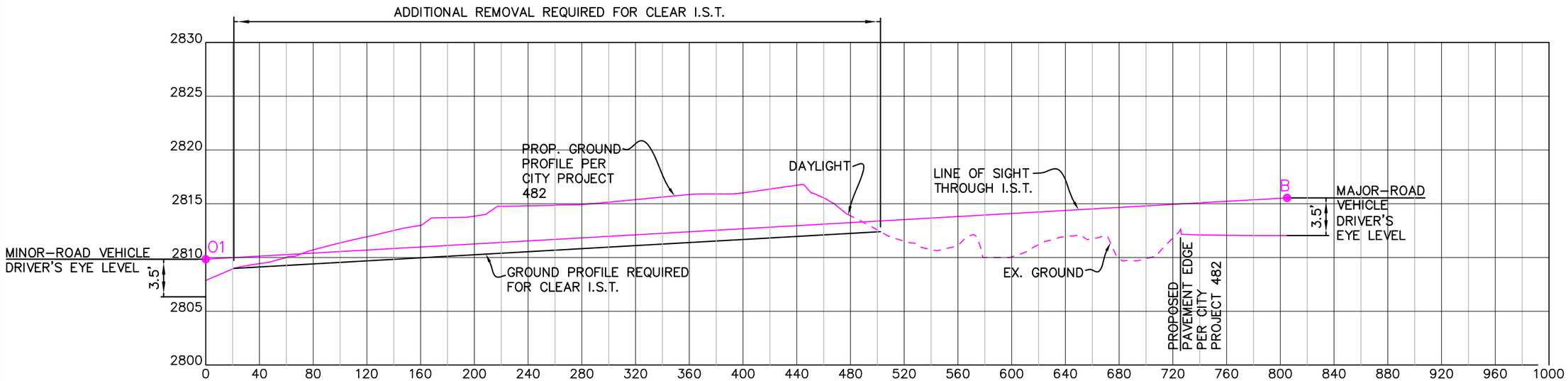


SECTION 'O1 - A'

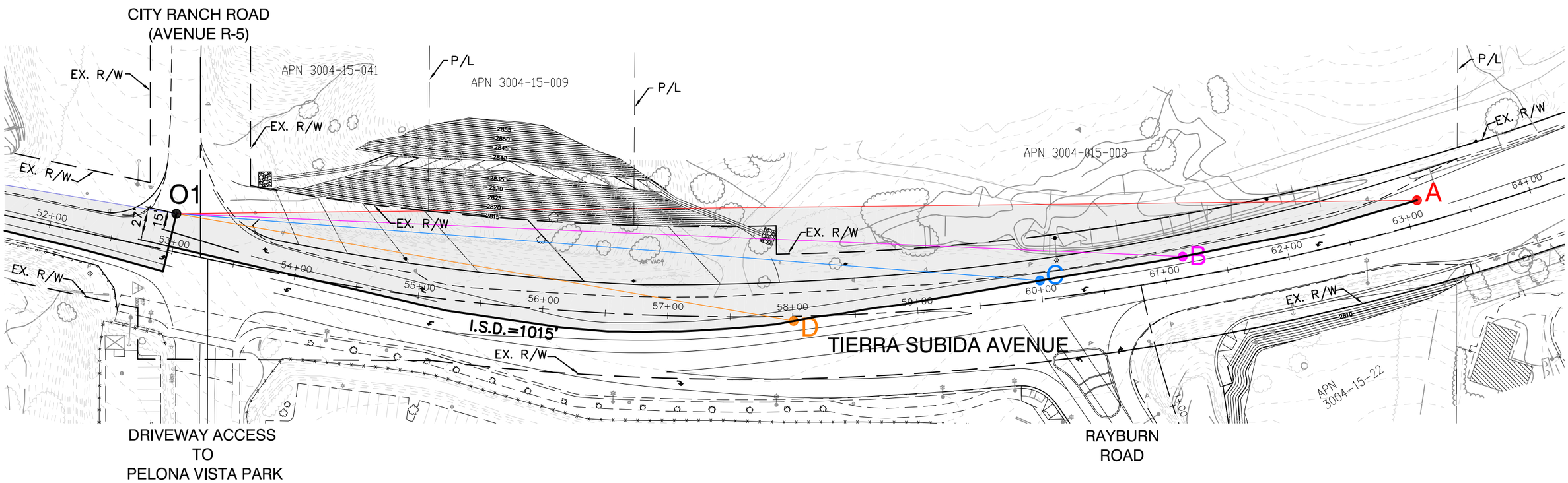


SCALE:1"=80'

VARIOUS LINES OF SIGHT WITHIN DEPARTURE INTERSECTION SIGHT TRIANGLE STUDY SCENARIO No.1	EXHIBIT NO.: 1

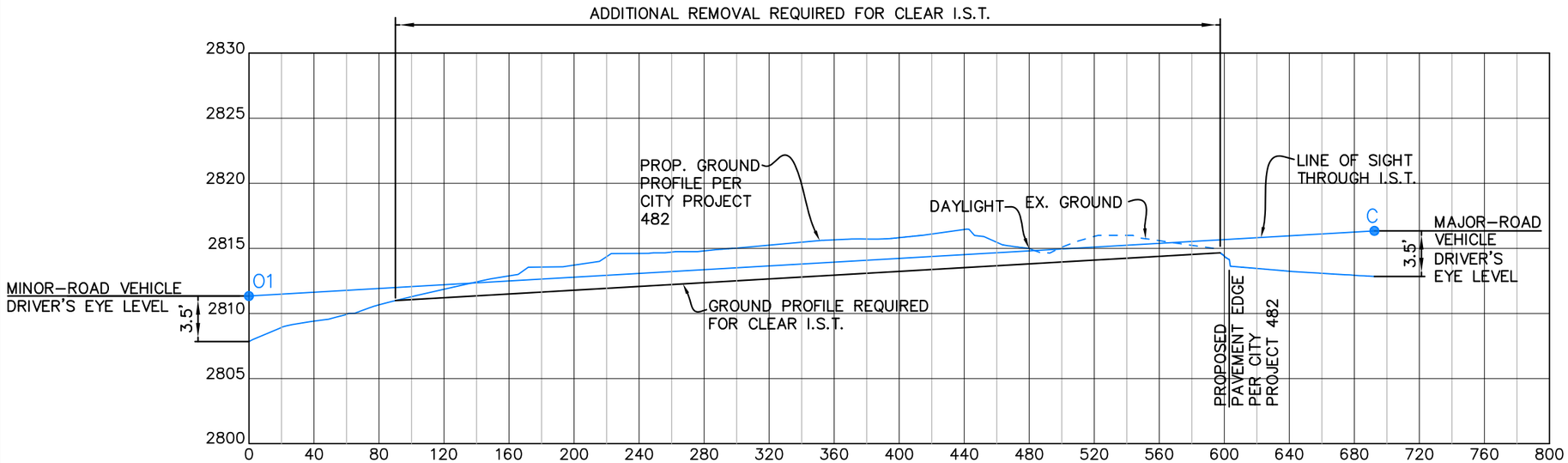


SECTION 'O1 - B'

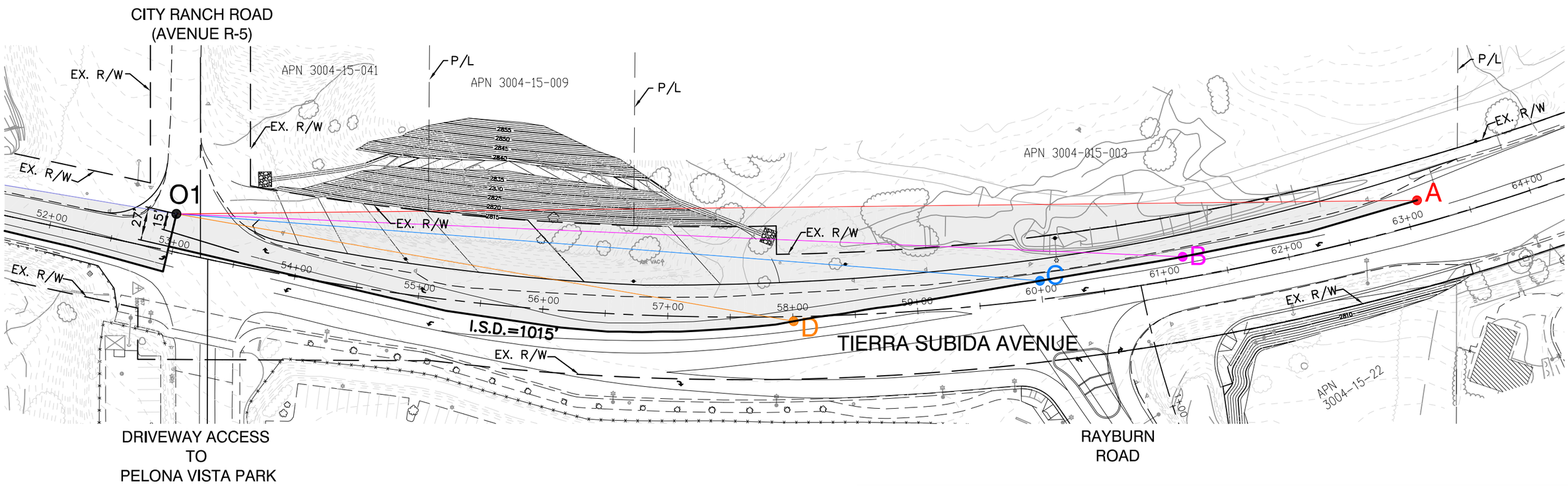


SCALE:1"=80'

VARIOUS LINES OF SIGHT WITHIN DEPARTURE INTERSECTION SIGHT TRIANGLE STUDY SCENARIO No.1	EXHIBIT NO.: 2

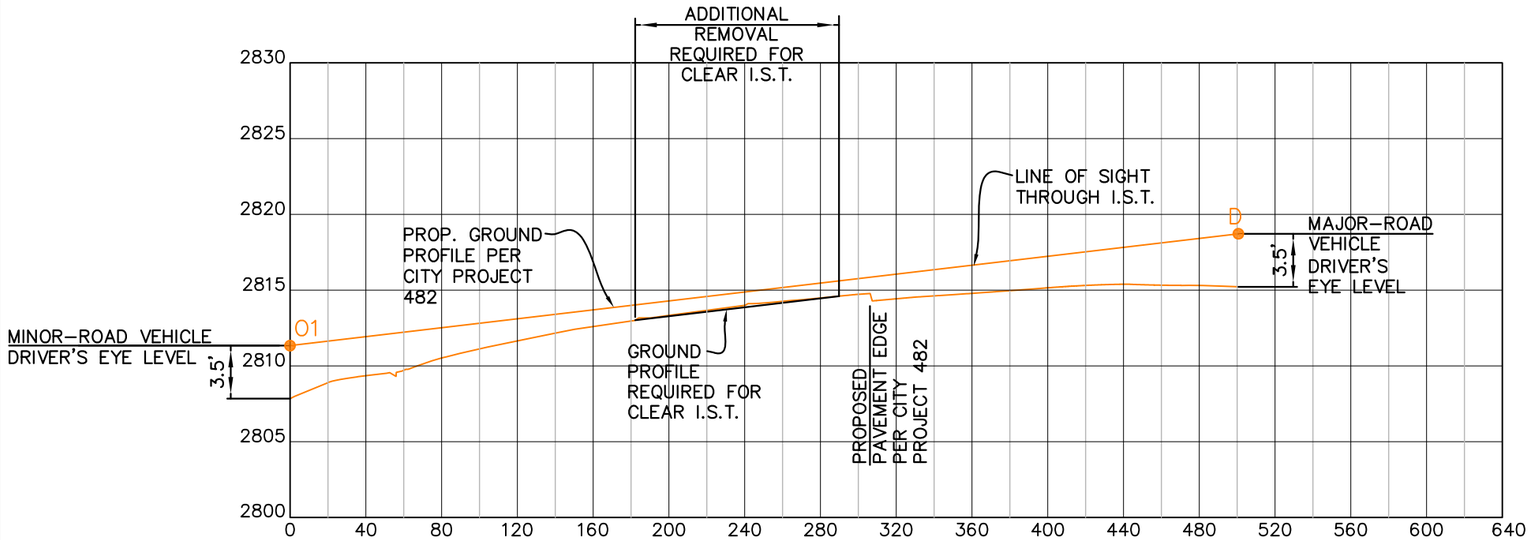


SECTION 'O1 - C'

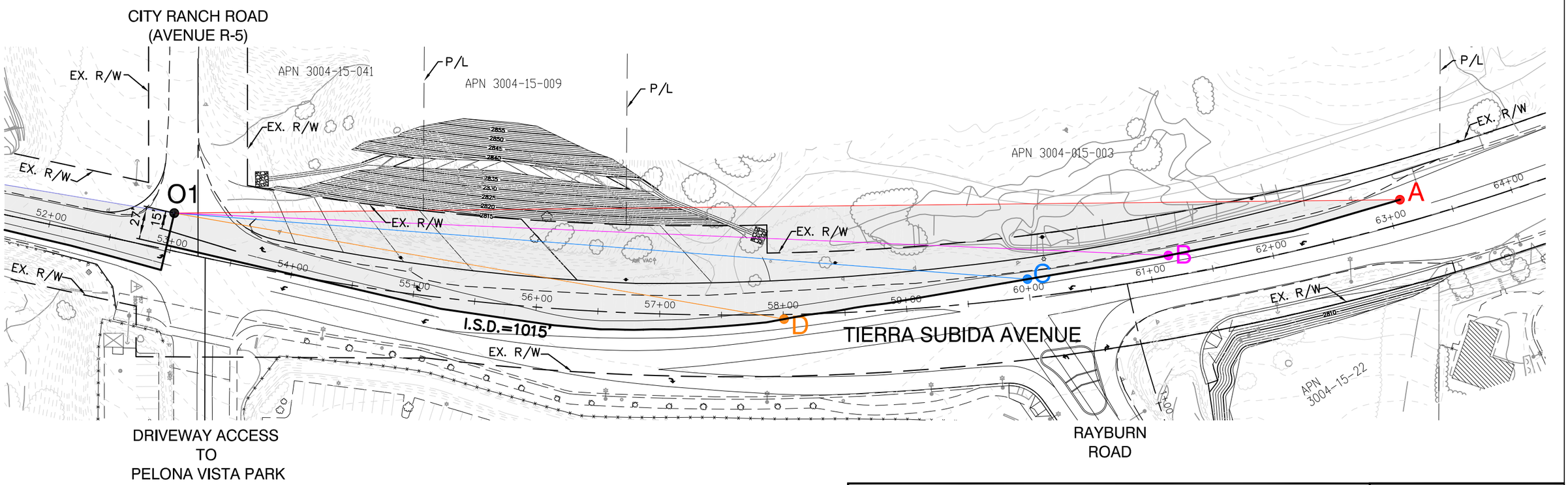


SCALE:1"=80'

VARIOUS LINES OF SIGHT WITHIN DEPARTURE INTERSECTION SIGHT TRIANGLE STUDY SCENARIO No.1	EXHIBIT NO.: 3

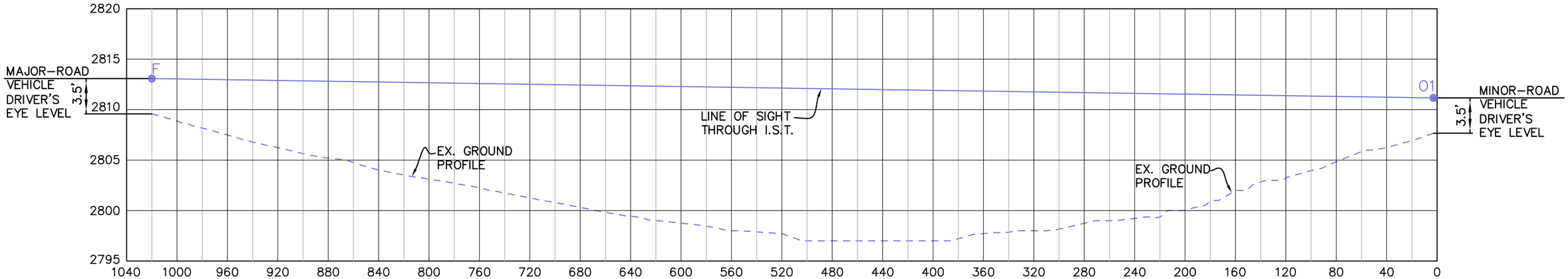


SECTION 'O1 - D'



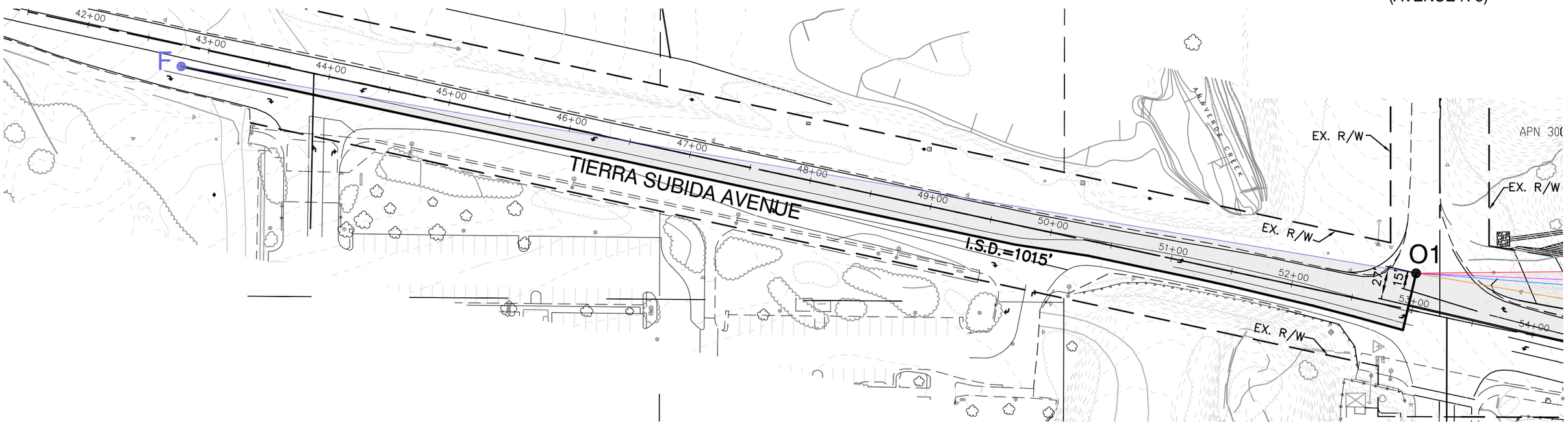
SCALE:1"=80'

VARIOUS LINES OF SIGHT WITHIN DEPARTURE INTERSECTION SIGHT TRIANGLE STUDY SCENARIO No.1	EXHIBIT NO.: 4



SECTION 'O1 - F'

CITY RANCH ROAD
(AVENUE R-5)

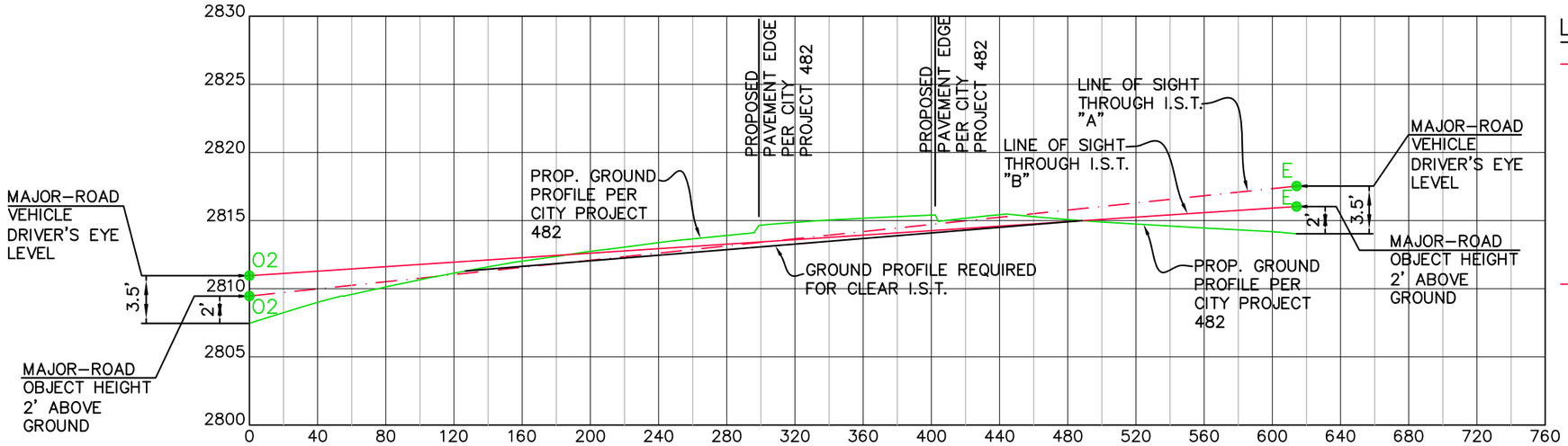


DRIVEWAY ACCESS
TO
PELONA VISTA PARK

SCALE:1"=80'

VARIOUS LINES OF SIGHT WITHIN DEPARTURE INTERSECTION SIGHT TRIANGLE STUDY SCENARIO No.1

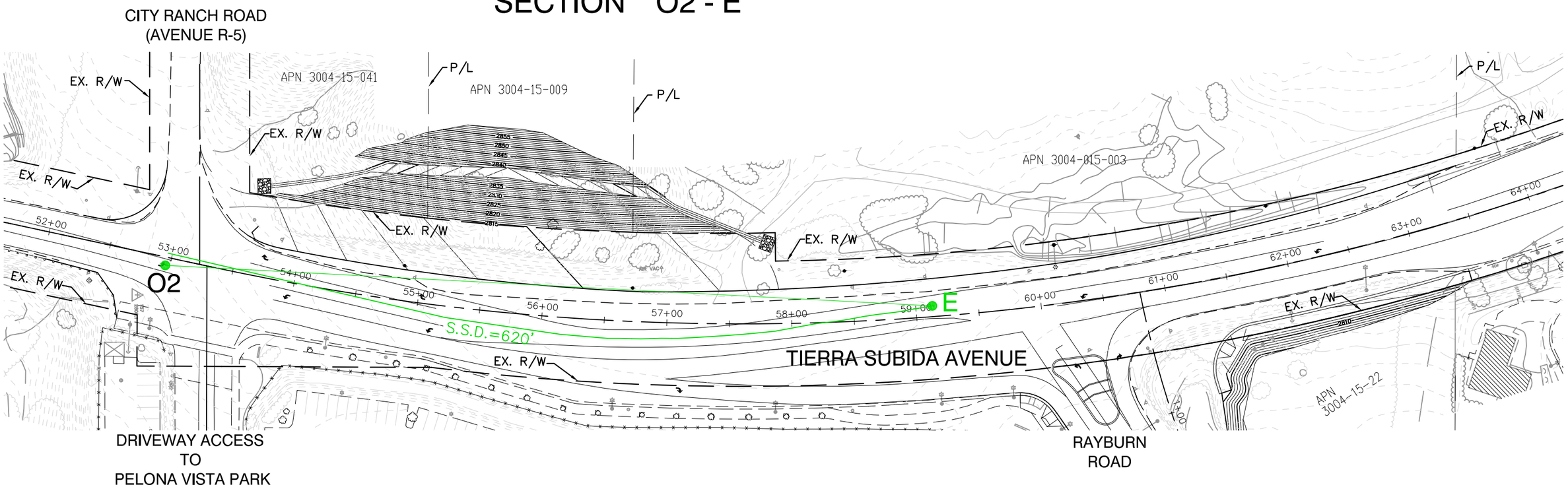
EXHIBIT NO.: 5



SECTION 'O2 - E'

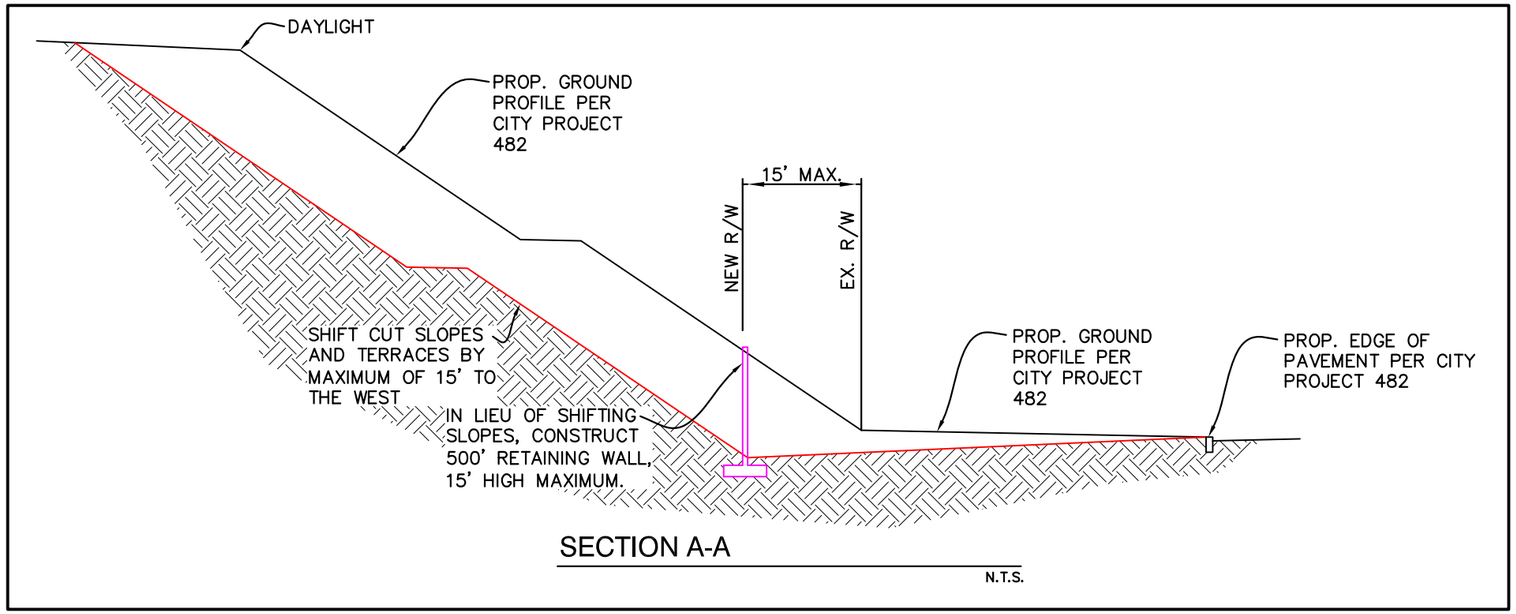
LEGEND

LINE OF SIGHT THROUGH I.S.T. "A"	=	LINE CONNECTING THE EYE LEVEL FOR VEHICLE DRIVER TRAVELING SOUTH BOND ON TIERRA SUBIDA AVENUE (3.5' ABOVE GROUND) TO THE OBJECT HEIGHT 2' ABOVE GROUND STOPPED AT CITY RANCH ROAD INTERSECTION TRYING TO MAKE LEFT ON CITY RANCH ROAD
LINE OF SIGHT THROUGH I.S.T. "B"	=	LINE CONNECTING THE EYE LEVEL FOR VEHICLE DRIVER STOPPED AT CITY RANCH ROAD INTERSECTION TRYING TO MAKE LEFT ONTO CITY RANCH ROAD (3.5' ABOVE GROUND) TO THE OBJECT HEIGHT 2' ABOVE GROUND TRAVELING SOUTH BOND ON TIERRA SUBIDA AVENUE



SCALE:1"=80'

LINE OF SIGHT 'O2 - E'	EXHIBIT NO.: 6



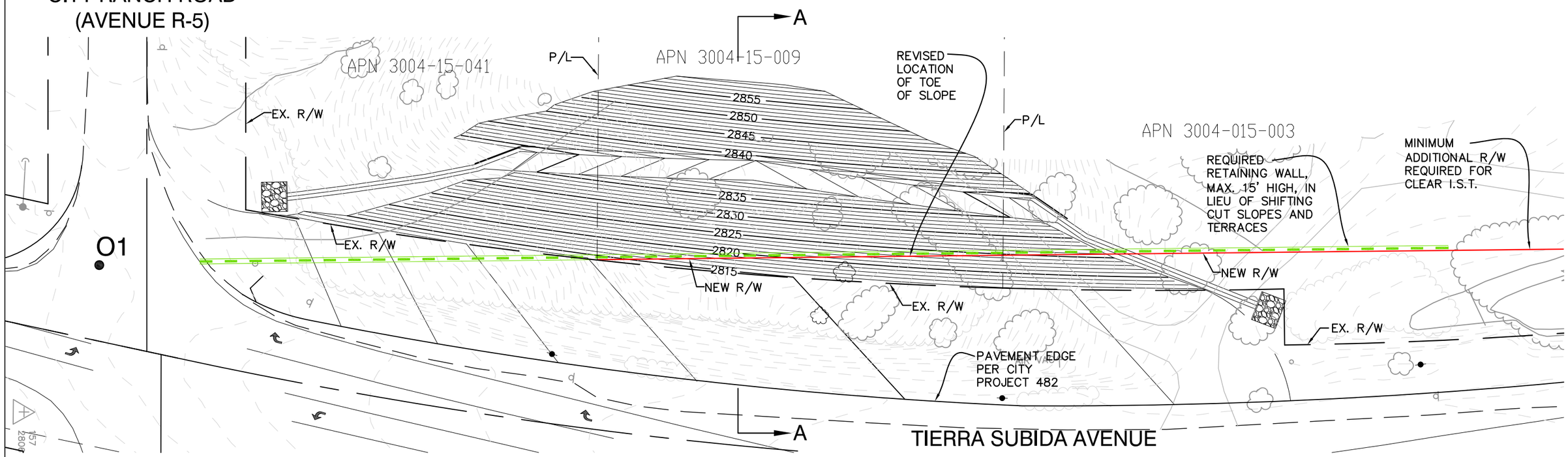


EXHIBIT OF REQUIRED ADDITIONAL R/W

EXHIBIT NO.: 7

AVENUE R-5

APN 3004-15-008

APN 3004-15-041

APN 3004-15-002

APN 3004-15-003

APN 3004-15-009

APN 3004-15-015

APN 3004-15-025

X

X

NOTE:

* PLAN SHOWS 2: 1 SLOPES. HOWEVER THE ACTUAL ALLOWABLE SLOPE MAY VARY UPON GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS.

FILL * 2:1 MAX.

CUT * 2:1 MAX.

PROP. R/W

EX. R/W

R=250'

R=32'

30'

2.9%

3.8%

2.0%

4b'

NEW EP.

NEW EDGE OF PAVEMENT PER CITY PROJECT 482

C/L

TIERRA SUBIDA AVENUE

DRIVEWAY ACCESS TO PELONA VISTA PARK

RAYBURN ROAD

KEYNOTES

MIMIMUM REQUIRED RIGHT-OF-WAY ACQUISITION FOR FRONTAGE ROAD

1. 9,820 SF FROM APN 3004-015-041
2. 9,420 SF FROM APN 3004-015-009
3. 30,280 SF FROM APN 3004-015-003

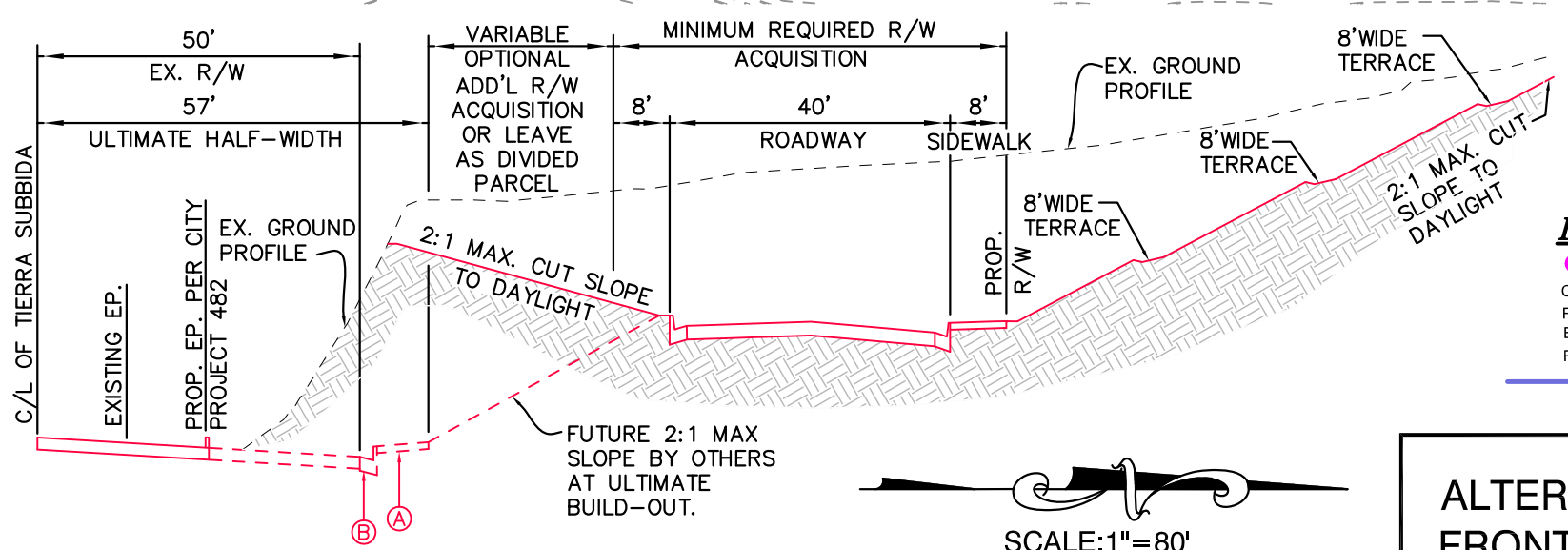
OPTIONAL ADDITIONAL RIGHT-OF-WAY ACQUISITION OR LEAVE AS DIVIDED PARCEL

4. 15,950 SF FROM APN 3004-015-041
5. 16,040 SF FROM APN 3004-015-009
6. 44,440 SF FROM APN 3004-015-003

- A FUTURE SIDEWALK BY OTHERS AT ULTIMATE BUILD-OUT.
- B FUTURE CURB AND GUTTER BY OTHERS AT ULTIMATE BUILD-OUT.
- C PROPOSED CURB AND GUTTER.
- D PROPOSED SIDEWALK.
- E PROPOSED 8' WIDE CONCRETE TERRACE.
- I PROPOSED EDGE OF PAVEMENT.
- S SIGNALIZED INTERSECTION

LEGEND

- PROPOSED STREET LIGHT
- C&G CURB AND GUTTER
- PROP. PROPOSED
- EP. EDGE OF PAVEMENT
- R/W RIGHT OF WAY
- ESTIMATED DAYLIGHT LINE FOR CUT AND FILL SLOPES.



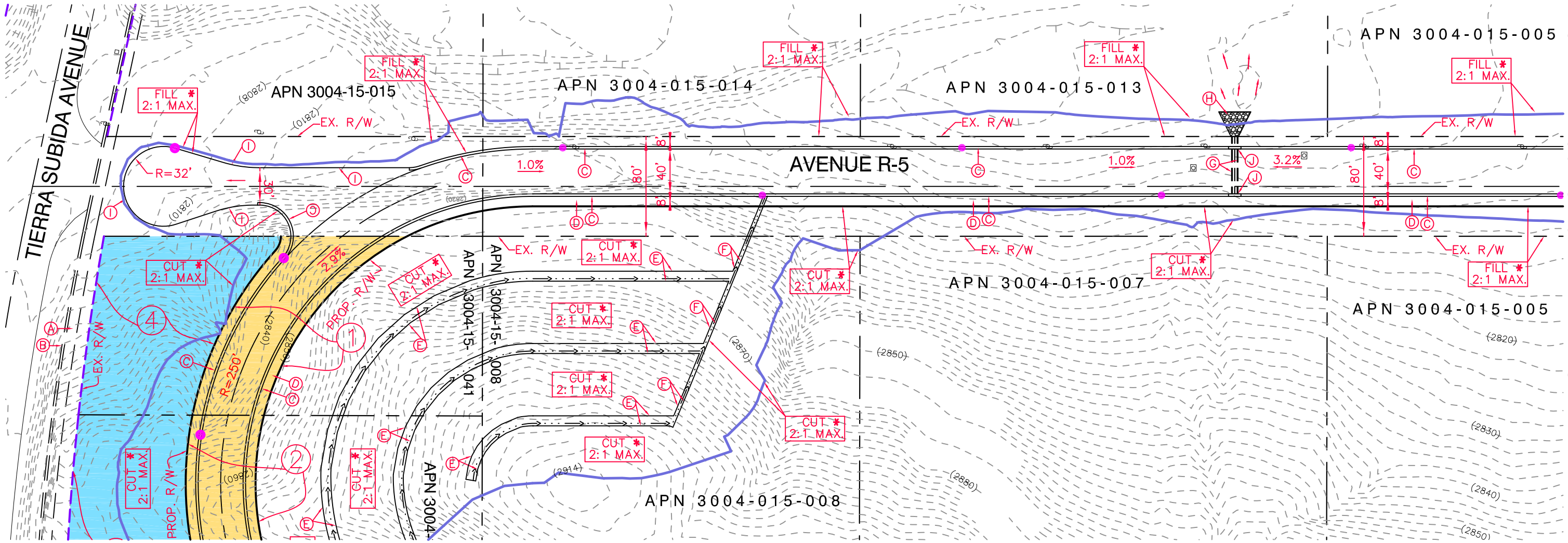
SECTION X–X

N.T.S.

SCALE:1"=80'

ALTERNATE No.4
FRONTAGE ROAD AND AVENUE R-5

EXHIBIT NO.: 8A



SEE EXHIBIT '8A'
FOR CONTINUATION

SCALE:1"=80'

LEGEND

MIMIMUM REQUIRED RIGHT-OF-WAY ACQUISITION FOR FRONTAGE ROAD

1. 9,820 SF FROM APN 3004-015-041
2. 9,420 SF FROM APN 3004-015-009
3. 30,280 SF FROM APN 3004-015-003

OPTIONAL ADDITIONAL RIGHT-OF-WAY ACQUISITION OR LEAVE AS DIVIDED PARCEL

4. 15,950 SF FROM APN 3004-015-041
5. 16,040 SF FROM APN 3004-015-009
6. 44,440 SF FROM APN 3004-015-003

- (A) FUTURE SIDEWALK BY OTHERS AT ULTIMATE BUILD-OUT.
- (B) FUTURE CURB AND GUTTER BY OTHERS AT ULTIMATE BUILD-OUT.
- (C) PROPOSED CURB AND GUTTER.
- (D) PROPOSED SIDEWALK.
- (E) PROPOSED 8' WIDE CONCRETE TERRACE.
- (F) PROPOSED 3' WIDE CONCRETE GUTTER.
- (G) PROPOSED STORM DRAIN PIPE.
- (H) PROPOSED RIP-RAP.
- (I) PROPOSED EDGE OF PAVEMENT.
- (J) PROPOSED CATCH BASIN.
- (S) SIGNALIZED INTERSECTION
- ● PROPOSED STREET LIGHT

C&G	CURB AND GUTTER
PROP.	PROPOSED
EP.	EDGE OF PAVEMENT
R/W	RIGHT OF WAY

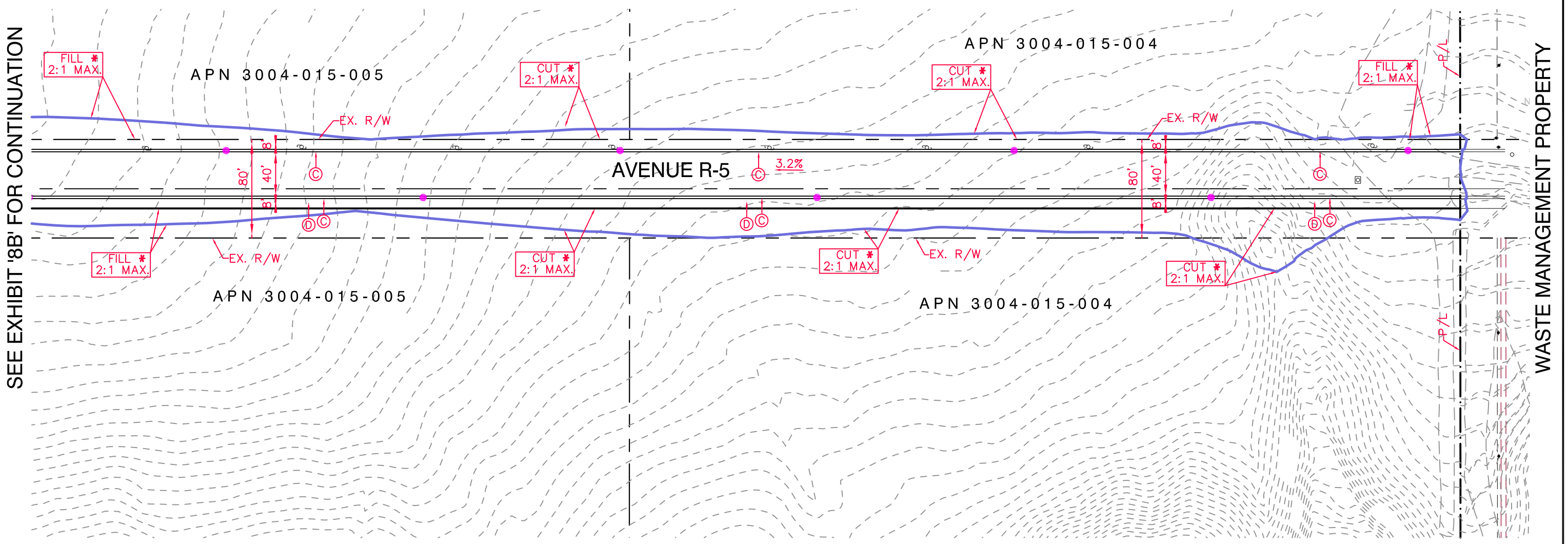
ESTIMATED DAYLIGHT LINE FOR CUT AND FILL SLOPES.

NOTE:

* PLAN SHOWS 2: 1 SLOPES. HOWEVER THE ACTUAL ALLOWABLE SLOPE MAY VARY UPON GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS.

ALTERNATE No.4
FRONTAGE ROAD AND AVENUE R-5

EXHIBIT NO.: 8B



SCALE:1"=80'

LEGEND

Ⓒ	PROPOSED CURB AND GUTTER.
Ⓓ	PROPOSED SIDEWALK.
Ⓢ	SIGNALIZED INTERSECTION
●	PROPOSED STREET LIGHT
C&G	CURB AND GUTTER
PROP.	PROPOSED
EP.	EDGE OF PAVEMENT
R/W	RIGHT OF WAY
P/L	PROPERTY LINE
—	ESTIMATED DAYLIGHT LINE FOR CUT AND FILL SLOPES.

NOTE:

* PLAN SHOWS 2: 1 SLOPES. HOWEVER THE ACTUAL ALLOWABLE SLOPE MAY VARY UPON GEOTECHNICAL INVESTIGATION AND RECOMMENDATIONS.

ALTERNATE No.4
FRONTAGE ROAD AND AVENUE R-5

EXHIBIT NO.: 8C

PRELIMINARY OPINION OF PROBABLE COST *[01]*

PROPOSED ALTERNATIVES TO MITIGATE SIGHT DISTANCE DEFICIENCIES
AT EXISTING ACCESS TO WASTE MANAGEMENT - PALMDALE SITE
AT INTERSECTION OF TIERRA SUBIDA AND CITY RANCH ROAD

March 24, 2010

ALT #1	***Lower* Tierra Subida by a maximum 15" across 400' length and construct modified widened shoulder between City Ranch Road and Rayburn Road.**		**Probable Cost ($)**	
Hard Costs				
1.01	Remove and dispose of 30,000 SF AC pavement and base for street lowering.	0.63	18,900	
1.02	Remove and dispose of 12,000 SF AC pavement and base for transitioning.	0.63	7,560	
1.03	Earthwork : raw cut and export 1,000 yards (roadway lowering).	8.00	8,000	
1.04	Earthwork : raw cut and export 3,000 yards (shoulder modification).	8.00	24,000	
1.05	Construct 42,000 SF 6" AC over 11" CAB pavement on compacted subgrade.	5.22	219,240	
1.06	Remove existing & install at lower grade new 550 LF of 16" water main per requirements and approval of Los Angeles County Waterworks District.	166.25	91,438	*[02]*
1.07	Remove existing & install at lower grade new 550 LF of 12" water main per requirements and approval of Palmdale Water District.	169.57	93,264	*[03]*
1.08	Remove & reinstall at lower grade (by SCE) 2 power poles.	4,415.77	8,832	
1.09	Remove & reinstall at lower grade 550 LF of 4" sewer force main.	54.02	29,711	
1.10	Traffic control		12,000	
Hard Cost : Subtotal			**512,944**	
Hard Cost : Contingencies (@ 30%)		0.30	153,883	*[04]*
1.11	In lieu of shifting City proposed cut slopes, construct 500 LF retaining wall, with height varying from 1 to 15 feet.	261.61	130,805	*[05]*
Soft Costs (including, but not limited to the following)				
1.12	Legal: Acquire 1,500 SF from APN 3004-015-009 and 12,000 SF from -003 for R/W.			
1.13	Engineering fee	210.00		
1.14	Surveying (detailed topographic survey)	95.00		
1.15	City plan review	7,000.00		
Soft Cost : Subtotal (estimated at 10% of hard costs)		**0.10**	**79,763**	
Alternative #1 Estimated Total			**$877,395**	

Notes

[01] Unit prices based on 2009 Saylor and JT previous experiences.

[02] L.A. County Waterworks District may require bond before construction.

[03] Palmdale Water District may require bond before construction.

[04] The listed scope of work and associated quantities represent the anticipated major work based on conceptual design and preliminary engineering. No plans have been submitted to the agencies for review. The incorporation of a 30% contingency factor hopes to account for discrepancies in scope between this preliminary cost estimate and the final required scope after official plan review process and approval with all governing agencies.

[05] Deduct this cost if decision is made to opt for shifting the cut slopes proposed under City Project 482. Shifting the slopes entails additional on-site grading further into the hill, cost (or shared cost) of which should be taken into consideration.

PRELIMINARY OPINION OF PROBABLE COST *[01]*

PROPOSED ALTERNATIVES TO MITIGATE SIGHT DISTANCE DEFICIENCIES
AT EXISTING ACCESS TO WASTE MANAGEMENT - PALMDALE SITE
AT INTERSECTION OF TIERRA SUBIDA AND CITY RANCH ROAD

March 24, 2010

ALT # 2	***Raise* intersection of Tierra Subida and City Ranch Road by 2.5 feet and construct modified widened shoulder from City Ranch Road to Rayburn Road.**		**Probable Cost ($)**	
Hard Costs				
2.01	Remove and dispose of 50,000 SF AC pavement and base.	0.63	31,500	
2.02	Remove and dispose of 5,000 SF concrete sidewalk.	1.27	6,350	
2.03	Remove and dispose of 300 LF concrete curb/gutter.	2.63	789	
2.04	Earthwork : raw fill 4,000 yards (import of 1,000 yards…see item 2.06)	12.63	50,520	
2.05	Construct 50,000 SF 6" AC on 11" CAB pavement on compacted subgrade.	5.22	261,000	
2.06	Contruct 5,000 SF concrete sidewalk.	5.79	28,950	
2.07	Construct 300 LF concrete curb/gutter.	14.01	4,203	
2.08	Construct 1,600 LF 3' retaining wall.	120.01	192,016	
2.09	Grading : raw cut 3,000 yards (shoulder modification).	8.00	24,000	
2.10	Remove and reinstall 3 street lights.	4,415.77	13,247	
2.11	Traffic control		12,000	
Hard Cost : Subtotal			**624,575**	
Hard Cost : Contingencies (@ 30%)		0.30	187,373	*[06]*
2.12	In lieu of shifting City proposed cut slopes, construct 300 LF retaining wall, with height varying from 1 to 12 feet.	252.01	75,603	*[05]*
Soft Costs (including, but not limited to the following)				
2.13	Legal: Acquire 1,500 SF from APN 3004-015-009 and 12,000 SF from -003 for R/W.			
2.14	Engineering fee	160.00		
2.15	Surveying (detailed topographic survey)	100.00		
2.16	City plan review	9,000.00		
Soft Cost : Subtotal (estimated at 10% of hard costs)		0.10	**88,755**	
Alternative #2 Estimated Total			**$976,306**	

Notes

[01] Unit prices based on 2009 Saylor and JT previous experiences.

[04] The listed scope of work and associated quantities represent the anticipated major work based on conceptual design and preliminary engineering. No plans have been submitted to the agencies for review. The incorporation of a 30% contingency factor hopes to account for discrepancies in scope between this preliminary cost estimate and the final required scope after official plan review process and approval with all governing agencies.

[05] Deduct this cost if decision is made to opt for shifting the cut slopes proposed under City Project 482. Shifting the slopes entails additional on-site grading further into the hill, cost (or shared cost) of which should be taken into consideration.

PRELIMINARY OPINION OF PROBABLE COST *[01]*

PROPOSED ALTERNATIVES TO MITIGATE SIGHT DISTANCE DEFICIENCIES AT EXISTING ACCESS TO WASTE MANAGEMENT - PALMDALE SITE AT INTERSECTION OF TIERRA SUBIDA AND CITY RANCH ROAD

March 24, 2010

ALT # 3	**Raise intersection of Tierra Subida and City Ranch Road by 6 inches; lower 300 feet of Tierra Subida after intersection, by 6 inches; raise intersection of Tierra Subida and Rayburn Road by 9 inches; and construct modified widened shoulder from City Ranch Road to Rayburn Road.**		**Probable Cost ($)**
Hard Costs			
3.01	Remove and dispose of 110,000 SF AC pavement only.	0.42	46,200
3.02	Remove and dispose of 25,000 SF base material.	0.63	15,750
3.03	Remove and dispose of 1,000 LF concrete curb/gutter.	2.63	2,630
3.04	Remove and dispose of 8,000 SF sidewalk.	1.27	10,160
3.05	Earthwork : raw cut 250 yards (lower roadway subgrade).	8.00	2,000
3.06	Earthwork : raw cut 3,000 yards (shoulder modification).	8.00	24,000
3.07	Earthwork : raw fill 300 yards (raise sidewalk by 6 to 9 inches).	4.75	1,425
3.08	Construct 110,000 SF 6" AC on 11" CAB pavement on existing base layer.	5.22	574,200
3.09	Construct 25,000 SF 6" AC on 11" CAB pavement on compacted subgrade.	5.22	130,500
3.10	Construct 8,000 SF concrete sidewalk.	5.79	46,320
3.11	Construct 1,000 LF concrete curb/gutter.	14.01	14,010
3.12	Construct 800 LF 1' retaining curb.	20.95	16,760
3.13	Remove and reinstall 8 street lights.	4,415.77	35,326
3.14	Traffic control		12,000
Hard Cost : Subtotal			**931,281**
Hard Cost : Contingencies (@ 30%)		0.30	279,384 *[04]*
3.15	In lieu of shifting City proposed cut slopes, construct 300 LF retaining wall, with height varying from 1 to 12 feet.	252.01	75,603 *[05]*
Soft Costs (including, but not limited to the following)			
3.16	Legal: Acquire 1,500 SF from APN 3004-015-009 and 12,000 SF from -003 for R/W.		
3.17	Engineering fee	160.00	
3.18	Surveying (detailed topographic survey)	120.00	
3.19	City plan review	17,000.00	
Soft Cost : Subtotal (estimated at 10% of hard costs)		0.10	**128,627**
Alternative #3 Estimated Total			**$1,414,895**

Notes

[01] Unit prices based on 2009 Saylor and JT previous experiences.

[04] The listed scope of work and associated quantities represent the anticipated major work based on conceptual design and preliminary engineering. No plans have been submitted to the agencies for review. The incorporation of a 30% contingency factor hopes to account for discrepancies in scope between this preliminary cost estimate and the final required scope after official plan review process and approval with all governing agencies.

[05] Deduct this cost if decision is made to opt for shifting the cut slopes proposed under City Project 482. Shifting the slopes entails additional on-site grading further into the hill, cost (or shared cost) of which should be taken into consideration.

PRELIMINARY OPINION OF PROBABLE COST *[01]*

PROPOSED ALTERNATIVES TO MITIGATE SIGHT DISTANCE DEFICIENCIES
AT EXISTING ACCESS TO WASTE MANAGEMENT - PALMDALE SITE
AT INTERSECTION OF TIERRA SUBIDA AND CITY RANCH ROAD

March 24, 2010

ALT # 4	**Close off City Ranch Road at Tierra Subida. Construct frontage road and Avenue R-5 and intersect Tierra Subida at Rayburn Road, creating a 4-way signalized intersection. See note 6 for continuation.**		**Probable Cost ($)**
Hard Costs			
4.01	Construct 116,000 SF 6" AC over 11" CAB pavement on compacted subgrade.	4.22	489,520
4.02	Construct 5,890 LF curb & gutter.	10.01	58,959
4.03	Construct 24,000 SF sidewalk.	3.54	84,960
4.04	Earthwork		
4.04.1	Earthwork : raw Cut 117,000 yards, raw Fill 13,000 yards	5.50	715,000
4.04.2	Export : Haul 104,000 yards to dump site 1 mile away.	2.75	286,000
4.05	Construct conc. terrace on cut slope, approx. 8,500 SF, with drainage devices (splash walls, gutters, parkway drain).		84,450
4.06	Construct 2 catch basins, connecting RCP, and rip-rap structure		14,273
4.07	Relocate existing power poles (14) behind new curb and install at new grade.	10,000.00	142,000
4.08	Adjust existing electrical manhole vaults (5) to new grade.	5,000.00	25,000
4.09	Retaining Walls : ***None anticipated.***		0
4.10	Convert stop-controlled 3-way intersection to 4-way signalized intersection.	236,406.60	236,407
4.11	Install 23 street lights and associated work.	5,000.00	115,000
4.12	Traffic control		8,000
Hard Cost : Subtotal			
	Subtotal		**2,259,568**
	Hard Cost : Contingencies (@ 30%)	0.30	677,871 *[04]*
Soft Costs (including, but not limited to the following)			
4.13	Legal: Right-of-way, acquisition from affected properties estimated as follows:		
	From APN 3004-015-041: 9,820 SF required for frontage road.		
	From APN 3004-015-009: 9,420 SF required for frontage road; 16,040 SF optional add'l acquisition or leave as divided parcel.		
	From APN 3004-015-003: 30,280 SF required for frontage road; 44,440 SF optional add'l acquisition or leave as divided parcel.		
4.14	Engineering fee	120.00	
4.15	Surveying (detailed topographic survey)	80.00	
4.16	City plan review	7,000.00	
Soft Cost : Subtotal	**(estimated at 10% of hard costs)**	0.10	**293,744** *[07]*

Alternative #4	**Estimated Total**
4.17	**$3,231,183**

Notes

[01] Unit prices based on 2009 Saylor and JT previous experiences.

[04] The listed scope of work and associated quantities represent the anticipated major work based on conceptual design and preliminary engineering. No plans have been submitted to the agencies for review. The incorporation of a 30% contingency factor hopes to account for discrepancies in scope between this preliminary cost estimate and the final required scope after official plan review process and approval with all governing agencies.

[06] Close off City Ranch Road at Tierra Subida. Construct Avenue R-5 from WM property line and a frontage road that intersects Tierra Subida at Rayburn Road, and create a 4-way signalized intersection. Preliminary design calls for a 40-foot roadway measured from curb to curb, with an 8-foot sidewalk adjacent to the west curb

and a 10-foot-minimum buffer between the east curb and the ultimate location of the west sidewalk of Tierra Subida proper.

[07] Land acquisition costs and legal fees for Alt #4 (though unknown at this time) could be significantly inflated compared to other alternatives due to the unwillingness and lack of cooperation from affected property owner that will be subject to land dedication, especially the owner of APN 3004-015-041