

DRAINAGE INFORMATION SHEET

PROJECT TITLE: TANOAN AT HIGH DESERT ZONE ATLAS/DRNG. FILE #: E-22/014
DRB #: _____ EPC #: _____ WORK ORDER #: _____
LEGAL DESCRIPTION: TRACT N-1 TANOAN PROPERTY
CITY ADDRESS: CORNER OF ACADEMY BLVD. AND TRAMWAY BLVD.
ENGINEERING FIRM: WILSON AND COMPANY CONTACT: DAVID B. THOMPSON
ADDRESS: 6611 GULTON CT. NE PHONE: (505) 345-5345
OWNER: SNK CONTACT: ED J. MYSLIVY
ADDRESS: 5907 ECKERT #805 PHONE: (210) 699-3901
SAN ANTONIO, TX 78201-99 CONTACT: RANDY HARRIS
ARCHITECT: HDO ARCHITECT-PLANNERS PHONE: (510) 934-4206
ADDRESS: 2950 CAMINO DIABLO SUITE 105
WALNUT CREEK, CA 94596 CONTACT: _____
SURVEYOR: _____ PHONE: _____
ADDRESS: _____ CONTACT: _____
CONTRACTOR: _____ PHONE: _____
ADDRESS: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
☒ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION
____ OTHER _____

PRE-DESIGN MEETING:

____ YES
____ NO
____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
☒ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
____ DRAINAGE REQUIREMENTS
____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 5-25-94
BY: Dave Thompson

MAY 26 1994

Tim Eichenberg, Chair
Linda Stover, Vice-Chair /
Asst. Secretary-Treasurer
Ronald D. Brown, Secretary-Treasurer
Daniel Hernandez, Director
Daniel Lyon, Director

John P. Kelly, P.E.
Executive Engineer



**Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority**

2600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

Post-it® Fax Note	7671	Date	3-3	# of pages	1
To	BRAD BINGHAM		From	LYNN MAZUR	
Co./Dept.	HYDROLOGY		Co.	AMAFCA	
Phone #			Phone #		
Fax #			Fax #		

File

March 3, 2004

Mr. James R. Topmiller, P.E.
Bohannon Huston, Inc.
7500 Jefferson St. NE, Courtyard 1
Albuquerque, New Mexico 87109

E-22/D16

Re: Tract N-6-A, Tanoan Properties, ZAP E-22

Dear Mr. Topmiller:

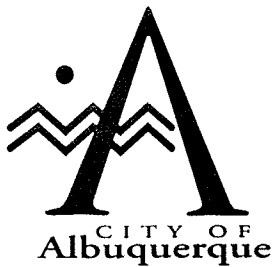
Enclosed for your use are copies of the recorded Grant of Easement and Encroachment Permit Agreement for the referenced property. AMAFCA approves building permit for the lot.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology (w/out enclosures)



October 6, 1997

Martin J. Chávez, Mayor

Dan Aguirre, P.E.
Wilson & Company
4775 Indian School Road NE
Suite 200
Albuquerque, NM

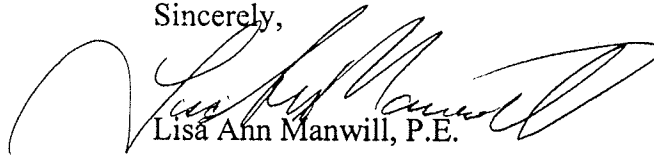
**RE: TANOAN AT HIGH DESERT (E22-D16). ENGINEER'S CERTIFICATION FOR
CERTIFICATE OF OCCUPANCY AND RELEASE OF FINANCIAL
GUARANTEES. ENGINEER'S CERTIFICATION DATED SEPTEMBER 19, 1997.**

Dear Mr. Aguirre:

Based on the information provided on your September 30, 1997 submittal, City Hydrology accepts the Engineer's Certification of grading and drainage for Release of Financial Guarantees and Certificate of Occupancy.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,



Lisa Ann Manwill, P.E.
Hydrology

c: Terri Martin
Andrew Garcia
File

Good for You, Albuquerque!





City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 23, 1994

Dan Aguirre
Wilson & Company
6611 Gulton Ct. NE
Albuquerque, NM 87109

RE: GRADING PERMIT APPROVAL FOR TRACT N-1 TANOAN (E-22/D16) ENGINEER'S STAMP
DATED 8/17/94

Dear Mr. Aguirre:

Based upon your 8/19/94 submittal, the referenced project is conditionally approved for Grading Permit. The conditions of this approval are as follows:

1. No grading shall occur within those areas designated as a FEMA 100-year floodplain.
2. You shall revise the drawing to include:
 - a) An erosion control plan.
 - b) An additional signoff block for AMAFCA.

When the appropriate revisions are made, please submit the mylars to this office for signoff. At that time, I will issue another letter stating that the conditions of approval have been met.

Please keep in mind that a Topsoil Disturbance Permit will be required prior to commencing with the actual grading of the site.

If I can be of further assistance, feel free to contact me at 768-3622.

Sincerely,

Scott Davis
PWD, Hydrology Division

c: Larry Caudill
Andrew Garcia
File

HYDROLOGY AND HYDRAULICS REPORT

FOR

TANOAN TRACT N-1

ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO

WCEA PROJECT NO. 94-509B

SEPTEMBER 1994

Prepared For:

**SNK California, Inc.
Four Embarcadero Center
Suite 3700
San Francisco, California 94111**

Prepared By:

**WILSON & COMPANY
6611 Gulton Court
Albuquerque, NM 87190-3548**

SEP 21 1994

TANOAN TRACT N-1 HYDROLOGY AND DESIGN STUDY

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I. INTRODUCTION

Purpose and Scope of Study

The purpose of this study is to evaluate the hydrologic and hydraulic characteristics of the watershed and associated arroyos impacting the proposed development known as Tanoan Tract N-1. This study will predict existing and proposed peak storm discharges for the watershed, identify the hydraulic characteristics of the existing structures, and recommend the size and type of proposed structure through the tract. The recommended structure will allow developed condition peak runoff to pass through the proposed site without generating adverse conditions at Pino Dam, in the site itself, or in the contributing arroyos. The study is also the initial step to submission of a Conditional Letter of Mapping Revision (CLOMR) to FEMA.

Technical Criteria

The City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) Section 22.2, *Hydrology of the Development Process Manual*, Volume 2, dated January 1993 and AMAFCA's *Sediment and Erosion Design Guide*, Draft version, dated December 1993, were used for the technical criteria for this study.

II. DRAINAGE BASIN LOCATION AND DESCRIPTION

General Basin Location and Description

The watershed impacting the proposed development is located mainly within the Grant Boundary, Township 11 North, Ranges 4 and 5 East, 35° 10' 00" North latitude, 106° 27' 30" West longitude, in the City of Albuquerque, Bernalillo County, New Mexico. The watershed is bounded generally on the north by Cañon de Domingo Baca, on the east by the Sandia Mountain Range crest, on the south by Bear Canyon, and on the west by Pino Dam and Tramway Boulevard. See Figure 1.

The watershed is drained by four arroyos: the Pino Arroyo, the South Pino Tributary, the North Bear Tributary, and the South Bear Tributary. Total watershed area draining to Pino Dam is approximately 6.5 square miles. The watershed drains in a westerly direction, from elevation 10,240 on the Sandia Mountain Range crest to elevation 5930 on the Pino Dam floor. The overall basin length is about 5.3 miles. At the present time, the watershed is mainly undeveloped. A development known as High Desert, located just east of Tramway Boulevard, is proposed. The hydrology associated with High Desert is used extensively due to its direct impact on Tanoan Tract N-1.

Reference should be made to Exhibit 1A, Existing Watershed Hydrology Map and Exhibit 1B, Proposed Watershed Hydrology Map.

III. GENERAL INFORMATION

Topographic Mapping

Topographic mapping used in the study was obtained from U.S. Geological Survey 7.5 minute quadrangle maps and from Bohannon-Huston, Inc. The overall watershed map was compiled from U.S.G.S. maps Alameda and Sandia Crest, scale 1:24,000. The Tanoan Tract N-1 map was obtained as a CADD drawing from Bohannon-Huston, Inc.

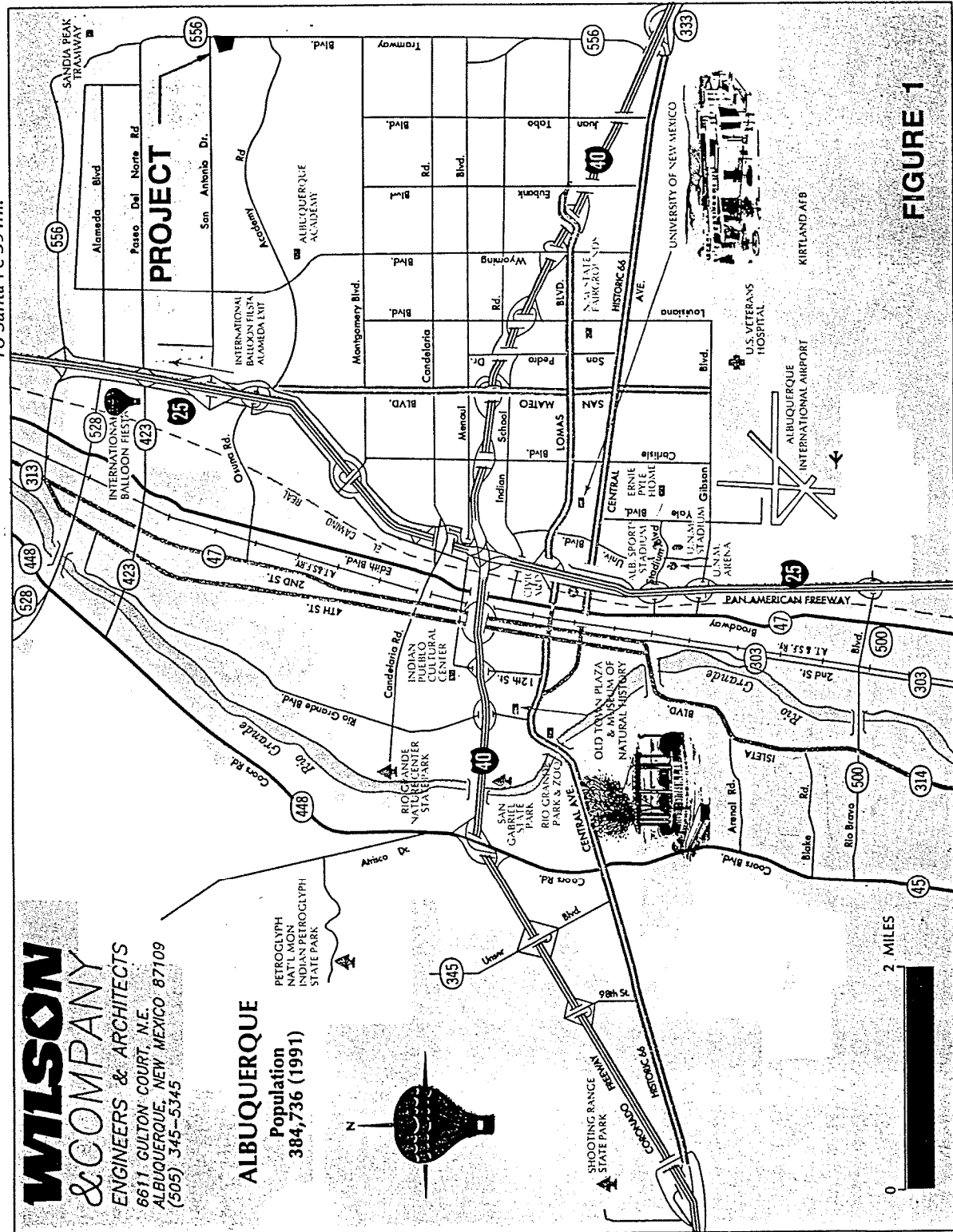
WILSON & COMPANY
 ENGINEERS & ARCHITECTS
 6611 GULTON COURT, N.E.
 ALBUQUERQUE, NEW MEXICO 87109
 (505) 345-5345

ALBUQUERQUE
 Population
 384,736 (1991)

PETROGLYPH
 NAT'L MON
 INDIAN PETROGLYPH
 STATE PARK

To Santa Fe 59 mi.

To Amarillo, Tx. 283 Mi.



0 2 MILES

To El Paso, Tx. 263 Mi.

To Flagstaff, Az. 322 Mi.

FIGURE 1

Field surveying was obtained for Tramway Boulevard, for the Tramway Boulevard structures, for channel configurations immediately east of Tramway Boulevard, and for channel configurations within the Tanoan tract. This field surveying did not extend into the upper reaches of the watershed.

Previous Drainage Studies

The *High Desert Drainage Management Master Plan*, prepared by Bohannon-Huston, Inc. (BHI) and the *High Desert Phase I Hydrology and Design Drainage Report*, prepared by Bohannon-Huston, Inc., were utilized to provide the majority of the information upstream of the Tanoan tract. AHYMO computer data files were obtained from BHI, and the data files' applicability to this study was confirmed.

IV. HYDROLOGIC ANALYSIS

Methodology

The hydrologic model used to estimate the peak discharges and volumes for the watershed was the January 1994 AHYMO computer program by AMAFCA. As defined in the *Development Process Manual*, the principal design storm is the 100 year-6 hour event. The DPM continues the design storm definition to include storm durations greater than six hours when examining sediment transport, when detention storage is a concern, and/or when combining and routing sub-basin hydrographs. Because this study is concerned with each of the three conditions listed, the principle design storm chosen was the 100 year-24 hour event.

Basin and Routing Parameters

BHI's drainage study for the High Desert development analyzed all four arroyos impacting the Tanoan Tract. Because this study for Tanoan makes use of BHI's hydrographs, the AHYMO data files obtained for BHI were checked for applicability to this Tanoan study.

Basin parameters for the AHYMO model were identified for each sub-basin. Sub-basin area, land treatment, length, conveyance condition and slope were measured from the topographic mapping. Time of concentrations and time to peaks were estimated using the principles given in the DPM, Section 22.2, Part B, adjusting the parameters for steep slopes, rock channels, and natural channels in the upper watersheds. The AHYMO Routing Schematics, Figures 2A and 2B, illustrate the routing sequence for the entire watershed. After reviewing the basin parameters used by BHI, it was concluded that the BHI models should be used, without basin data modification, to generate runoff hydrographs upstream of Tramway Boulevard.

Rainfall

Rainfall information for use in the AHYMO model was based on the NOAA Atlas 2, *Precipitation-Frequency Atlas of the Western United States*, Volume IV - New Mexico, as provided in the DPM, Section 22.2, Figures C-1 through C-3.

Existing Undeveloped Conditions

Hydrographs of the existing undeveloped conditions upstream of Tramway Boulevard as obtained from BHI were used without modification.

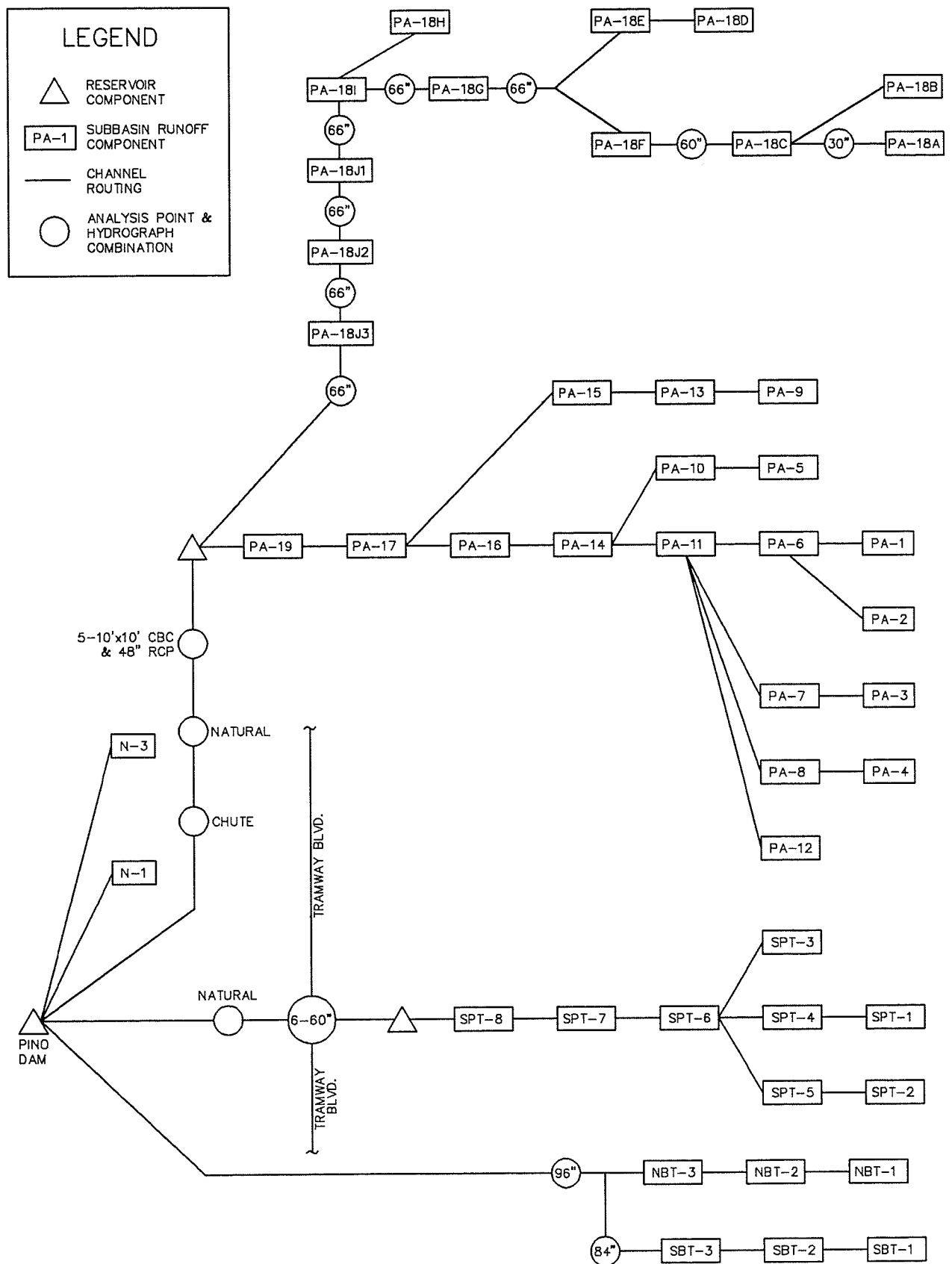


FIGURE 2A
EXISTING CONDITIONS ROUTING SCHEMATIC

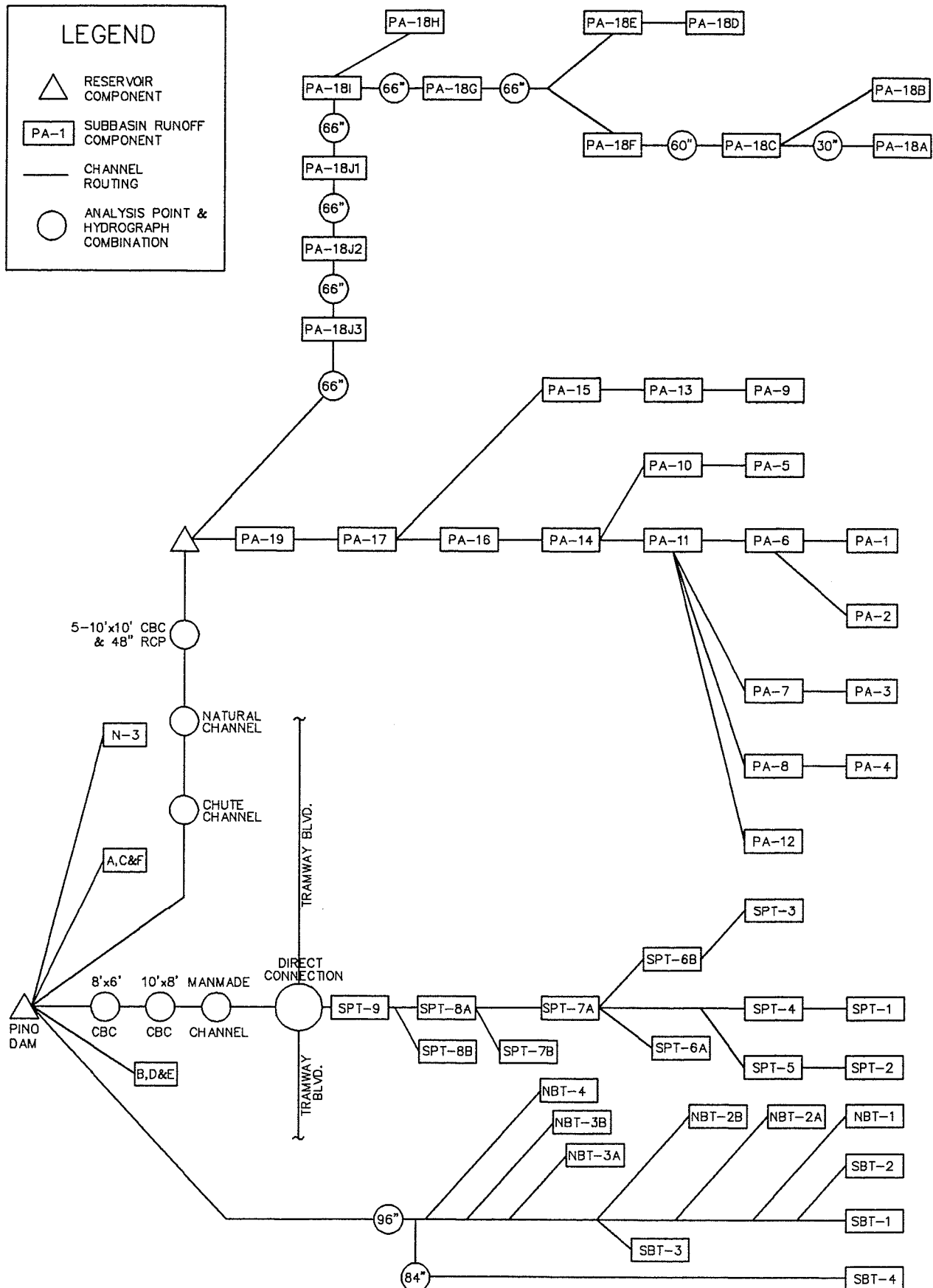
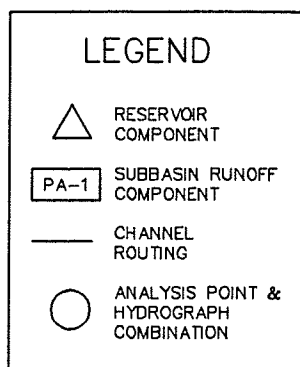


FIGURE 2B
PROPOSED CONDITIONS ROUTING SCHEMATIC

A. *Site Basin*

Tanoan Tract N-1 is currently an undeveloped, multi-family, residential property of approximately 13.6 acres. Vegetation is a 50 percent to 60 percent coverage of native brush and grasses. The tract is bordered on the north by the undeveloped tract N-3, on the east by the proposed Tennyson Street, on the south by the undeveloped tract M-1 and on the west by Pino Dam. The soils for the site consist mainly of sandy loams of the Embudo and Tijeras series as identified by the Soil Conservation Service Soils Map for Bernalillo County.

Two FEMA floodplains traverse the tract. These floodplains are delineated on Exhibit 2, the Tanoan Tract Existing Conditions Basin Map, along with the drainage easements associated with the floodplains. The FEMA flood boundary shown on Exhibit 2 is from the FIRM Community Panel No. 350002 0018 C with a zone designation of AO, shallow flooding with depths ranging from 1 to 3 feet. Also shown on Exhibit 2 is the existing flood boundary as determined by this study.

B. *Upstream Basins*

Two of the four previously mentioned sub-basins directly affect the Tanoan Tract. Pino Arroyo and South Pino Tributary, using the BHI AHYMO models, reveal that the Pino Arroyo will deliver 4425 cfs, bulked to reflect the expected sediment load, to its existing Tramway Boulevard structure (5-10'x10' CBC and 1-48" RCP), and the South Pino Tributary will deliver 1470 cfs, bulked, to its existing Tramway Boulevard structure (6-60" RCP). AMAFCA has indicated that no overtopping of the existing 6-60" RCPs will be tolerated during the 100-year event. The Authority has currently retained a consultant, Wilson & Company, to analyze and design any modifications to the existing structure necessary to ensure no overtopping occurs. Consequently, for this study, the existing 6-60" RCPs were hydraulically modeled with no overtopping.

C. *Sediment Bulking Factors*

BHI performed a sediment bulking calculation for the High Desert hydrographs. The bulking factor used was seven percent as an average. An assumed bulking factor of 10 percent was used to generate the *bulk*ed peak discharges associated with the Tanoan Tract watershed:

Proposed Developed Conditions

Again, BHI's AHYMO model for the High Desert proposed condition was used to generate the runoff hydrographs reaching Tramway Boulevard. Pino Arroyo and South Pino Tributary, using the BHI AHYMO models, reveal that the Pino Arroyo will deliver 4425 cfs, bulked to reflect the expected sediment load, to its Tramway Boulevard structure (existing 5-10'x10' CBC and 1-48" RCP), and the South Pino Tributary will deliver 1925 cfs, bulked, to its Tramway Boulevard structure (BHI's proposed direct connection to the existing 6-60" RCPs).

Analysis Results

The peak discharges for each Tanoan sub-basin and selected design points in the watershed are illustrated on Exhibit 1A, the Existing Watershed Hydrology Map and Exhibit 1B, the Proposed Watershed Hydrology Map.

V. HYDRAULIC ANALYSIS

Methodology

A detailed hydraulic analysis was done for the Pino Arroyo and the South Pino Tributary to generate hydraulic characteristic parameters used in performing sediment transport capacity, prudent line setback determination, stilling basin design, proposed hydraulic structure design, to refine the AHYMO hydrology models, and to delineate the 100-year flood boundary. This analysis was performed using a combination of WSPRO and HY-8, the FHWA's water surface profile model and culvert hydraulics model. Input to the models was derived from a combination of actual field survey data and existing topographic mapping.

Tramway Structures

The hydraulic structures crossing Tramway Boulevard were investigated for their current capacity. It was determined that the capacity of the 5-10'x10' CBC and the 48" RCP in Pino Arroyo are sufficient to pass the 100 year-24 hour storm with no overtopping into Tramway Boulevard. The capacity of the 6-60" RCPs in South Pino Tributary will not pass the 100 year-24 hour storm without weir overtopping into Tramway Boulevard. Of the existing condition peak discharge in South Pino Tributary reaching Tramway Boulevard, 110 cfs will overtop into the boulevard. AMAFCA, therefore, has directed Wilson & Company, in a separate study, to analyze and design a solution that ensures no overtopping will occur at the existing 6-60" RCPs. Consequently, the hydraulic modeling of the existing structure will incorporate no overtopping; and the Tanoan Tract N-1 will be required to accept all flows reaching Tramway Boulevard. The BHI proposed condition for High Desert indicates a closed conveyance system connected to the existing 60" RCPs; therefore, it was assumed that the South Pino Tributary would not be allowed to overtop in the proposed condition, as well.

Tract N-1 Structure

Conceptual development plans for Tract N-1 provide for conveying South Pino Tributary through a closed conduit system to Pino Dam. Analysis indicates a 10'x8' CBC with an improved inlet is needed to capture the peak discharge of 1925 cfs at Tennyson Boulevard. Once captured, the 10' x 8' CBC can be reduced to an 8' x 6' CBC and the discharge routed to Pino Dam. The design calls for removal of the existing 6-60" RCPs and associated headwalls under the abandoned Juan Tabo Road. The removed structure will be replaced with the improved inlet design depicted in Exhibit 4. An improved concrete-lined trapezoidal channel section, to ensure continuation of supercritical flow, is proposed from the improved inlet to the outlet of the existing 6-60" RCPs at Tramway Boulevard. The channel section is shown on Exhibit 3.

Analysis of the proposed CBC structure with WSPRO indicated the channel section, the improved inlet, the 10'x8' CBC, and the 8' x 6' CBC operate in the super-critical flow regime for the peak discharge of 1925 cfs. See Appendix D. Contraction coefficients (shock coefficients) were added to the WSPRO model at Sections 10+01, 10+51, 10+91, 11+11, 11+26 and 11+41 to more appropriately model the entrance conditions.

The outlet conditions were studied in great detail. A stilling basin design for a St. Anthony Falls basin was completed. A discussion of this analysis is provided in the following section, *Stilling Basin Design*.

The proposed conditions call for revising the FEMA South Pino Tributary 100-year flood boundary by routing the flood waters through the proposed concrete box culvert structure. There is no proposal to revise the FEMA Pino Arroyo 100-year flood boundary. The development plans call for only parking areas to be located in the existing easement and with slope protection to be placed along the southern

channel banks of the Pino Arroyo. There are no structures proposed for placement within the flood boundary as delineated by this study.

Prudent Line Analysis

A prudent line analysis was necessary to determine if the FEMA floodplain or the expected lateral erosion controlled the northern development limits for tract N-1. Two methods were used to estimate the prudent line, both based on the Optimal Bend Shape as defined in the AMAFCA *Sediment and Erosion Design Guide*.

The first estimate of the prudent line was based on the Approximate Maximum Erosion Distance. This method places the prudent line 251 feet south (maximum lateral erosion distance plus one-half the channel width) of the down valley slope line between the existing concrete chute and the 5-10'x10' CBCs. This is an approximation-based typical channel geometrics and is a conservative estimate. See Appendix C for more details.

The computer program CURVCALC was used for the second estimate of lateral erosion. It uses the average annual sediment flows to calculate the lateral erosion and expected bend shape. This method also places the prudent line 251 feet south (maximum lateral erosion plus one-half the channel width) of the down valley slope line between the existing concrete chute and the 5-10'x10' CBCs. CURVCALC program input and output is presented in Appendix C. It should be noted that the CURVCALC model reached the maximum distance in two years. After this time frame, the channel would experience an avulsion and then begin the process again. The data supplied to the CURVCALC program was obtained from a combination of AHYMO models using the *sediment trans* commands and WSPRO for hydraulic characteristics. *Washload* input to the *sediment trans* command is based on compiling a weighted average of the topographic factor LS for the watershed. The analysis can be found in Appendix C.

Because the erosion lines calculated are still within the FEMA floodplain easement, it is suggested that the FEMA floodplain easement limits continue to control the northern development for tract N-1.

Stilling Basin Design

Due to the very high velocities at the concrete box culvert outlet, erosion problems could occur that might damage the structure.

A St. Anthony Falls stilling basin was analyzed using the procedures in the *Hydraulic Design of Energy Dissipators for Culverts and Channels* (HEC 14). The results are summarized below.

$L_B = 18$ ft.

$L_T = 19$ ft.

Chute Blocks

$H = 2.0$ ft.

$W = 1.5$ ft.

$N = 7$

Baffle Blocks

$H = 2.0$ ft.

$W = 1.5$ ft.

$N = 7$

Distance from Chute = 6.0 ft.

End Sill

H = 1.17 ft.

W = 1.0 ft.

Sidewall = 19.5 ft.

Wingwall

Slope = 1:1

Length = 19.5 ft.

See Appendix E for details on this analysis.

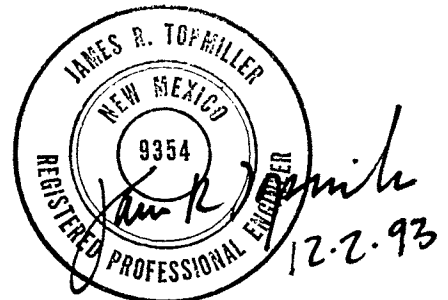
Tract N-1
Tanoan Properties
Conceptual Drainage Management Plan

November 1993

TRACT N-1
TANOAN PROPERTIES
CONCEPTUAL DRAINAGE MANAGEMENT
PLAN

Prepared for:

Brown & Associates
3411 Candelaria NE
Albuquerque, NM 87107



Job No. 93219.41

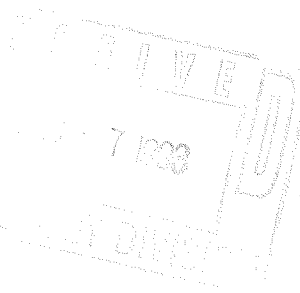


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I. INTRODUCTION

The purpose of this Conceptual Drainage Plan is to provide a guide for future development of this property. This site is identified as Tract N-1, Tanoan Properties. It contains approximately 13.6 acres. The tract is currently zoned for multi-family residential development under a zoning designation of R-E.

If an Environmental Planning Commission (EPC) Site Plan submittal is required for the development of this property, it is anticipated that this plan will serve as the required Drainage Plan submittal for approval of the Site Development Plan. The key jurisdiction for the drainage issues of this property is the Albuquerque Metropolitan Arroyo and Flood Control Authority (AMAFCA). Their involvement is due to the Pino Dam structure and pool, the floodplains, and the impact of existing large upstream basins on the property. The City of Albuquerque is also a reviewer of this plan with respect to general development requirements, Tennyson Street hydraulics and the proposed on-site storm drain system.

The key drainage elements of this plan are the following:

- A. Conveyance of existing flows from the upstream basins of the Pino Arroyo and the South Pino Tributary Arroyo.
- B. The adequacy of the Tramway crossing structures on these arroyos.
- C. The capacity of the AMAFCA Pino Dam facility.
- D. Tennyson Street hydrology and hydraulics.
- E. Pino Arroyo Analysis of floodplain and "prudent line."

This report and its guidelines will form the basis of final drainage analysis of this site upon the availability of an actual Site Development Plan for the property.

II. COLLABORATING REPORTS

In conjunction with the site hydrology prepared under this plan, the "High Desert Drainage Management Master Plan," prepared by Bohannon-Huston Inc., Nov. 1993, was utilized to provide the majority of the information on upstream basins, primarily the Pino Arroyo and the South Pino Tributary Arroyo. This report only recently has been submitted to AMAFCA and the City of Albuquerque. Simultaneous review of this report with the High Desert report is possible and should ease cross-referencing.

III. METHODOLOGY

The methodologies used in this report are those permitted and described in the City of Albuquerque's Development Process Manual (DPM) and the revised Chapter 22 section on hydrology. For the large upstream basins of this report, the AHYMO models of the "High Desert Subdivision Drainage Management Master Plan" were utilized as the source for flows. The smaller on-site and off-site basins were analyzed using the rational method of the DPM. All flows referenced in the following sections are 100-year, 6-hour storm events.

IV. EXISTING CONDITIONS

A. Site Characteristics

Tract N-1 is currently a vacant, undeveloped property of approximately 13.6 acres. The site is only partially vegetated and only recently was heavily graded under activities that occurred with the Tramway Boulevard project.

On the east side of the property lies the proposed Tennyson Street alignment. This street has not been dedicated nor constructed at this time, but the alignment has been identified under previous platting and sector plans. This alignment is reflected on the enclosed Proposed and Existing Conditions Maps in the rear pocket. To the north and south, Tracts N-3 and M-1 are also undeveloped and vacant at this time. On the west lies the AMAFCA Pino Dam. This dam is an earthen dam with two primary upstream basin flow inlets. In the

southeastern portion of the dam, an existing 96" storm drain is outletted to the bottom of the dam pool. In the northeast portion of the dam, an existing concrete spillway has been constructed to bring the Pino flows down the steep banks of the dam pool without significant erosion. The spillway is not designed for a 100-year storm event.

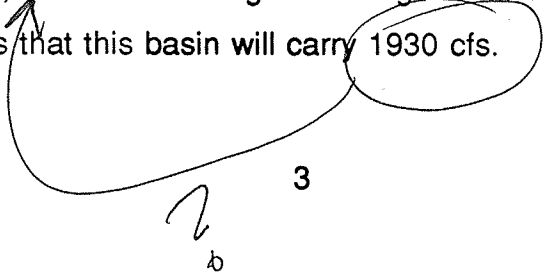
The soils for the site are sandy loams of the Embudo and Tijeras series as identified by the SCS Bernalillo County Soils Map.

Two large FEMA floodplains are found on the property. These floodplains are identified on the FEMA Floodplain Map provided on the plans. Interim drainage easements currently identified on the property (see the Existing and Proposed Conditions Maps) were originally platted to reflect these floodplains.

B. Upstream Basins

Two major off-site drainage basins impact Tract N-1. The first major upstream basin is the Pino Arroyo watershed. From the High Desert Drainage Management Master Plan, the existing flow to the Pino/Tramway Blvd. crossing structure (five 10' x 10' box culverts) is 4,920 cubic feet per second (cfs). The capacity of this structure, based on an eight foot available headwater depth and using FHWA charts, is approximately 3,500 cfs. Further discussion of this under-capacity is provided in the Proposed Conditions section of this report.

The second major upstream basin is the South Pino Tributary Arroyo. Again, from the High Desert Drainage Management Master Plan, the existing flow to this crossing structure at Tramway (six 60" RCP culverts) is approximately 1,615 cfs. The existing capacity of this structure, again by inlet conditions, is approximately 1,680 cfs. Treating future High Desert flows as an "existing" condition means that this basin will carry 1930 cfs.



There also is a minor Tramway crossing structure, accepting 117 cfs with a structure capacity of 170 cfs.

Basin 2, located on the private property and old Tramway right-of-way east of Tract N-1, is approximately 3 acres and generates 7 cfs.

Tracts N-3 and M-1 drain away from the site.

C. On-site Basins

On-site, only one drainage basin is applicable. This basin is identified as Basin 1, incorporating substantially the entire site. Its basin area is approximately 14 acres and has been calculated to generate approximately 31.8 cfs in the undeveloped condition. This basin discharges directly to the Pino Dam pool.

These basins discharge significantly ahead of the incoming peaks of the Pino and South Pino Tributary Arroyos and thus do not add to the total design flowrates of these major off-site basins as they cross the site.

D. Pino Dam

Using the hydrology and AHYMO models established under the High Desert Drainage Management Master Plan, and utilizing the stage-discharge curve developed by Wilson & Co. in May 1991, the Pino Dam was analyzed with the following results:

1. A volume, including sediment, of 411.9 acre-feet in the 100-year, 6-hour storm event.
2. A water surface elevation of 5,969.4, approximately 10 feet below the spillway elevation.
3. An outlet discharge of approximately 177 cfs.
4. Total inflow (peak flowrate) to the drain is 5966 cfs.

The water surface elevation of 5,969.4 has been delineated on the Existing Conditions Map, enclosed in the rear pocket of this report. The existing dead storage in the bottom of the dam was not considered in the Wilson & Co. study in this report nor in this report.

These results indicate that the dam has a significant amount of excess volume for runoff storage in the 100-year, 6-hour storm event.

V. PROPOSED CONDITIONS

A. Site Development

Site development of this property is only in its infancy. No final plan is available to utilize in the preparation of proposed drainage management schemes at this time. Due to this condition, the plan could not be submitted as a "drainage report or plan," but is submitted as a "conceptual drainage plan."

The site is zoned and proposed for multi-family residential development. Under this scenario, the site will be developed with a certain number of 1-2 story buildings located across the site and will be provided with incidental parking, landscaping, and recreational uses.

No time frame for development is known, but it is possible that plans for the development of this property may be submitted within the next four to six months, or less. With the construction of infrastructure, described later in this section, it is intended to use the full site area for the placement of building structures, excluding the following areas:

1. The interim drainage easement/FEMA floodplain located along the north boundary of the property.
2. The slope of the dam pool on the west side of the property.
3. The permanent easement provided for the proposed storm drain system on-site (this easement's location has not been finally

determined).

No construction of any sort will occur within the side slope of the dam.

Construction of non-structural facilities such as parking lots, landscaping, etc. will be permitted over the remaining two areas of the list above.

Construction of buildings or structures within the FEMA floodplain (interim drainage easement) is permitted upon the construction of the storm drain systems identified in a following subsection. As FEMA has not released this floodplain, flood insurance will be required for those affected structures. The existing interim drainage easement covering the FEMA floodplain will be vacated and removed from the property. As stated previously, the FEMA floodplain will continue to exist until removed by an appropriate letter of map revision procedures, regardless of the installation of any drainage improvements.

Additionally, the existing 60' drainage easement shown traversing the property from east to west will also be vacated and a new easement granted over the proposed storm drain.

B. Proposed Drainage Infrastructure

This report calls for the construction of the following drainage infrastructure:

1. A major storm drain facility extending from the outlet of the existing 60" RCP culverts under the Tramway Blvd. pavement to the Pino Dam. Preliminary sizing of this storm drain is a 102" pipe. The Pino Dam modifications will be discussed further in a later section.

The construction of Tennyson Street from the north property line of Tract N-1 to the existing end of pavement near Antelope Run Subdivision, just north of Academy Road. It is anticipated that

Any building construction or fill proposed in SFHA will require a LOMR
How will you force flows from 6-60" RCP's into 102" does not appear to have capacity for 1930cfs?

possibly only the west half of Tennyson Street will be required to be constructed with the development.

The storm drain alignment shown on the Proposed Conditions Map is not intended to be final location, but is subject to the final layout of the Site Development Plan and final engineering reports for the property's development. The most significant feature of the proposed storm drain extension is the required transition structure from the six-60" culverts under Tramway to a single pipe.

The cost of this transitional structure will be significant, however, there also are significant benefits afforded to the property by placing the flows coming from Tramway Blvd. underground. This benefit lies first in the aesthetic aspects of a hidden major drainage structure and second, in the potential use of the area above the underground pipe as parking and landscaping. This benefit serves both the subject property and the private lands between the old and new Tramway right-of-ways.

Appropriate City easements for construction and maintenance of the proposed structure will be required from the off-site property. Additionally, the NMSHTD will review and approve all connections to the existing six-60" culverts.

Tennyson Street is also covered under another subsection which will follow.

C. Upstream Basins

The upstream basin areas applicable to this property in its developed condition do not change from those identified in the Existing Conditions section. The flow rate of 4920 cfs identified for the Pino Arroyo does not change under developed conditions. For the South Pino Tributary Arroyo, it is assumed for the purposes of this report that High Desert is either complete or nearing completion of

certain drainage facilities and it is prudent to analyze Tract N-1 with these flows in mind. Accordingly, the South Pino Tributary Arroyo, under developed High Desert conditions, is anticipated to flow at approximately 1930 cfs. High Desert recognized that this flow exceeded the existing unmodified capacity of the culvert inlets and will require pipe to pipe structural connections on the east side of Tramway Blvd.

The small flow of 117 cfs just north of Simms Park Road remains unaltered under Tract N-1's proposed development.

A potentially significant concern is raised by the under-capacity of the existing box culverts on the Pino Arroyo under Tramway. This under-capacity of approximately 1,420 cfs (4920 cfs minus 3500 cfs) must be considered carefully. This report proposes the following assumptions be considered regarding this under-capacity:

1. Overflow from the box culverts on Pino appears to discharge in a southerly direction within either the swales lying on the east side of the Tramway Blvd. pavement or southerly into the median of Tramway Blvd. As shown by drainage directional arrows on the Proposed Conditions Map, Tramway Blvd. in this reach is an inverted section, providing a fairly substantial channel for conveyance of water. Even so, some Pino flows may be anticipated to cross Tramway Blvd.
2. Previously approved flows for this arroyo were well under the current 4920 cfs result. The box culverts under Tramway Blvd. were designed with this lower design flow in mind (approximately 3440 cfs), and the structure was adequate at that time for the design flows. This situation is similar to what is now a myriad of similar problems across the City of Albuquerque that reflect the increased flows determined by new hydrology methods.

Time to identify public, but when will bonds be available, what will happen during interim.

FEMA requires
3 feet of freeboard
for home's
downstream approval
Sediment to
remove floodwaters

This structure is a "regional" facility. Public infrastructure funds were only recently utilized to construct the existing facility. If any improvements to it are required, especially as a result of new hydrology, they should be "regional" concerns and not a hindrance to downstream development.

The calculations in the Appendix of this report determine that capacity can be reached by providing a berm of top elevation equal to 6027.0 (without freeboard). This can be obtained by a berm of only 2' - 3' in height (the low point about the Pino box culverts appears to be 6025.0). A slightly higher berm would be necessary if freeboard is desired.

D. On-site Basins

With the development of the site and the construction of Tennyson Street, approximately three basins are created. Basin A covers approximately the entire non-road site which will collect site flows and transfer them in a westerly direction. With the future development of this site, drainage plans will design a swale located at the western side of the property. This swale will collect site flows and transfers them to a proposed inlet system, which in turn collects flows and conveys them to the proposed storm drain. Basin A is anticipated to generate approximately 59 cfs. Basins B and C cover the proposed Tennyson Street. Basin B, the southern portion of Tennyson Street below lines south the proposed storm drain, is anticipated to generate approximately 11 cfs. At an approximately 1.6% slope, Tennyson Street carries over 20 cfs. at less than 0.5 feet (the collector street maximum).

Basin C is anticipated to collect flows in Tennyson Street from a point opposite the Pino crossing structure to the storm drain at Tract N-1. Inlets are placed on the lower reach of this Tennyson Street basin to collect flows and transfer them to the proposed storm drain. The flows from Basin C are approximately 9 cfs. Tennyson can carry this flow in accordance with DPM collector street criteria.

Where will lower end of Basin "B" outfall into?

Basin D, approximately 16.4 cfs., with the removal of the existing six 60" culverts under the old Tramway pavement, will drain to an inlet structure constructed over the transition structure. This inlet will collect the local flows of Basin D and convey them to the storm drain.

Pino Arroyo Capacity (Tract N-3)

Section A-A, identified on the Existing Conditions Map in the rear pocket of this report, is a cross-sectional view of the existing Pino Arroyo cross-section adjacent to the property. Calculations in the rear of this report indicate that this flow is anticipated to remain confined to the existing channel without impact to Tract N-1. The analysis and calculations provided in the Appendix (Pino Arroyo Analysis) reflect the use of a simple Manning's analysis ($n=0.03$, slope $<4\%$) of the arroyo from the concrete spillway at the dam slope to Tramway box culvert. This simple analysis is sufficient to provide enough information to qualitatively assess the capacity of the existing channel and determine if further study is required.

Conservatively assuming that the 4920 cfs. (bulked) from the box culverts remains in the main flow channel immediately downstream of the culverts, a normal depth of 3.2 feet is determined. The total energy of this flow condition is 7.2 feet. Since total energy reflects a calculated maximum height of hydraulic jump (no energy loss), it is a conservative approximation of the maximum water surface of the 100-year storm flow in this arroyo reach. Utilizing this total energy depth, the floodplain for this arroyo is shown within the identified Interim Drainage Easement (see the Existing and Proposed Conditions Maps).

Another concern is the location of the south "prudent line" for the Pino Arroyo. This report suggests that the prudent line is located within the Interim Drainage

Easement (and therefore outside the area proposed for structures in future site development) for the following reasons:

- Using a line drawn between the spillway and the 10' x 10' box culverts as the "main flowpath," the arroyo's main flowpath is typically over 300' from the Interim Drainage Easement limit.
- Using the conservative Floodplain Administration's estimate of prudent line setback (6' per 100 cfs), the setback is 295' for 4920 cfs. The Interim Drainage Easement limit (also the FEMA Floodplain) ranges from roughly 100' to over 300' along the length of this arroyo.
- A significant riprap embankment of very large stone exists along the south bank (at the floodplain limit line) of the Pino Arroyo. This riprap forms a significant barrier to southward erosion.
- With a vast expanse of low land to the north of the "main flowpath," it is expected that the arroyo will gravitate in that direction, rather than toward Tract N-1.

Development is constrained, as stated earlier in the report, to remain outside the Interim Drainage Easement, and subsequently, outside the "prudent line."

E. Pino Dam Grading Modifications

The Pino Dam is currently located within an easement dedicated with the construction and design of the Pino Dam facility. The proposed regrading of the site as shown on the Proposed Conditions Map accomplishes the goal of an evenly graded site prior to development. The grading as shown recovers a certain portion of the drainage easement for site use by cutting the site down in the northern portion of the property and by filling in the existing low area in the south area of the property. To accomplish this, a significant amount of fill will be required. It is proposed that the major portion of this fill come from areas of the dam that may be regraded to provide additional cut earth material without

Not clear to where the erosion setback line is at, please show on drawing 1"=100' also show official 100 year floodplain.

comment to keep development above the spillway elevation.

VI. CONCLUSION

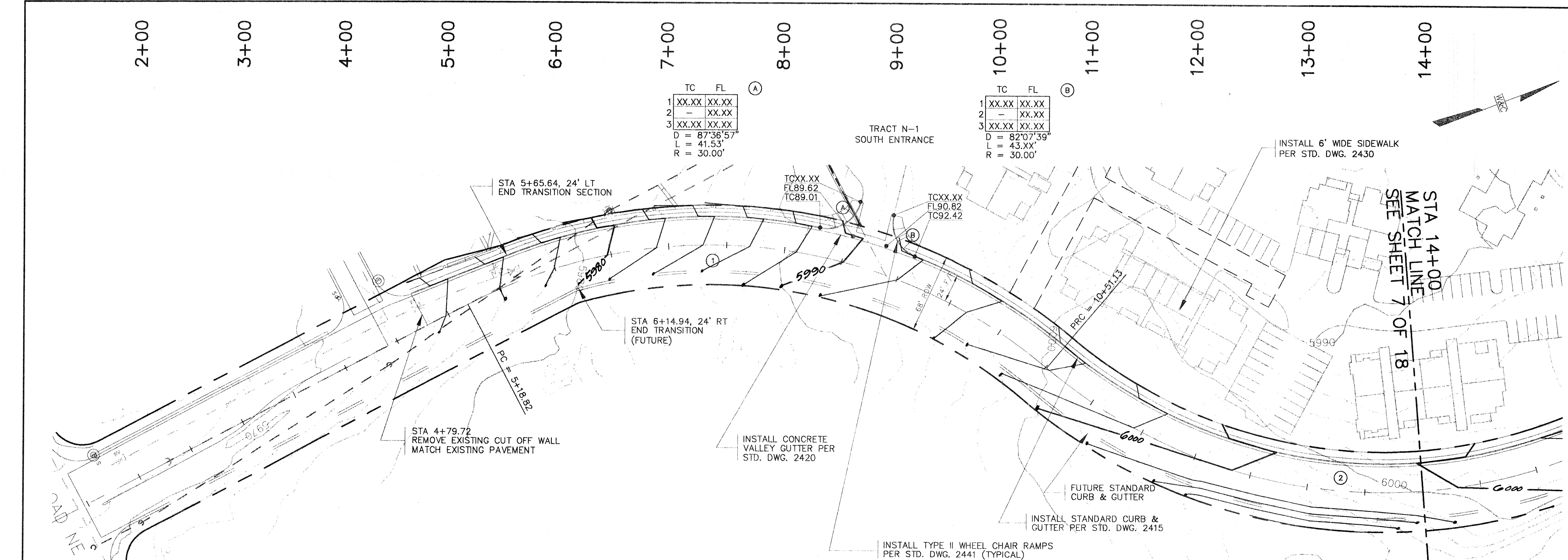
This report identifies a workable plan for the drainage management of this property when it is proposed for development. This report is being submitted to both the City of Albuquerque and AMAFCA, and, in a later submittal, the New Mexico State Highway and Transportation Department for their review and approval.

The key recommendations of this plan are the following:

1. Regrading of Tract N-1 to the contours identified on the Proposed Conditions Map. Required fill earth for the site grading shall be taken from areas within the Pino Dam available for regrading. Sufficient capacity for the 100-year storm event runoff volumes is available in the dam for the proposed regrading as identified in this report.
2. Extension of a major storm drain from the existing six-60" culverts under Tramway to the Pino Dam pool. This extension will require coordination with adjacent property owners for easements and authorization to regrade.
3. Extension of Tennyson Street with the grades and drainage management schemes identified in this report.
4. Future site construction shall limit structural features to areas lying outside the Interim Drainage Easement (FEMA Floodplain). This will effectively keep these kinds of structures outside the "prudent line" qualitatively assessed in this report. Non-structural site improvements, such as parking lots and landscaping, may be located within the Interim Drainage Easement. It is shown that the Pino Arroyo floodplain remains in its current channel, located in Tract N-3.
5. A berm is required on the east side of Tramway and north side of Simms Park Road to raise available headwater depths at the Pino Arroyo box culverts under Tramway. Since the under-capacity problem of the existing box culverts affected several downstream properties of various ownerships, and since this was only a recent construction under the Tramway project, it is considered that

report. Non-structural site improvements, such as parking lots and landscaping, may be located within the Interim Drainage Easement. It is shown that the Pino Arroyo floodplain remains in its current channel, located in Tract N-3.

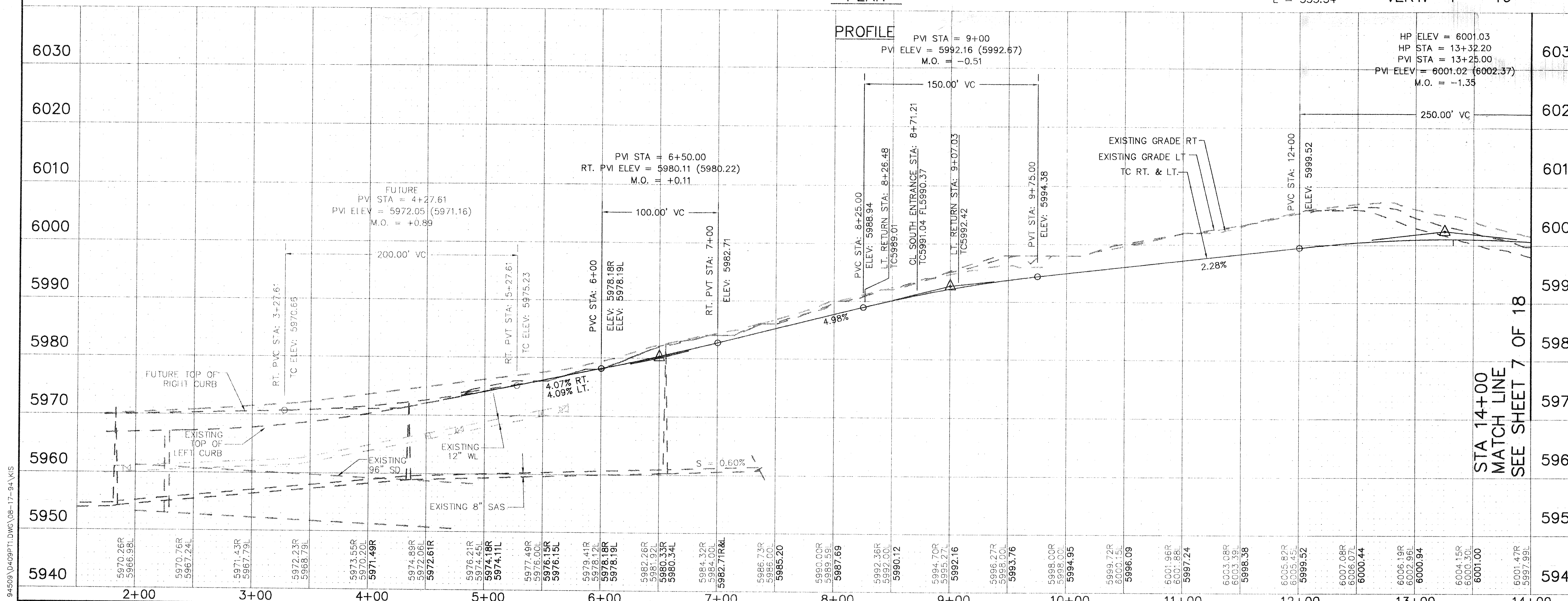
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6. Development of Tract N-1, when proposed, should not be delayed for the sole reason that the berm (Paragraph 5) is not yet constructed.



TENNYSON STREET
PLAN

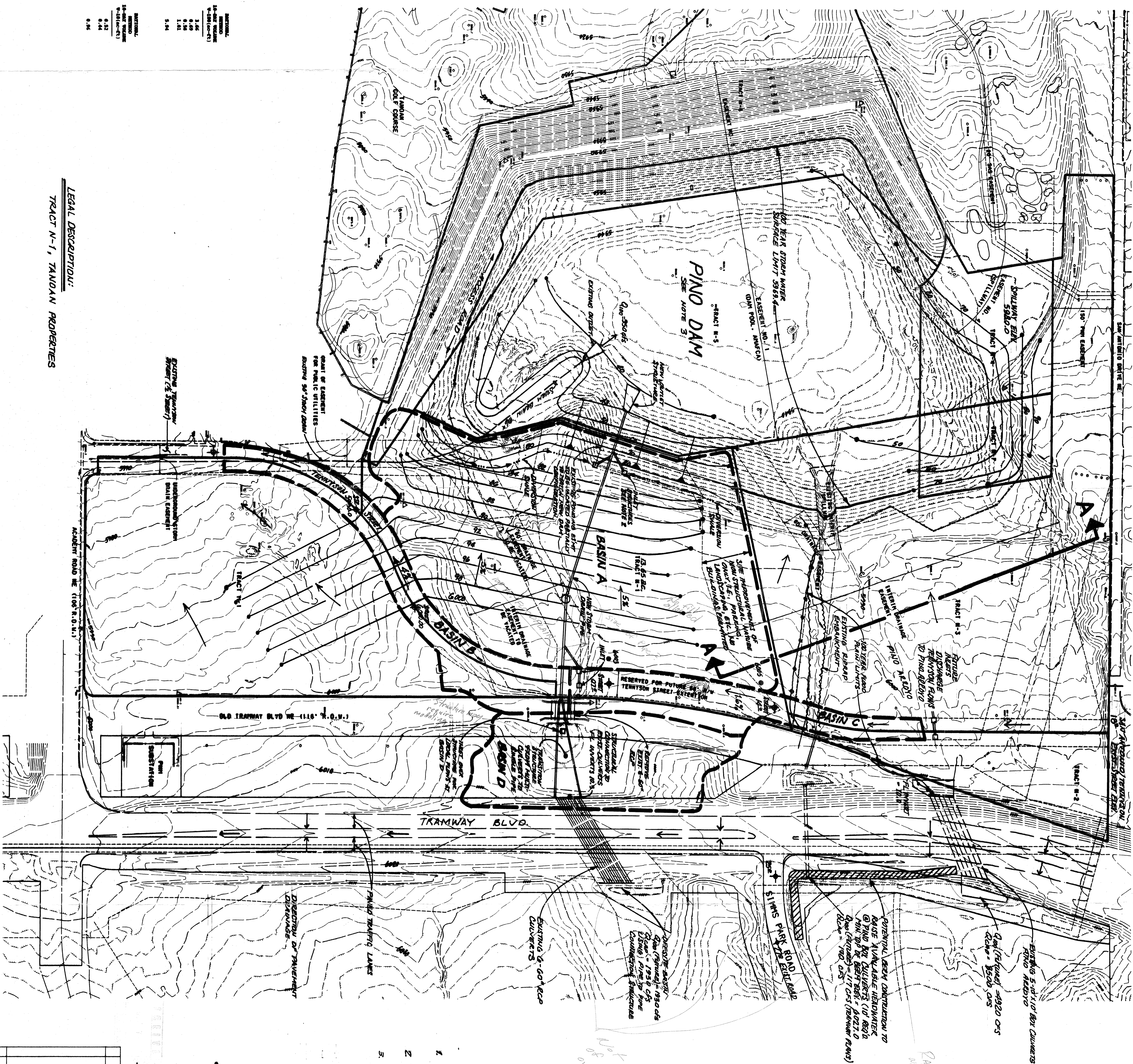
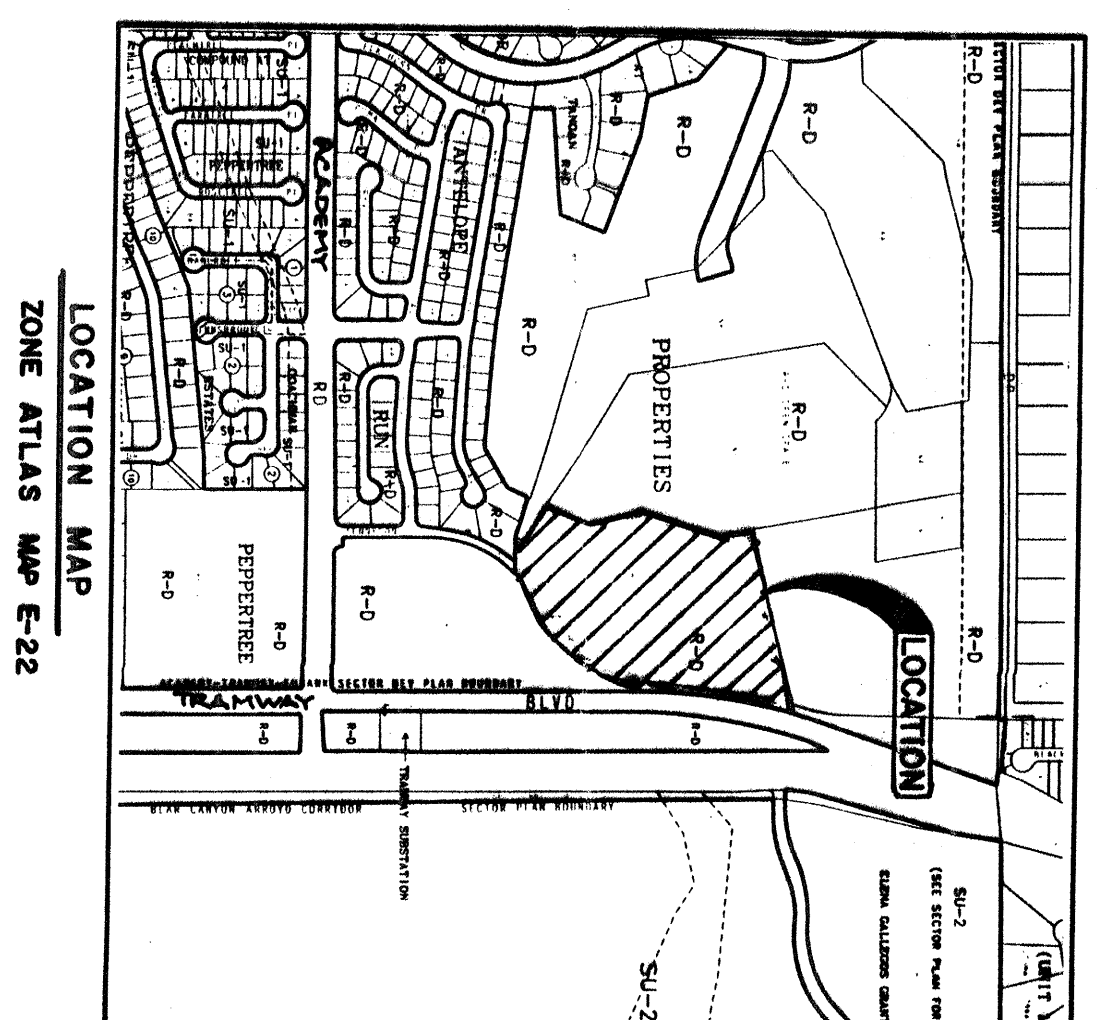
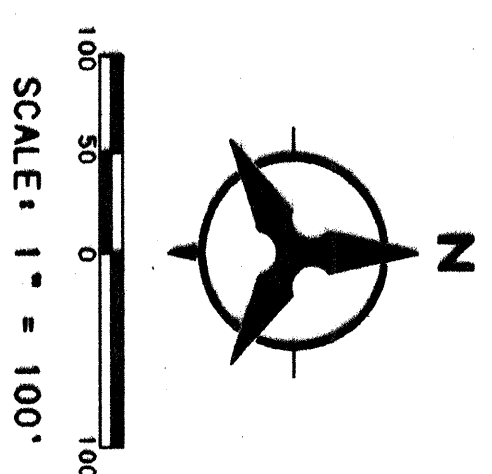
NOTE:
TRANSITION FROM STANDARD CURB TO 6\"

SCALE:
HORIZ: 1\"



CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT ENGINEERING GROUP					
DESERT HEIGHTS AT TANOAN PAVING AND STORM DRAIN PLAN & PROFILE TENNYSON STREET- STA 1+50 TO STA 14+00					
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

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1. "LOW (FURNISH)" REFERS TO PLANS OF THE REAR END DEVELOPMENT OF THE LOT, AND
2. THE CONSTRUCTION AND DESIGN OF THE ILLUOS AND TENUOUSION STREET WILL BE DEFERRED TO THE TIME OF ACTUAL SITE DEVELOPMENT.
3. WITH THE RESERVATION OF THE DRYING AREA IN THE DRY POOL (SEE PLAN) THE VULNERABLE CHARACTERISTICS OF THE DRY WET CLIMATE FROM THE "EXISTING CARBONAT WAT" DERIVED FROM THE CLIMATE ANALYSIS WILL NEED TO BE RECONSIDERED TO ACCESS THE IMPACT OF THE PROPOSED RESERVATION AND ITS APPROPRIATE WITH THE DRY WET CLIMATE DUE TO RECONSIDERING EXISTING THE LOT. THE USE OF WATER SURFACE FLOW 5369.4 FOR THE PARK DRY POOL IS DISAGREED.

Not clear on amount of dead water available over culverts, that 3 feet of F&B board minimum is required L&M approve.

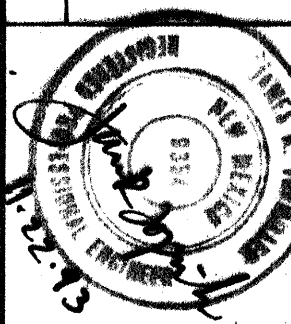
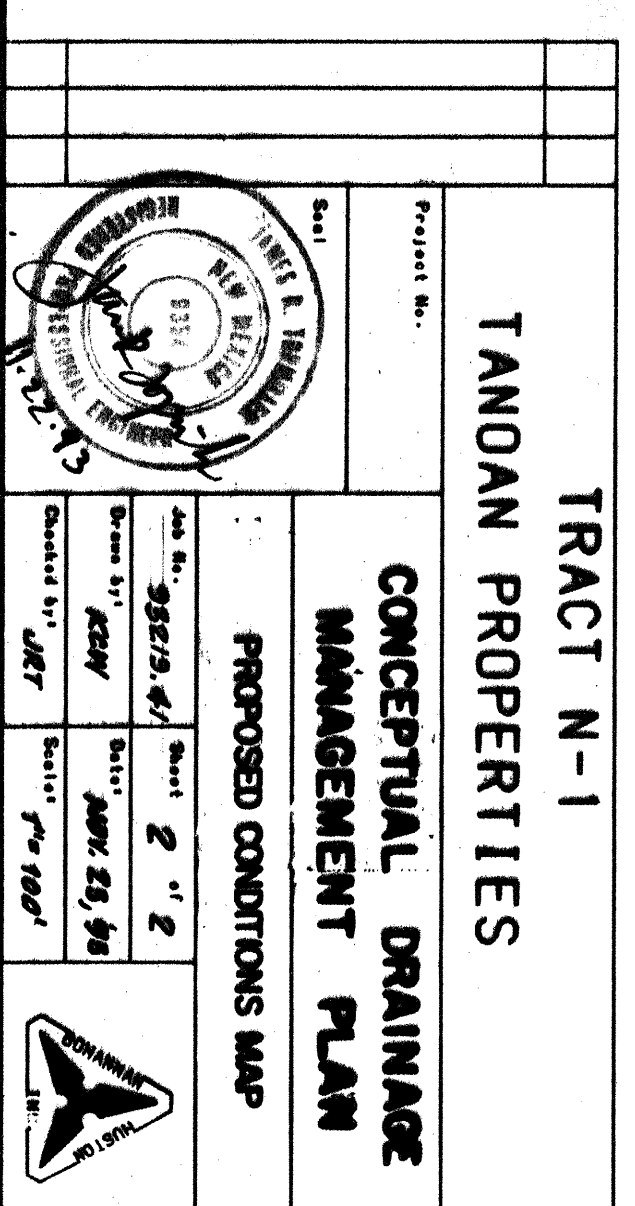
Raising the Bar
on NASTC's
or
owner

Better Community
Approval

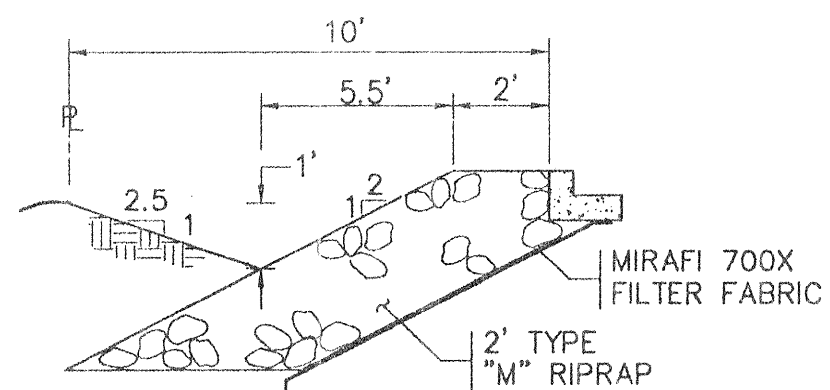
1004 DEGRADED											
CONDITIONS-1004R			CONCENTRIC			NATURAL			NATURAL		
BASED ID (NO.)			A B C D			E			F		
A	2.15	0	0	0	0	0.5	5.61	39.4	2.43	3.66	0.28
B	11.9	0	7	3	90	0.40	5.61	10.9	0.45	0.69	0.52
C	1.83	0	7	3	90	0.41	5.61	9.2	2.90	0.48	0.44
D	3.04	0	0	0	0	0.39	5.61	10.4	0.17	1.43	0.44
TOTAL: 19.21									TOTAL: 96.0		
									TOTAL: 3.52		
									TOTAL: 5.94		

1004 DEGRADED											
CONDITIONS-1004R			CONCENTRIC			NATURAL			NATURAL		
BASED ID (NO.)			A B C D			E			F		
A	2.15	0	0	0	0	0.5	5.61	39.4	2.43	3.66	0.28
B	11.9	0	7	3	90	0.40	5.61	10.9	0.45	0.69	0.52
C	1.83	0	7	3	90	0.41	5.61	9.2	2.90	0.48	0.44
D	3.04	0	0	0	0	0.39	5.61	10.4	0.17	1.43	0.44
TOTAL: 19.21									TOTAL: 96.0		
									TOTAL: 3.52		
									TOTAL: 5.94		

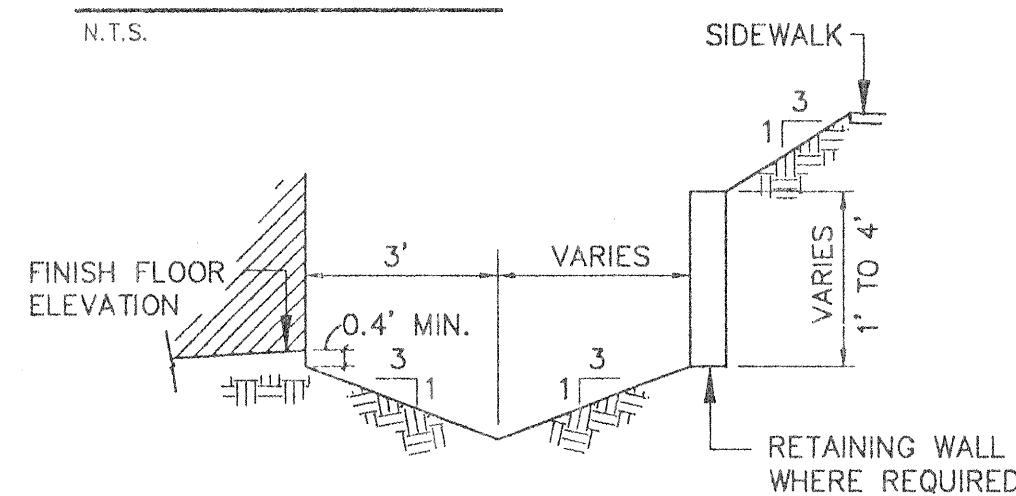
LEGAL DESCRIPTION:
TRACT N-1, TANDAN PROPERTIES



TRAMWAY BLVD.



SECTION A-A



DRAINAGE SWALE DETAIL

ENGINEER'S CERTIFICATION - FINAL CO.

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

ENGINEER'S CERTIFICATION - PHASE I

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

ENGINEER'S CERTIFICATION - PHASE II

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

ENGINEER'S CERTIFICATION - PHASE III

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

ENGINEER'S CERTIFICATION - PHASES IV & V

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

* TEMPORARY FLOWING - WILL BE CORRECTED PRIOR TO REACHING BUILDING TO BE CORRECTED PRIOR TO PERMANENT C.O.

* SW SUBJECT TO BE LOWERED PRIOR TO PERM. C.O.

ENGINEER'S CERTIFICATION - PHASES VI & VII

I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

ENGINEER'S CERTIFICATION - PHASES VIII & IX

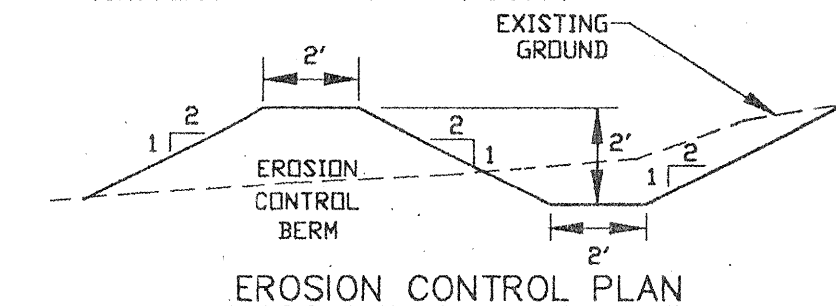
I, DANIEL S. AGUIRRE, DO HEREBY CERTIFY THAT THIS SITE IS GRADED AS HEREON AND IS IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED DRAINAGE PLAN.

LEGEND

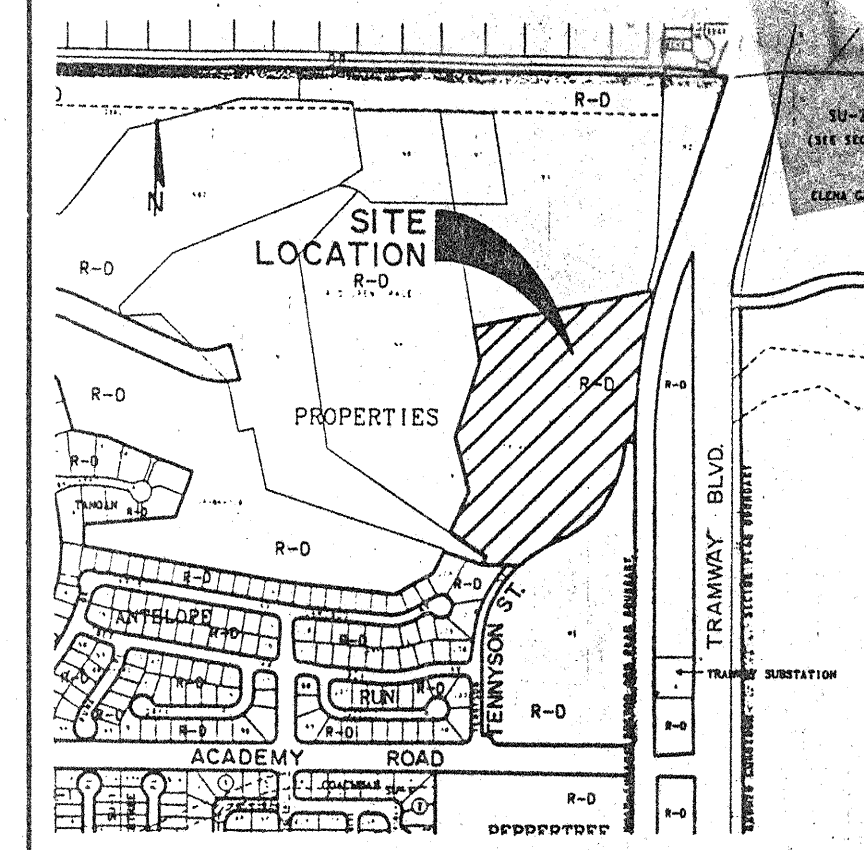
- EXISTING INTERMEDIATE CONTOUR
- EXISTING INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED SPOT ELEVATION
- EROSION CONTROL BERM
- BASIN BOUNDARY
- TOP OF WALL/BOTTOM OF WALL ELEVATIONS
- DIRECTION OF FLOW
- 18' TO 4' RETAINING WALL

GRADING NOTES:

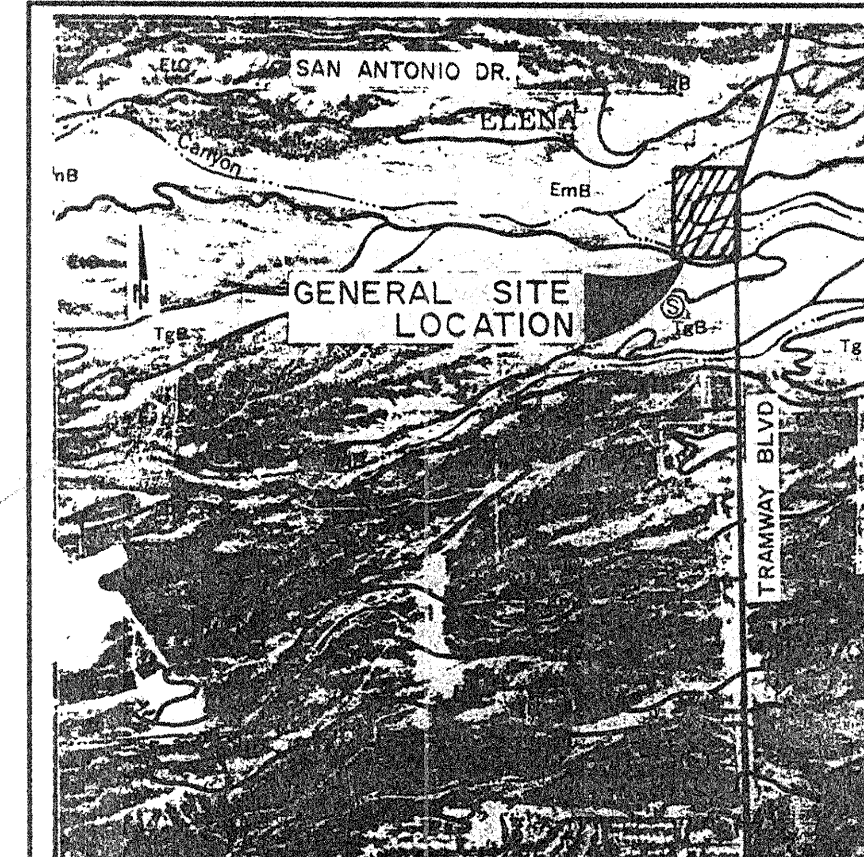
- CONTRACTOR MUST OBTAIN A TOPSOIL DISTURBANCE PERMIT FROM THE ENVIRONMENTAL HEALTH DIVISION PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS TO REFER TO EARTHWORK SPECIFICATIONS AS NOTED IN THE SOILS REPORT PREPARED BY VINYARD AND ASSOCIATES AND DATED 28 SEPTEMBER 1994.
- THE CONTRACTOR SHALL CONFORM TO ALL CITY, COUNTY, STATE AND FEDERAL DUST CONTROL MEASURES AND REQUIREMENTS AND WILL BE RESPONSIBLE FOR PREPARING AND OBTAINING ALL NECESSARY APPLICATIONS AND APPROVALS.
- THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SLOPE OF PUBLIC RIGHT-OF-WAY OR ONTO THE PUBLIC COURSE. THIS CAN BE ACHIEVED BY CONSTRUCTING TEMPORARY BERMS AS PER DETAIL THIS SHEET AND WETTING THE SOIL TO KEEP IT FROM BLOWING.
- THE CONTRACTOR IS TO ENSURE THAT NO SLOPES SHALL EXCEED 1' VERTICAL FALL IN 3' HORIZONTAL RUN (3:1). THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES WITH THIS REQUIREMENT SO THAT RESOLUTIONS MAY BE CONSIDERED WITH A MINIMUM OF DELAY.



EROSION CONTROL PLAN

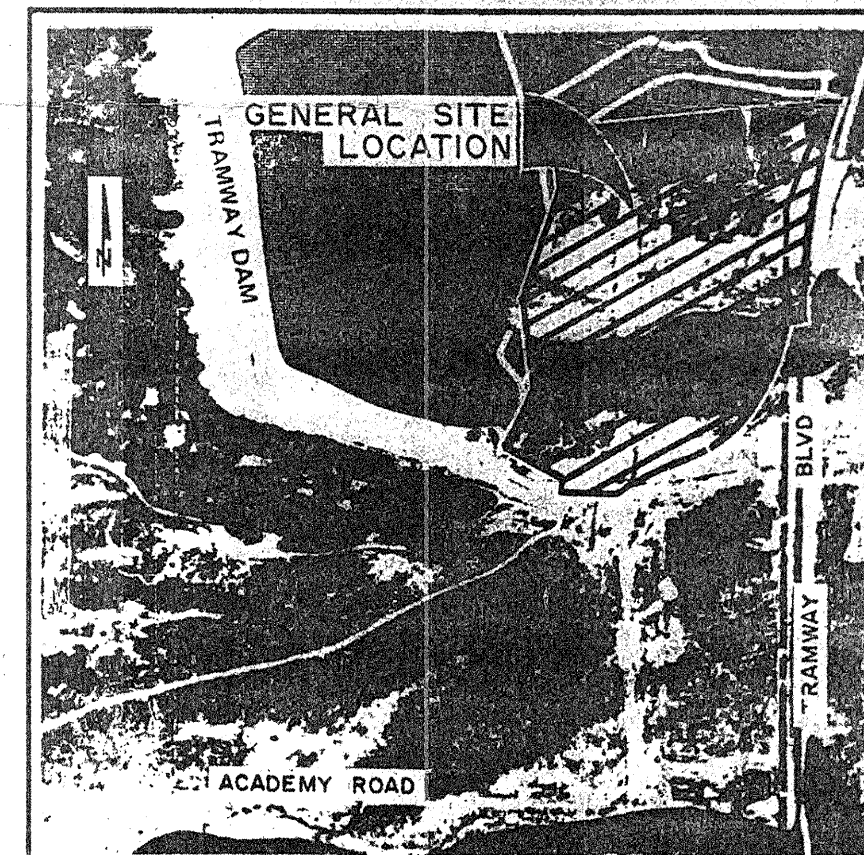


LOCATION MAP
ZONE ATLAS MAP NO. E-22



SOILS MAP

REFERENCE: SCS BERNAULLO COUNTY SOIL SURVEY SHEET NO. 22



FLOOD INSURANCE MAP

REFERENCE: FLOOD INSURANCE STUDY PANEL 18

LEGAL DESCRIPTION

TRACT N-1, TANOAN PROPERTIES.

BENCH MARK

A STANDARD BRASS USC&GS BRASS TABLET STAMPED "TUMBLE 1969" SET IN CONCRETE PROJECTING 0.2 FEET ABOVE THE GROUND, LOCATED ON SAN ANTONIO DRIVE APPROXIMATELY 500 FEET NORTHWEST OF THE INTERSECTION OF TENNYSON STREET AND SAN ANTONIO DRIVE. ELEV.(SD) 1929=6009.155

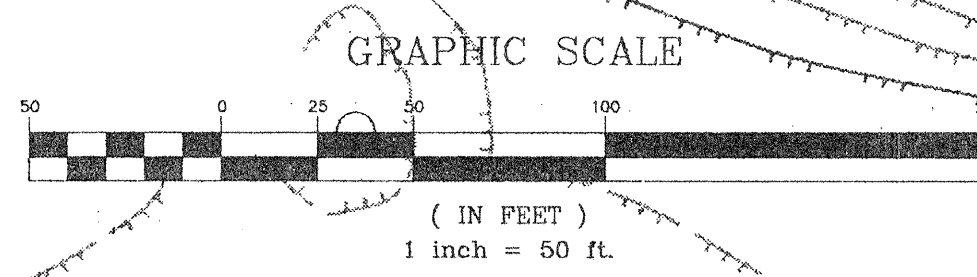
DESERT HEIGHTS AT TANOAN
APARTMENT COMPLEX

FINAL GRADING PLAN
PHASING PLAN

DESIGN D.S.A.	DRAWN K.I.S.	DATE OCT 1994
FILE NO. 94-509		SHEET NO. 3 OF 18
WILSON & COMPANY 6611 GULTON CT ALBUQUERQUE, NEW MEXICO 87109 (505) 345-5345 COA Reg. No. 5029.90		

APPROVED FOR ROUGH GRADING ±1'
DATE 1-26-95
COA

APPROVED
DATE 11-21-94
AMAFCA



GRAPHIC SCALE

(IN FEET)

1 inch = 50 ft.

1 - DOUBLE TYPE "B" INLET
2 - SINGLE TYPE "D" INLET
TOG = 5980.80
INV. = 5976.80

18" X 6" CBC
SEE SHEET 5 OF 18
COA MAINTAINED TO TRAMWAY BLVD. ROW

INSTALL TYPE "C" INLET
TOG = 5985.10
INV. = 5982.11
(AT 96" SD)
INV.(W) = 5980.85

INSTALL TYPE "D" INLET
TOG = 5984.80
INV. = 5980.80

DRAINAGE REPORT

Site Location: The site is located on the proposed Tennyson Road approximately one block north of Academy Road. The Pino Dam is located west of the Property.

Methodology: For this site, section 22.2 of the City of Albuquerque DPM was followed to calculate the peak runoff. The method designated Part A was used to determine the runoff from each on-site basin. The charts and formulas in Part A were followed using the 100 year frequency 6 hour rainfall volume as the design storm. The site is located in Zone 4 as determined from Figure A. The peak discharge was determined using Table 9. The offsite flows were analyzed in a drainage report prepared by Bohannon-Huston, Inc. (BHI) entitled "Tract N-1, Tanoan Properties, Conceptual Drainage Management Plan," November 1993 (E22-D16).

Existing Conditions: The site is currently undeveloped draining from east to west. The site is encumbered by two floodplain easements. The floodplains are a result of peak flows traversing the middle of the site from 6-60" RCPs (1930 CFS) and from 5-10"x10" CBO's (4920 CFS) to the north of the property. Both culverts are located within Tramway Boulevard ROW. Also, a 96" RCP is located along the southwest portion of the site conveying 950 CFS. All of the offsite flows drain to the Pino Dam Pool located just west of the site. Existing drainage easements are shown on this plan.

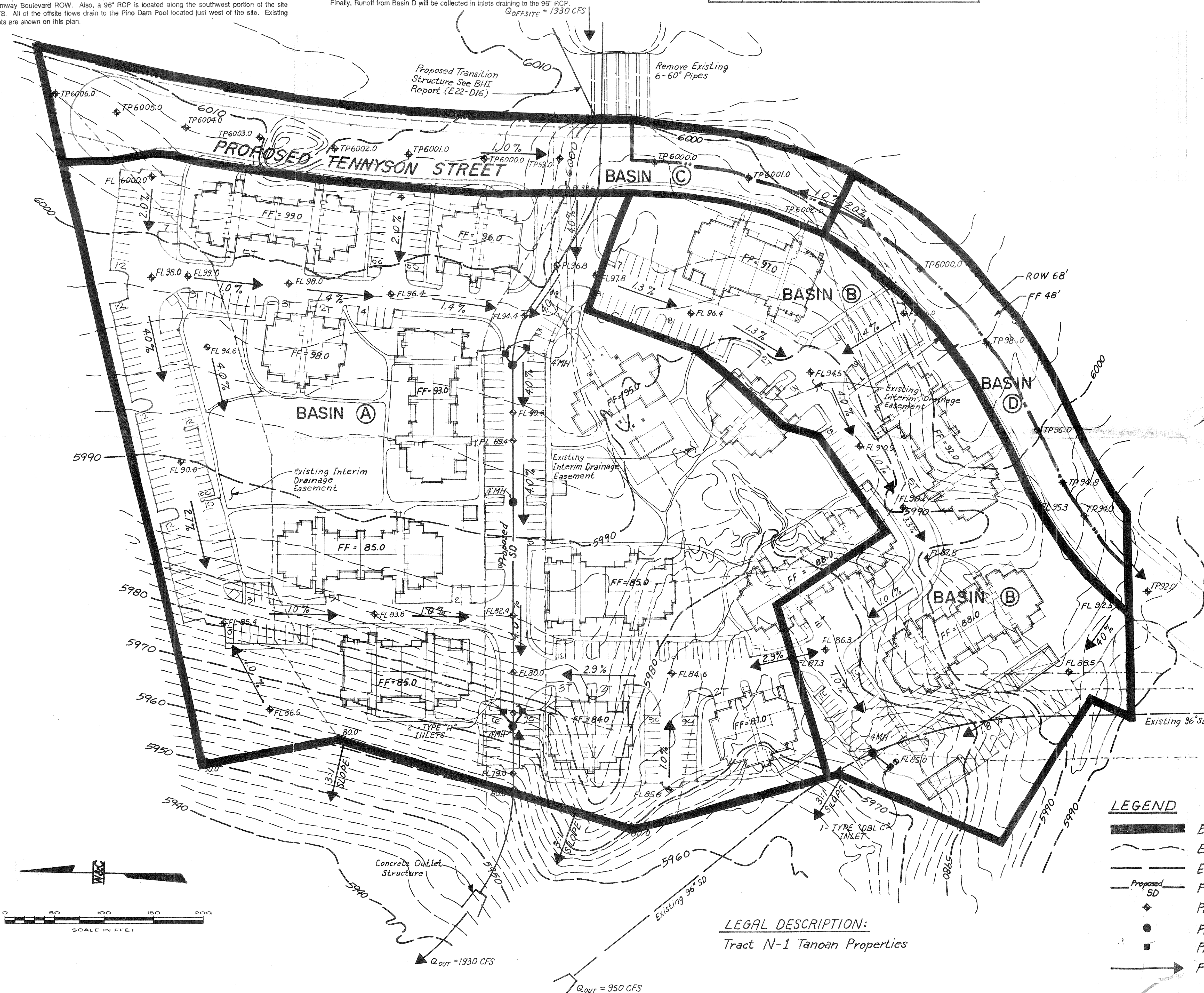
EXISTING CONDITIONS

AREA (ACRE)	LAND TREATMENT	ZONE	Qp (CFS/ACRE)	QpTOT (CFS)
14.2	A	4	2.20	31.2

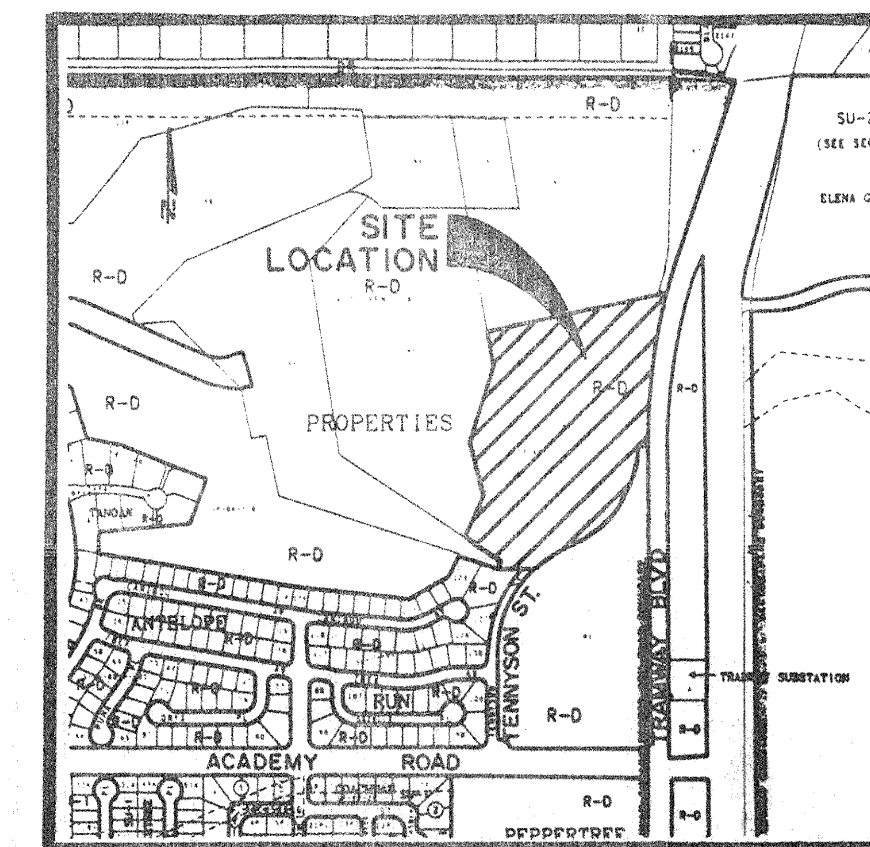
Proposed Conditions: The site will be developed into an apartment complex. In the "Tract N-1, Tanoan Properties, Conceptual Drainage Management Plan", BHI proposes to install a 102" RCP through the site with a transition structure downstream of the 6-60" RCPs under Tramway Boulevard and improve the inlet upstream. This will reduce the floodplain, if approved by FEMA, and provide a drainage conveyance system for on-site flows. BHI is continuing the analysis for this storm sewer system and will coordinate with the proposed apartment complex, for the on-site flows, runoff from Basin A will be collected in storm inlets connected to the 102" RCP in two locations and drain to the Pino Dam Pool. Runoff from Basin B will be collected in inlets and discharged to the 96" RCP draining to the dam. Runoff from Basin C, Tennyson Road, will be collected in inlets discharging to the 102" RCP. Finally, Runoff from Basin D will be collected in inlets draining to the 96" RCP.

100% DEVELOPED CONDITIONS

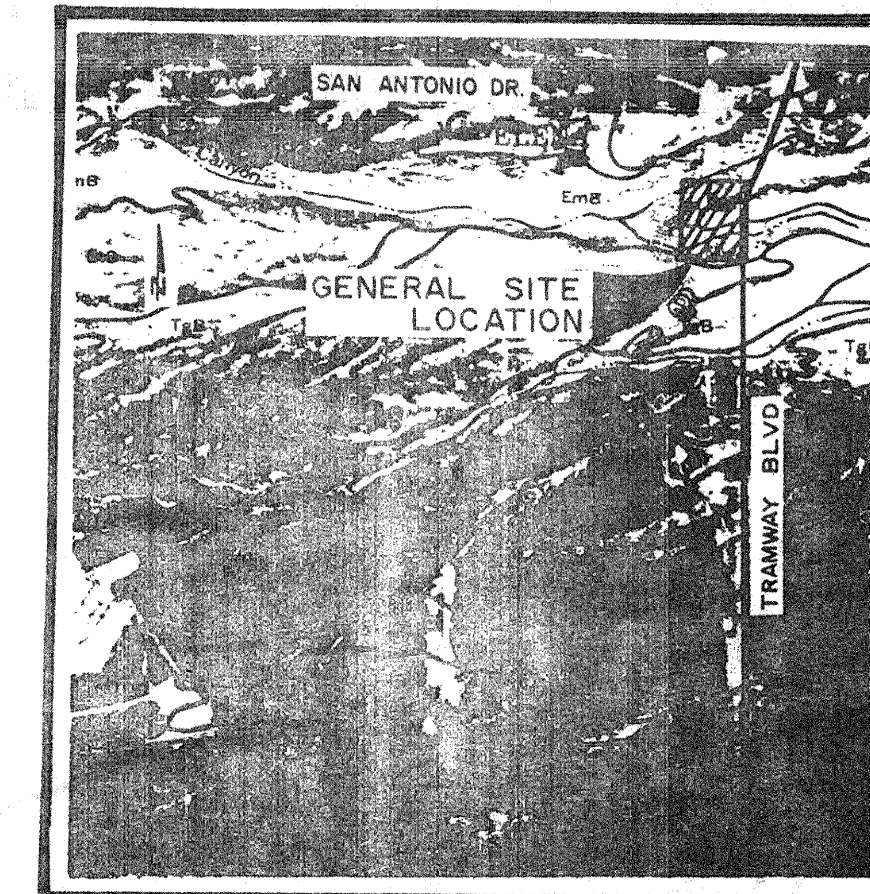
BASIN	AREA (ACRE)	LAND TREATMENT	ZONE	Qp (CFS/ACRE)	QpTOT (CFS)
A	3.7	B	4	2.92	37.0
B	1.0	D	4	2.92	14.0
C	0.1	B	4	2.92	6.6
D	0.15	B	4	2.92	5.5



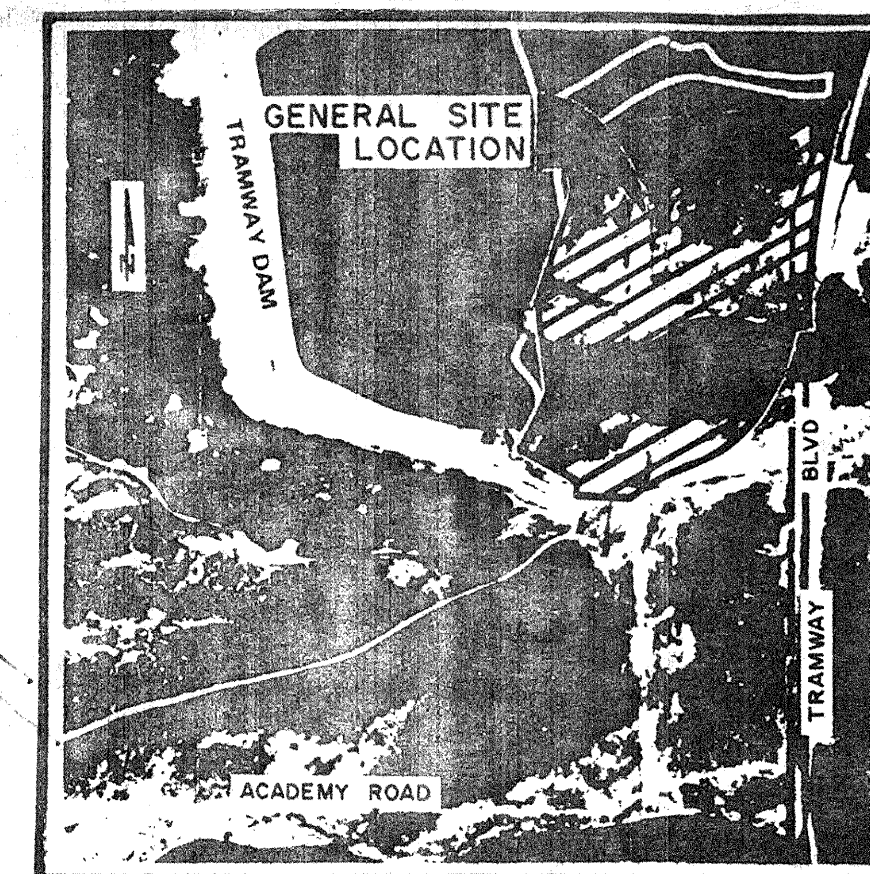
LEGAL DESCRIPTION:
Tract N-1 Tanoan Properties



LOCATION MAP
ZONE ATLAS MAP NO. E-22-Z



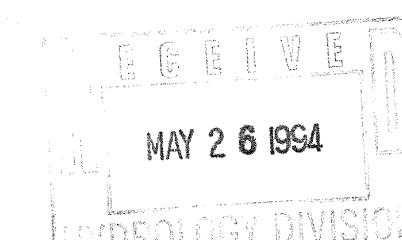
SOILS MAP
REFERENCE: SCS BERNALILLO COUNTY SOIL SURVEY SHEET NO. 22



FLOOD INSURANCE MAP
REFERENCE: FLOOD INSURANCE STUDY PANEL 18

LEGEND

- Basin Boundary
- Existing Contours
- Existing Storm Drain
- Proposed Storm Drain
- Proposed Spot Elevations
- Proposed Manhole
- Proposed Inlet
- Flow Arrow



REVISIONS	BY

HDO
architects • planners
2550 Camino Abasco
Suite 105
North Creek, CA
94596
510 434-4206

CONCEPTUAL GRADING/DRAINAGE PLAN

TANOAN AT HIGH DESERT

A 220 UNIT APARTMENT COMMUNITY FOR:
SNK CALIFORNIA INC.
FOUR EMBARCADERO CENTER, SUITE 3700
SAN FRANCISCO, CALIFORNIA 94111-4106
(415) 433-0701 FAX (415) 433-0706

DRAWN	CHECKED
DATE 5-17-94	SCALE 1" = 50'
JOB NO.	SHEET
A3	SHEETS

DRAINAGE REPORT

Site Location: The site is located on the proposed Tennyson Road approximately one block north of Academy Road. The Pino Dam is located west of the Property.

Methodology: For this site, section 22.2 of the City of Albuquerque DPM was followed to calculate the peak runoff. The method designated Part A was used to determine the runoff from each on-site basin. The charts and formulas in Part A were followed using the 100 year frequency 6 hour rainfall volume as the design storm. The site is located in Zone 4 as determined from Figure A. The peak discharge was determined using Table 9. The offsite flows were analyzed in a drainage report prepared by Bohannan-Huston, Inc. (BHI) entitled "Tract N-1, Tanoan Properties, Conceptual Drainage Management Plan," November 1993 (E22-D16).

Existing Conditions: The site is currently undeveloped draining from east to west. The site is encumbered by two floodplain easements. The floodplains are a result of peak flows traversing the middle of the site from 6-60" RCPs (1930 CFS) and from 5-10'x10' CBC's (4920 CFS) to the north of the property. Both culverts are located within Tramway Boulevard ROW. Also, a 96" RCP is located along the southwest portion of the site conveying 950 CFS. All of the offsite flows drain to the Pino Dam Pool located just west of the site. Existing drainage easements are shown on this plan.

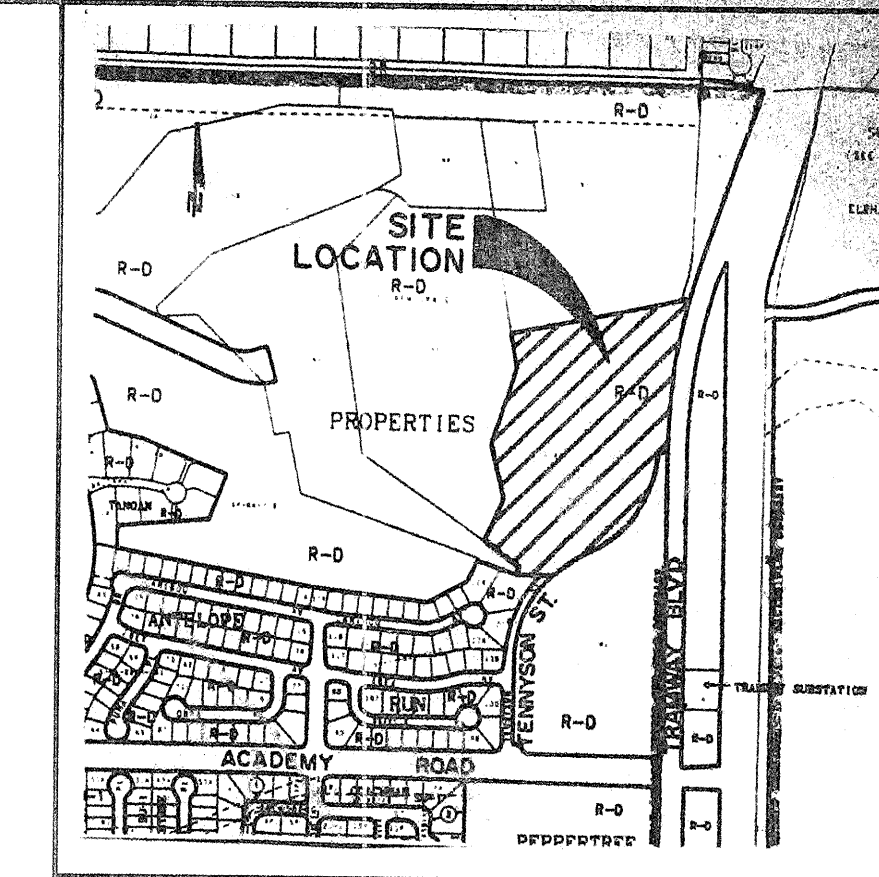
EXISTING CONDITIONS

AREA (ACRE)	LAND TREATMENT	ZONE	Qp (CFS/ACRE)	QpTOT (CFS)
14.2	A	4	2.20	31.2

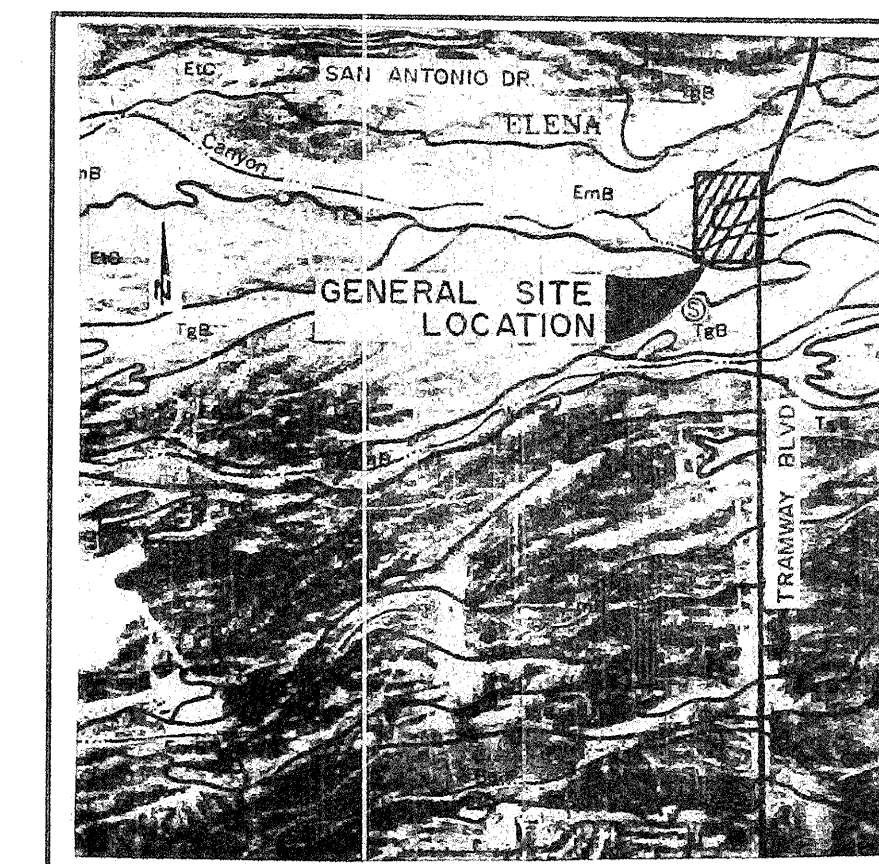
Proposed Conditions: The site will be developed into an apartment complex. An 8' x 6' concrete box culvert will be installed through the site with a transition structure downstream of the 6-60" RCPs under Tramway Boulevard and improve the inlet upstream. This will reduce the floodplain, if approved by FEMA, and provide a drainage conveyance system for on-site flows. For the on-site flows, runoff from Basin A will be collected in storm inlets connected to the 102" RCP in two locations and drain to the Pino Dam Pool. Runoff from Basin B will be collected in inlets and discharged to the 96" RCP draining to the Jam. Runoff from Basin C, Tennyson Road, will be collected in inlets discharging to the 102" RCP. Finally, Runoff from Basin D will be collected in inlets draining to the 96" RCP.

100% DEVELOPED CONDITIONS

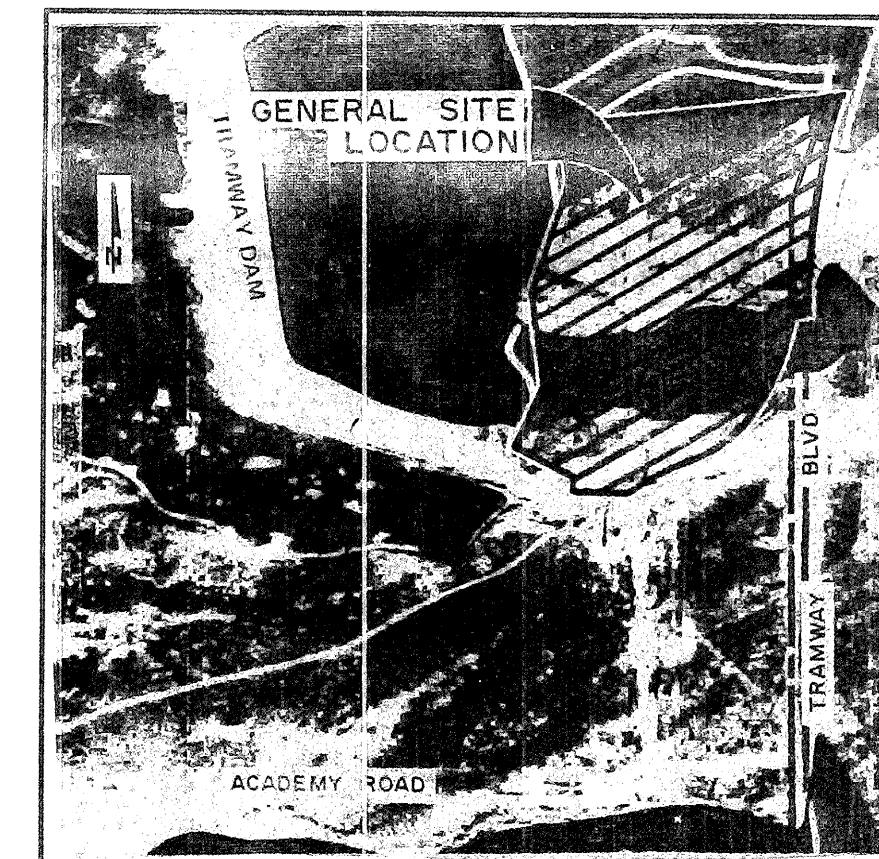
BASIN	AREA (ACRE)	LAND TREATMENT	ZONE	Qp (CFS/ACRE)	QpTOT (CFS)
A	3.7	B	4	2.92	37.0
B	1.0	B	4	2.92	14.0
C	0.1	B	4	2.92	6.6
D	0.15	B	4	2.92	5.5



LOCATION MAP
ZONE ATLAS MAP NO. E-22



SOILS MAP
REFERENCE: SCS BERNALILLO COUNTY SOIL SURVEY
SHEET NO. 22



FLOOD INSURANCE MAP
REFERENCE: FLOOD INSURANCE STUDY
PANEL 15

LEGAL DESCRIPTION TRACT N-1, TANOAN PROPERTIES.

BENCH MARK

A STANDARD BRASS USC&GS BRASS TABLET STAMPED "TUMBLE 1969" SET IN CONCRETE PROJECTING 0.2 FEET ABOVE THE GROUND, LOCATED ON SAN ANTONIO DRIVE APPROXIMATELY 500 FEET NORTHWEST OF THE INTERSECTION OF TENNYSON STREET AND SAN ANTONIO DRIVE. ELEV.(SD 1929)=6009.155

DESERT HEIGHTS AT TANOAN APARTMENT COMPLEX

GRADING AND DRAINAGE PLAN

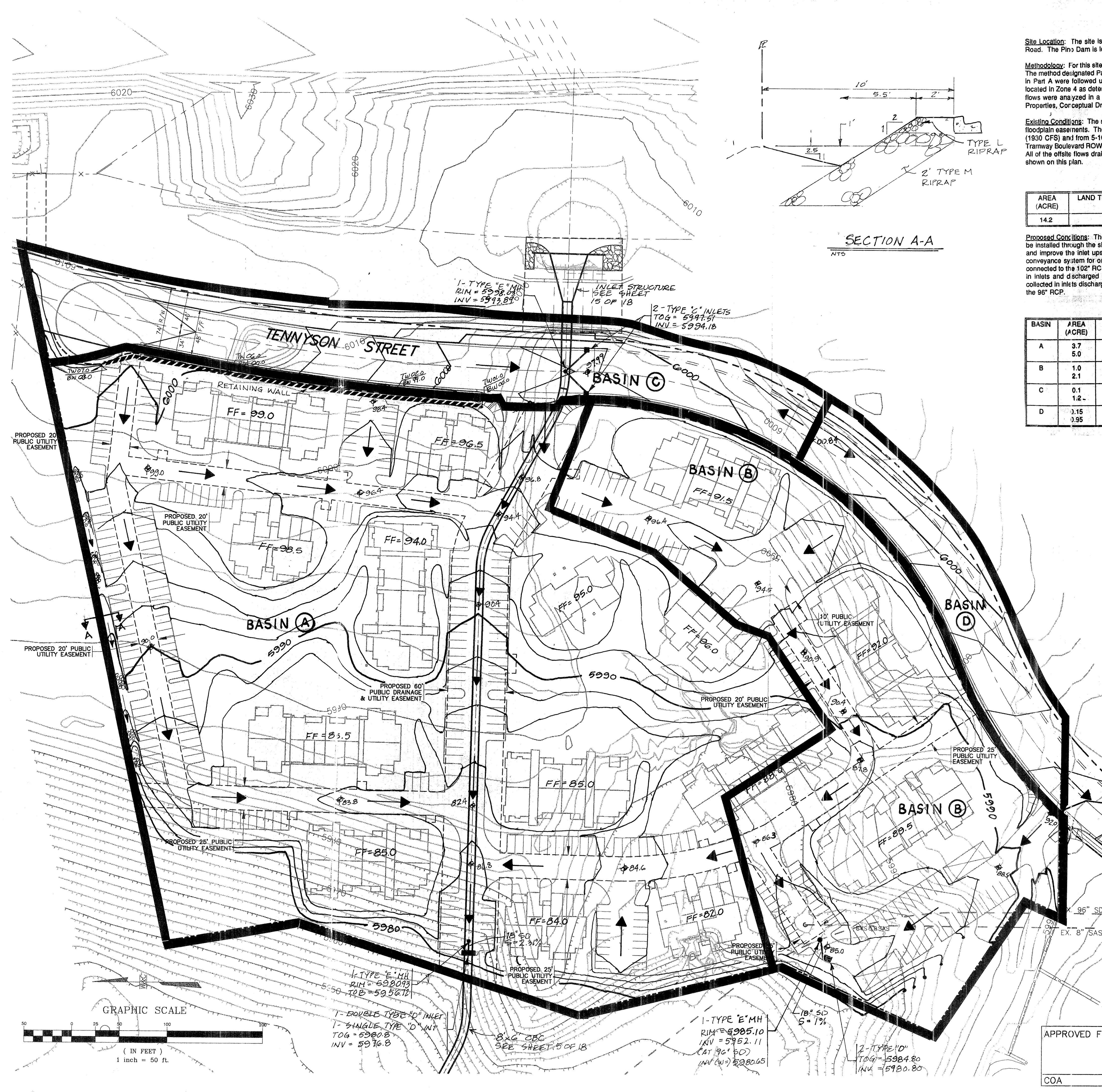
DESIGN D.S.A.	DRAWN K.I.S.	DATE AUGUST 1994
FILE NO. 94-509		SHEET NO. 3 OF 18

WILSON & COMPANY

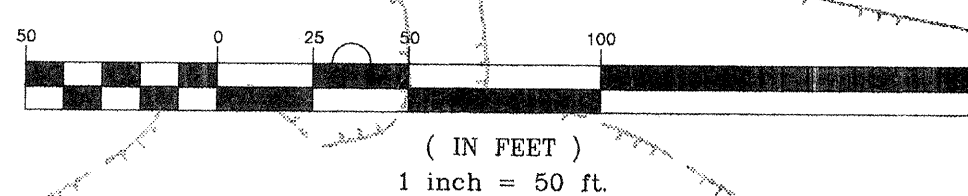
6611 GULTON CT
ALBUQUERQUE, NEW MEXICO
87109
(505) 345-5345

APPROVED FOR ROUGH GRADING ±1'

COA DATI

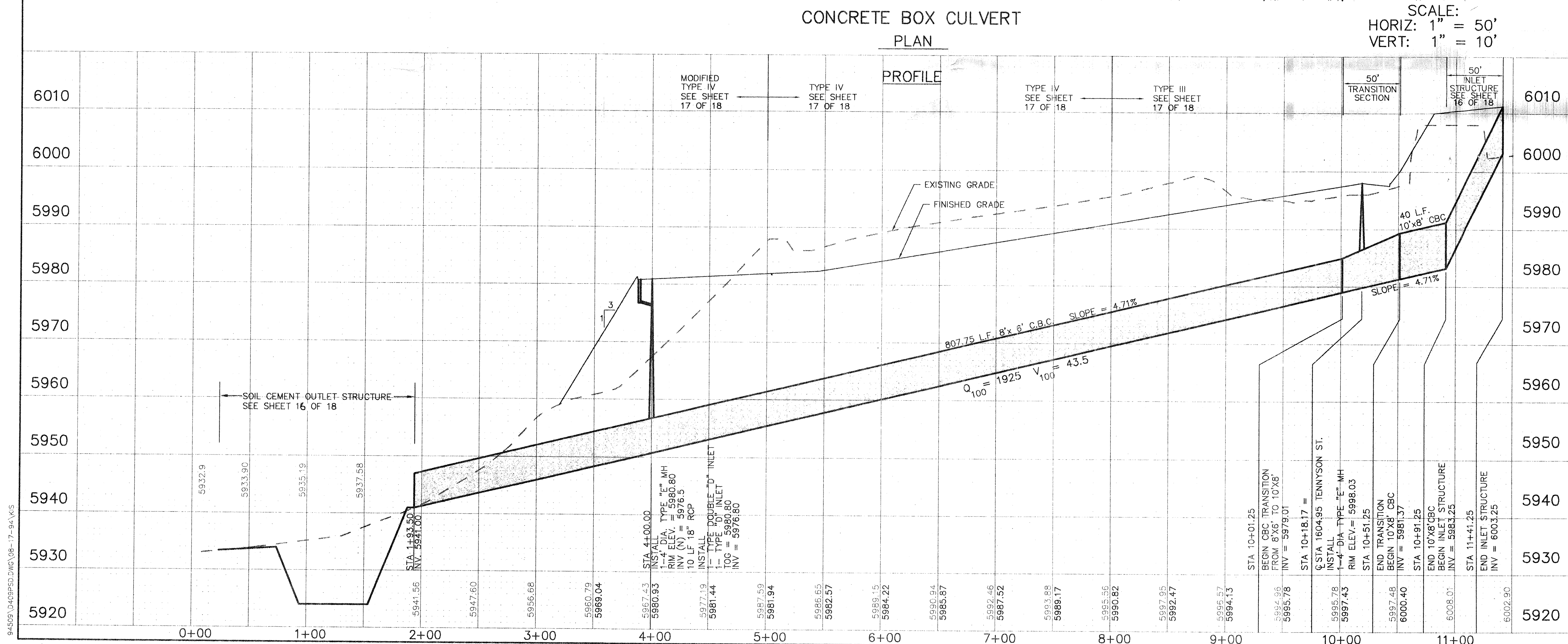
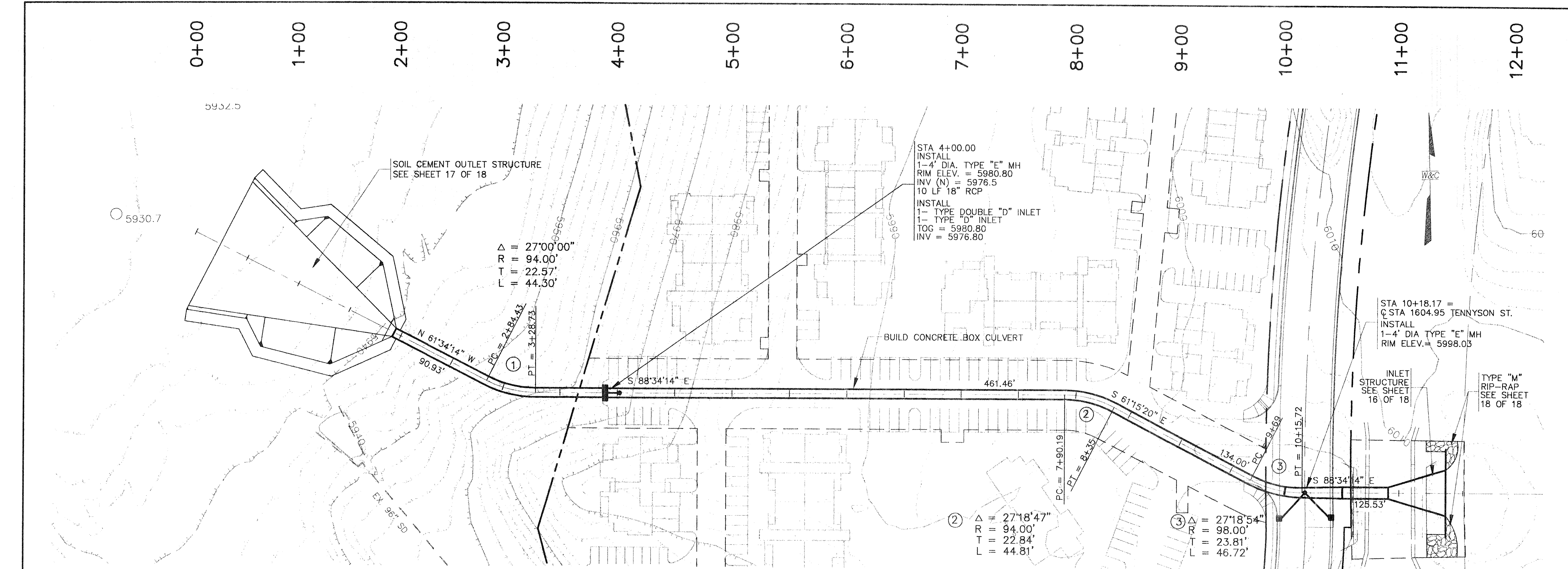


GRAPHIC SCALE



94509.D409GD.DWG 8/16/94 KIS

94509 (940950) DWG (8-17-94) XLS



ENGINEER'S SEAL			SURVEY INFORMATION			BENCH MARKS			AS-BUILT INFORMATION		
REVISIONS			FIELD NOTES		DATE	A STANDARD BRASS USC&GS BRASS TABLET		CONTRACTOR		WORK	
			NO.	BY		STAMPED "TUMBLE 1959" SET IN CONCRETE	PROJECTING 0.2 FEET ABOVE THE GROUND,	INSPECTED BY	DATE		
NO. DATE			BY			LOCATED ON SAN ANTONIO DRIVE APPROX. 500 FEET NORTHWEST OF THE INTERSECTION OF TENNYSON STREET AND SAN ANTONIO DR. <td colspan="2">ACCEPTANCE BY<td colspan="2">DATE</td></td>		ACCEPTANCE BY <td colspan="2">DATE</td>		DATE	
DESIGNED BY			REMARKS			OF TENNYSON STREET AND SAN ANTONIO DR. <td colspan="2">DRAWINGS<td colspan="2">DATE</td></td>		DRAWINGS <td colspan="2">DATE</td>		DATE	
DRAWN BY			REVISIONS					MICRO-FILM INFORMATION <td colspan="2">RECORDED BY</td>		RECORDED BY	
CHECKED BY			WILSON & COMPANY, ENGINEERS & ARCHITECTS					NO.		DATE	
			DATE MONTH 94					ELEVATION(SD 1929) = 6009.155 FT.			
			DATE MONTH 94								
			DATE MONTH 94								

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

DESERT HEIGHTS AT TANOAN
STORM DRAIN PLAN & PROFILE

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair.			Water		
Transportation			Waste Water		
Hydrology					

WCEA #94509
AUGUST 1994

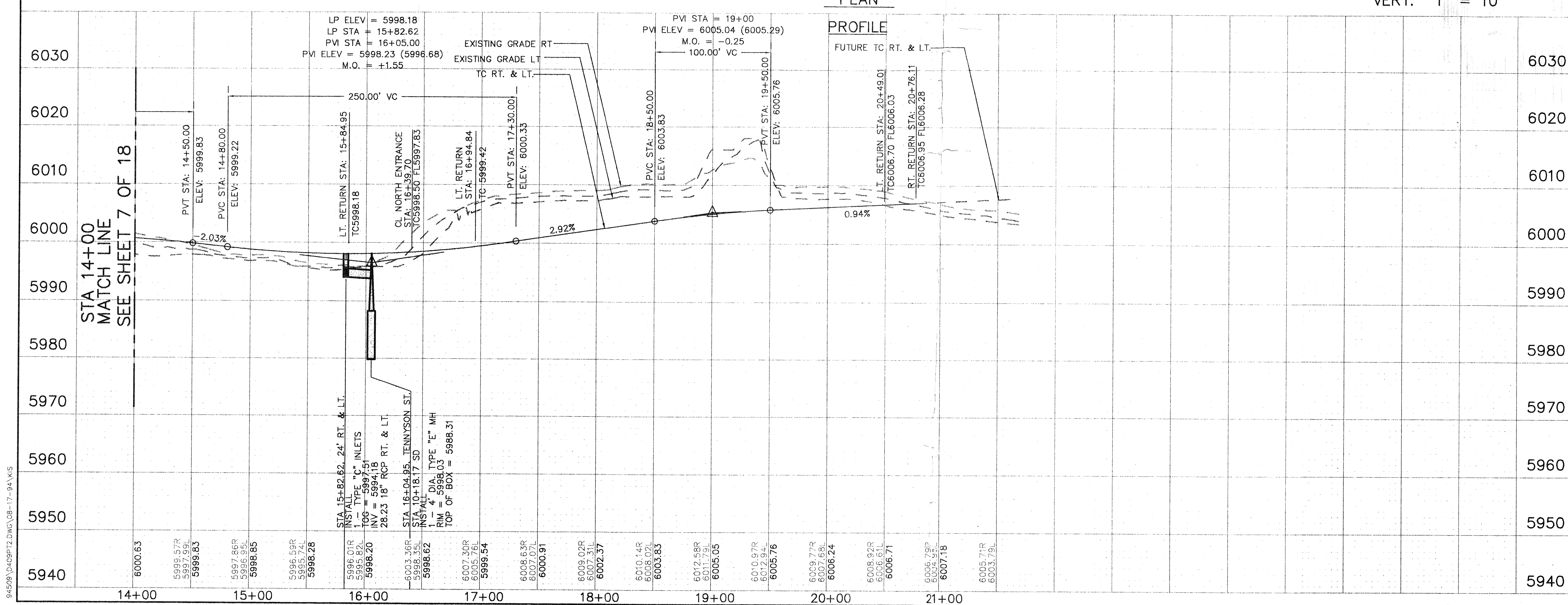
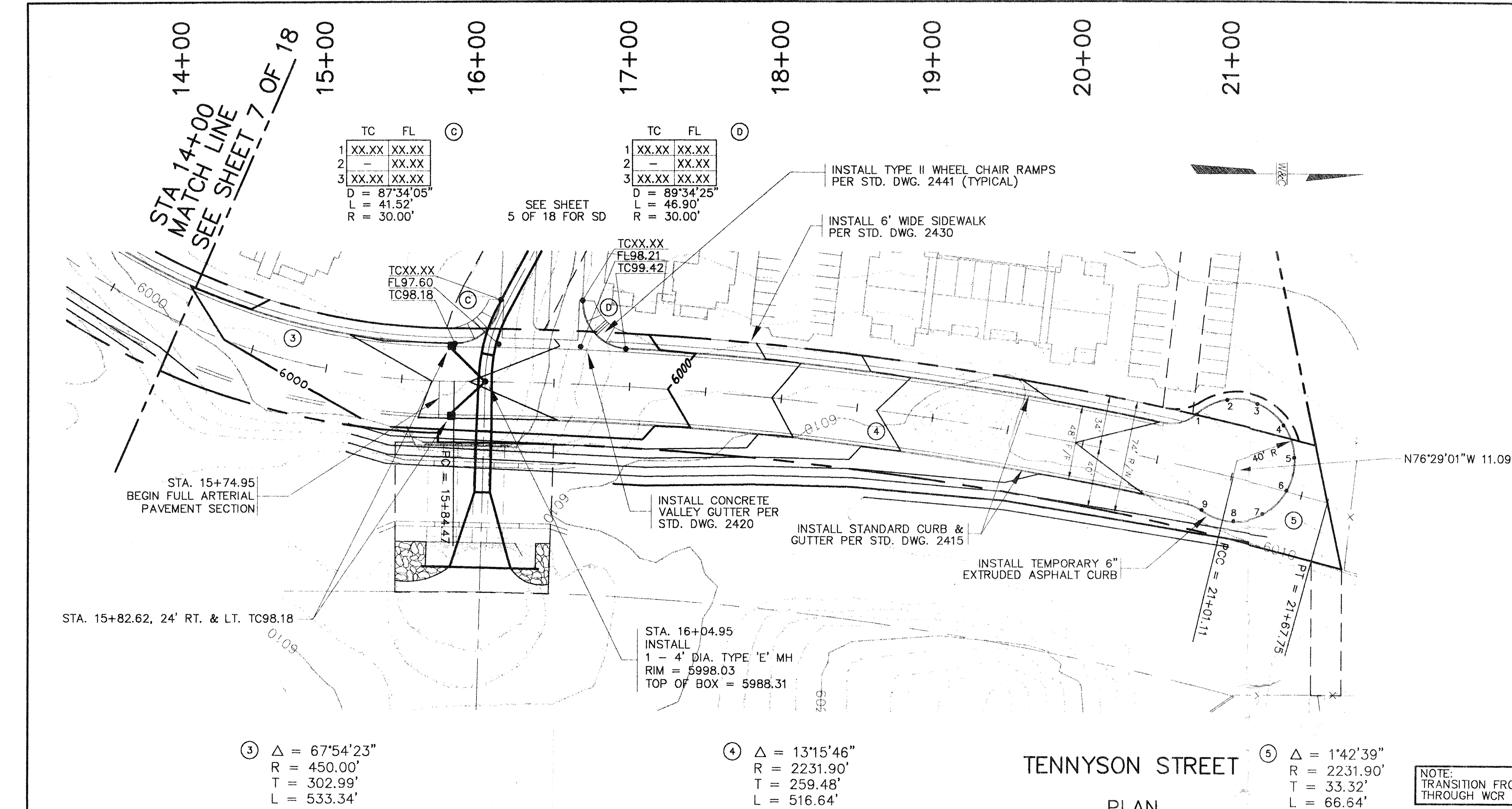
DRAWING NO. XXXX.XX

MAP NO. E-22

SHEET 5 OF 18

WILSON & COMPANY

AUG 19 1994



CUL-DE-SAC TABLE 1

PT	TC	STATION & OFFSET	DELTA
1	X.XX	20+68.84, 34.27' LT	32°07'17"
2	X.XX	20+85.89, 48.00' LT	32°07'17"
3	X.XX	21+07.40, 50.58' LT	32°07'17"
4	X.XX	21+27.07, 41.26' LT	32°07'17"
5	X.XX	21+39.07, 22.78' LT	32°07'17"
6	X.XX	21+37.62, 0.66' LT	32°07'17"
7	X.XX	21+28.24, 18.35' RT	32°07'17"
8	X.XX	21+08.24, 28.27' RT	32°07'17"
9	X.XX	20+85.96, 25.95' RT	32°07'17"

R = 40.00' L = 22.43' (BETWEEN PNTS)
RADIUS PT. = STA. 21+01.11, 11.01' LT

AS-BUILT INFORMATION			BENCH MARKS			SURVEY INFORMATION			ENGINEER'S SEAL		
CONTRACTOR	DATE	NO.	A STANDARD BRASS USC&GS BRASS TABLET	DATE	NO.	FIELD NOTES	DATE	NO.	REVISIONS	BY	DATE
DESIGNED BY	DATE	NO.	STAMPED "JUMBLE 1959" SET IN CONCRETE	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.
FIELD/PAVE BY	DATE	NO.	PROJECTING 0.2 FEET ABOVE THE GROUND,	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.
VERIFICATION BY	DATE	NO.	LOCATED ON SAN ANTONIO DRIVE APPROX.	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.
RECORDING BY	DATE	NO.	500 FEET NORTHWEST OF THE INTERSECTION	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.
NO.	DATE	NO.	OF TENNYSON STREET AND SAN ANTONIO DR.	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.
NO.	DATE	NO.	ELEVATION(SDL 1929) = 6009.155 FT.	DATE	NO.	NO.	NO.	NO.	NO.	NO.	NO.

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

DESERT HEIGHTS AT TANOAN
PAVING AND STORM DRAIN PLAN & PROFILE
TENNYSON STREET- STA 14+00 TO STA 21+67

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO. XXXX.XX MAP NO. E-22 SHEET 7 OF 18

WILSON & COMPANY
AUG 19 1994