City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 3, 2002

John A. Andrews, PE
The Larkin Group
8500 Menaul Blvd. NE
Albuquerque, NM 87112

Re: TVI Westside Master Drainage Plan
Engineer's Stamp Dated 12/14/01, [A9 / D1]

Dear Mr. Andrews:

Based upon the information provided in your submittal dated 12/28/01, the above referenced Master Drainage Plan is approved. All phases of your project should adhere to this Master Plan unless you wish to revise the Master Plan.

If you have any question, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, PWD
Development and Building Services

c: Susan Calongne, BCPW
Lynn Mazur, AMAFCA
Terri Martin, Hydrology
File

Albuquerque TVI

Master Drainage Plan

Albuquerque TVI

North West Site

August, 2001
Revised October, 2001
Second Revision December, 2001

Prepared By:
Larkin Group NM, Inc.
Consulting Engineers
8500 Menaul Blvd NE
Albuquerque, NM 87112
With:
DWL Architects & Planners
202 Central Ave. SE
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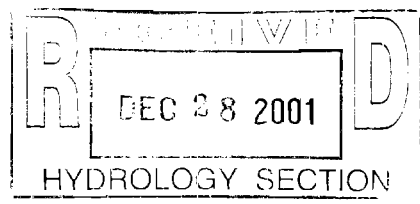

ENGINEER'S CERTIFICATION

I HAVE FULLY INSPECTED THE TRACT ON WHICH THE T.V.I. SITE SHOWN HEREON IS TO BE CONSTRUCTED AND THAT NO GRADING, FILLING OR EXCAVATION HAS OCCURRED THERON SINCE THE EXISTING CONTOUR MAP INCLUDED HEREIN WAS PREPARED.

John A. Andrews 10-30-01

JOHN A. ANDREWS, PE, No 3960 DATE

1.0 Introduction

Albuquerque TVI proposes to develop an additional educational complex for the citizens of the Albuquerque metropolitan area herein referred to as the TVI North West Site.

This TVI North West Site project consists of a 108 acre parcel located in the north west quadrant of the Albuquerque metropolitan area and lies approximately 1300 feet north of Irving Blvd. between proposed Universe Blvd. and proposed Rainbow Blvd., east to west. It is bounded on the north by proposed McMahon Blvd. and on the south by the West Branch of the Calabacillas Arroyo (See Figure 1, Location Map Zone Atlas Map A-9-Z). The site is shown on FIRM Map Number 35001C0103 D Panel 103 of 825 and is determined to be outside the 100-year floodplain except for the portion within the banks of the West Branch of the Calabacillas Arroyo (see FIRM Map in back pocket of this report).

A Master Plan for development of the complex was performed for the TVI North West Site, (June 2000) by DWL Architects & Planners Inc. to provide a framework for the incrementally phased development of this site. This Master Plan identified drainage patterns that impact the project and proposed conceptual solutions to the drainage conditions. This Master Plan was used as a reference for this Master Drainage Plan. A draft Prudent Line Study was performed on the West Branch of the Calabacillas Arroyo by Mussetter Engineering, Inc. for The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). This draft study was also used as a reference for this report. Pertinent pages of this draft report are included in Appendix F.

The development of the complex will be performed in phases through the coming years as the demand for the learning facilities is warranted and needed and also as funds become available.

With the exception of Phase I development, no schedule for construction of the future phases is known.

Phase I development is eminent and construction of this Phase is proposed to commence this fall, November 2001 and cooperation of the various agencies will be necessary. The agencies involved in the development of this complex include the following:

County of Bernalillo - The site is currently located in the County of Bernalillo, outside the Albuquerque municipal limits.

City of Albuquerque - Access to the site and portions of the offsite drainage facilities are located within the Albuquerque municipal limits.

AMAFCA - AMAFCA's West Branch of the Calabacillas Arroyo is located within the southerly portion of the site and receives the site drainage.

New Mexico Utilities Inc (NMUI) - The site is within the service area of NMUI therefore, water and sewer service will be provided by NMUI.

This Master Drainage Plan will provide a guide for the incrementally phased development of the site over a period of several years.

Guidelines for the hydrologic analysis are based on methods as defined in Section 22.2, Hydrology of the Development Process Manual (DPM), Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993 except that runoff flows were determined using Ahymo_97.

2.0 Existing Watershed Conditions

The site currently is vacant and covered with natural grasses and brush. This site is not within a FEMA flood plain but the draft prudent line study (Mussetter Engineering, Inc.) does determine a prudent line, along the north bank of the West Branch of the Calabacillas Arroyo, which AMAFCA proposes to recognize (Figure 2). The topographic conditions are also shown in **Figure 2,** generally, the site has a slope of 1.5 to 2 percent from west to east. A sediment bulking factor of 7% has been added to existing conditions flow rates. The conceptual drainage was addressed in the TVI North West Site Master Plan, June 2000. Areas of particular concern are the southern portion of the site which borders the West Branch of the Calabacillas Arroyo and a small tributary arroyo running through the site from the N.W. to S.E. see **Figure 2**.

2.0.a Off Site Existing Conditions

This site is affected by 5 off site drainage basins (OS-1 through OS-5). These basins are shown on **Figure 2** along with their historic flow paths. The offsite basins are currently undeveloped with natural grasses and brush. One offsite basin (OS-A) does not affect the site but may affect construction on Rainbow Blvd. and will be addressed in the development of Phase IV.

Table 1 Off Site Existing Runoff Summary

Basin ID	Area (Acres)	Existing Q (cfs bulked)	Existing 6 hr Vol. (ac-ft)
OS-1	29.8	29	1.2
OS-2	78.4	60	3.1
OS-3	37.2	38	1.4
OS-4	7.3	9	0.3
OS-5	3.9	5	0.1

Note: Runoffs from OS-1, OS-2, and OS-3 were determined using AHYMO_97. Runoff from areas OS-4 and OS-5 were computed using Section A.6 of C.O.A. D.P.M. which will result in slightly higher runoff values per acre. See computations - Appendix A

2.0.b On Site Existing Conditions

The on site drainage basins are currently undeveloped with natural grasses and brush. This site consists of 4 drainage basins (B-1 through B-4). These basins are also shown on **Figure 2**.

Table 2 On Site Existing Runoff Summary

Basin ID	Area (Acres)	Existing Q (cfs)	Existing 6 hr Vol. (ac-ft)
B-1	15.4	21.5	0.6
B-2	20.3	22	0.7
B-3	41.5	22.7	1.6
B-4	12.6	17.5	0.5

3.0 Developed Watershed Conditions

The Mussetter Prudent Line Study predicted fully developed conditions land treatments for this area as 0% A, 40%B, 18%C, and 42%D. This Master Plan will use land treatments 0% A, 22% B, 30% C, and 48% D for all offsite developed conditions and compare proposed onsite developed conditions to the Mussetter Study land treatments. The site will be incrementally developed in 5 Phases as discussed later in section 3.0.b. Each individual phase will address both short term and long term drainage issues as constructed. Land treatments for individual phases will be calculated as per the Master Plan, realizing that areas outside the main body of the campus are proposed to remain in their natural state. Realistically construction traffic and circumstances will cause disturbances to these areas. To allow for this, areas possibly disturbed by each phase of construction will be considered 50% land treatment A and 50% land treatment C.

Prior to development and construction of each phase a detailed grading and drainage plan will be prepared and submitted to all agencies for review and approval.

3.0.a Off Site Developed Conditions

All offsite basins are assumed to be fully developed with the following land treatment percentages 0% A, 22% B, 30% C, 48% D. This site is affected by 5 off site drainage basins (OS-1 through OS-5). These basins are shown on **Figure 2** along with their historic flow paths. When McMahon Blvd. and Rainbow Blvd. are constructed, they will prevent offsite flows from entering the TVI site. Drainage basins OS-2, OS-3, and OS-4 will be intercepted by Rainbow Blvd, and directed to the West Branch of the Calabacillas Arroyo when Rainbow Blvd. is constructed. Drainage basins OS-1, and OS-5 will be collected along McMahon Blvd. and directed east down McMahon Blvd. then to Universe Blvd and to the West Branch of the Calabacillas Arroyo.

Table 3 Off Site Developed Runoff Summary

Basin ID	Area (Acres)	Developed Q (cfs)	Developed 6 hr Vol. (ac-ft)
OS-1	27.5	93.5	3.2
OS-2	72.5	196	8.3
OS-3	37.2	177	4.3
OS-4	7.3	25	0.8
OS-5	3.9	13	0.4

Note: See computations Appendix A.

3.0.b On Site Developed Conditions

Due to the delicate nature of the existing soils and vegetation on site, all construction activities and traffic should be restricted to the construction limits to minimize any disturbance of existing vegetation. During construction all SWPPP practices should be maintained. An interim diversion berm should be constructed around the upstream portion of each construction phase to protect the construction and finished site from offsite flows. This berm should be constructed with measures to reduce sediment transportation such as but not limited to silt fences and

anchored straw bale silt traps (see Appendix E for details).

Based on meetings held with AMAFCA, free discharge to the West Branch of the Calabacillas Arroyo will be allowed provided the equilibrium slope (Mussetter Engineering Inc. 1999) is maintained via the required drop structures and steps are taken to address storm water quality issues ie. floatable trash and parking lot oils and grease. The site will be developed in five phases with no fixed time frame for implementation of Phase II through Phase V see Plate 1 through Plate 5.

The Seville subdivision located to the west of this site has begun the process of stabilizing the equilibrium slope (0.00032 to 0.00019 ft./ft.) of the West Branch of the Calabacillas Arroyo. To date this has included the installation of the AMAFCA negotiated riprap grade control drop structures. The introduction of each new discharge point, to the arroyo, will require the construction of slope stabilization drop structures downstream of similar material, drop depth and spacing to maintain consistency in the West Branch of the Calabacillas Arroyo. Prior to discharging developed conditions runoff in the West Branch of the Calabacillas Arroyo agreements with AMAFCA shall be negotiated for drop structure construction, and drainage easements or rights of way.

Upon completion of all five phases the developed conditions runoff (Appendix B) generated by the 100 year 6 hour event is summarized in Table 4.

Table 4 On Site Developed Runoff Summary

Phase	Area (acres)	Developed Runoff (c.f.s.)	Developed Volume (ac-ft)
Phase I	28.4	69.6	2.3
Phase II	18.7	59.5	2.0
Phase III	18.4	57.4	2.0
Phase IV	25.7	72.2	2.4
Phase V	10.5	32.5	1.1

Phase I

The Phase I consists of approximately 28.4 acres with the construction area consisting of 19.4 acres as 8 acres impervious, 2.6 acres as landscaped, and 8.8 acres as 50% A and 50% C. An interim diversion berm (Plate 1) should be constructed (detail Appendix E) to divert 46 c.f.s. (Phase I offsite) of existing runoff from OS-1 and a portion of B-3 (calculations Appendix A-12) through an interim desilting basin to the proposed storm drain in Universe Blvd. The developed runoff for this phase will increase to approx. 69.6 c.f.s.(Appendix B-1) which is less than the free discharge of 88.6 c.f.s. (Appendix B-1) projected by Mussetter's draft Prudent Line Study for the West Branch of the Calabacillas Arroyo for and area of this size. Construction for Phase I will also include a section of Universe Blvd (shown on Plate 1), and the installation of a 66" storm drain (Appendix C-4) also shown in Universe Blvd from the water quality enhancement facility to the West Branch of the Calabacillas Arroyo. This storm drain will ultimately carry developed flows (282 c.f.s. Appendix C-4) from OS-1, OS-5, Phase I, and Phase II. Phase I will also require an offsite all weather crossing structure for Universe Blvd. at the West Branch of the Calabacillas Arroyo crossing (5,290 c.f.s. capacity as per Mussetter Prudent Line Study). To maintain the equilibrium slope determined by the Mussetter Prudent Line Study will require the installation of grade control drop structures (see Appendix D for proposed profile). In order to maintain uniformity and consistency in the West Branch of the Calabacillas Arroyo these drop structures and crossings should be of similar design and material as have been constructed in the reaches adjacent to the Seville Subdivision located directly east of this site.

Phase I will require the offsite construction of Irving Blvd. (south half) and Universe Blvd. (west half) along with the respective storm drainage systems. Universe Blvd. will cross the West Branch of the Calabacillas Arroyo with an all weather crossing capeable of conveying the fully

developed flows of 5290 c.f.s., final design details to be negotiated with A.M.A.F.C.A. and City of Albuquerque Park and Rec. Dept. This structure shall have a separate detailed drainage report to be submitted and approved prior to construction.

Necessary items for the completion of Phase I

- Dedicate easement or right of way for Universe Blvd. and offsite storm drain
- Construction of half of Irving Blvd., a westerly extension of approximately 1300 ft. from the end of the existing pavement to the proposed Universe Blvd. intersection.
- Construction of half of Universe Blvd. from Irving Blvd. north past the entrance to the Phase I site.
- Construction of the arroyo crossing structure at Universe Blvd. at the West Branch of the Calabicallas Arroyo.
- Possible LOMR and/or CLOMR for Universe Blvd. arroyo crossing structure.
- Coordination and construction of water and sanitary sewer mains with New Mexico Utilities Inc.
- Construction of the offsite storm drain in Universe Blvd.
- Coordinate with AMAFCA and construct necessary drop structures in West Branch of the Calabacillas Arroyo east of Universe Blvd.

Phase II

Phase II (Plate 2) consists of approximately 18.7 acres with the construction area as 8 acres impervious, 2.6 acres as landscaped, and 8.8 acres as 50% A and 50% C. The Phase I interim diversion berm should be maintained in order to divert flows through the desilting basin to the now existing storm drain in Universe Blvd. The developed runoff for this phase will increase to approx.

59 c.f.s.(Appendix B-2), which is the free discharge (Appendix B-2) projected by Mussetter's draft Prudent Line Study for the West Branch of the Calabacillas Arroyo for an area of this size. The interim drainage berm and desilting basin will still be necessary until the construction is complete for Phase III, but landscaping can be installed up to the edge of the berm. The construction of the south half of McMahon Blvd along the north side of Phase II can be used to divert existing flows from OS-1 (29 c.f.s. Appendix A-1) and OS-5 (5 c.f.s. Appendix A-8). Phase II construction will also extend Universe Blvd north and the storm drain as shown on Plate 2.

Necessary items for the completion of Phase II

- Extension of the west half of Universe Blvd. north to the intersection with McMahon Blvd.
- Construction of the south half of McMahon Blvd. from the Universe Blvd. intersection west to the westerly limits of Phase II.

Phase III

The completion of Phase III (Plate 3) will require the extension of the south half of McMahon Blvd, and a 54 inch RCP storm drain @ approximately 0.5% slope (Appendix C-7) in McMahon Blvd. with inlets to intercept developed conditions, flows from basins OS-1 (93 c.f.s. Appendix A-14), and OS-5 (13 c.f.s. Appendix A-19). This storm drain will connect to the now existing storm drain in Universe Blvd to the West Branch of the Calabacillas Arroyo.

Phase III will cover approximately 18.4 acres consisting of 8.4 acres as impervious, 1 acre as landscaped, and 4.5 acres as A and 4.5 acres as C. The developed runoff for this phase will increase to approx. 57 c.f.s.(Appendix B-3), which is less than the free discharge of 58 c.f.s. (Appendix B-3) projected by Mussetter's draft Prudent Line Study for the West Branch of the

Calabacillas Arroyo for an area of this size. At this time the interim berm and desilting basin between Phase I and Phase II will still be necessary until the construction is complete for Phase III, but landscaping can be installed up to the edge of the berm.

Necessary items for the completion of Phase III

- Dedicate easement or right of way for McMahon Blvd. and offsite storm drain
- Extension of the south half of McMahon Blvd.
- Coordinate and construct water and sanitary sewer mains with New Mexico Utilities Inc.
- Construction of offsite storm sewer in McMahon Blvd.
- Coordinate with AMAFCA and construct necessary drop structures in West Branch of the Calabacillas Arroyo

Phase IV

The completion of Phase IV (Plate 4) will require the construction of the east half of Rainbow Blvd. with a 78" RCP storm drain at 0.7% slope (Appendix C-12) to divert offsite flows (432 c.f.s. developed) from OS-2, OS-3 and OS-4 to the West Branch of the Calabacillas Arroyo. This will eliminate the tributary arroyo as a water carrier and allow the development of this area to occur. Phase IV may require an interim diversion berm along the north side of the phase IV area to protect it from offsite flows until Rainbow Blvd. and Phase V is complete. The Rainbow Blvd. storm drain is sized to divert developed flows from south of McMahon Blvd. to the TVI southern property line but the last reach, to the West Branch of the Calabacillas Arroyo, will depend on the final size of and runoff from basin OS-A. At the current rate of development basin OS-A undoubtedly will not remain as shown on Figure 2 therefore the last reach of the Rainbow Blvd storm drain will depend on the developed size of OS-A. Completion of Phase IV will also require the installation of the required

equilibrium slope grade control structures in the West Branch of the Calabacillas Arroyo. Phase IV construction should include approximately 300 l. f. of storm drain and interim desilting basin installed at the existing tributary arroyo to collect and divert excess runoff to one of the grade control structures.

Phase IV will cover approximately 25.7 acres with the construction area consisting of 9.1 acres as impervious, 4.1 acres as landscaped, and 7.4 acres as A and 5.1 acres as C. The developed runoff for this phase will increase to approx. 72 c.f.s.(Appendix B-4), which is less than the free discharge of 81 c.f.s.(Appendix B-4) projected by Mussetter's draft Prudent Line Study for the West Branch of the Calabacillas Arroyo for and area of this size. Phase IV may require the construction of an all weather crossing capeable of conveying the fully developed flows of 5290 c.f.s. with final design geometries to be negotiated with Bernalillo County, City of Albuquerque, and A.M.A.F.C.A.

Necessary items for the completion of Phase IV

- Dedicate easement or right of way for Rainbow Blvd. and offsite storm drain.
- Construction of the east half of Rainbow Blvd.
- Construction of offsite storm drain in Rainbow Blvd.
- Possible construction of an all weather arroyo crossing structure at Rainbow Blvd depending on access requirements at the time of development of Phase IV.
- Possible LOMR and/or CLOMR for Rainbow Blvd arroyo crossing structure.
- Coordinate with AMAFCA and construct necessary drop structures in West Branch of the Calabacillas Arroyo.

Phase V

Based on facilities constructed under Phase I through Phase IV only minimal offsite facilities will need to be constructed under Phase IV development. Phase V will require the completion of the

onsite storm drain installed in the tributary arroyo with Phase IV. As a minimum this storm drain should be designed to accept 120 c.f.s. (Appendix C-12) developed conditions runoff from the offsite N.W. Tract (Appendix A-9) located at the south east corner of the proposed intersection of Rainbow and McMahon Blvds and developed runoff from Phase IV (Appendix B-4) and Phase V (Appendix B-5). The completion of this storm drain will eliminate the tributary arroyo and control the discharge point for Phase IV and Phase V runoff.

Phase V will cover approximately 10.5 acres with the construction area consisting of 4.7 acres as impervious, 1 acre as landscaped, and 2.4 acres as A and 2.3 acres as C. The developed runoff for this phase will increase to approx. 32.5 c.f.s. (Appendix B-5), which is less than the free discharge of 33.2 c.f.s. (Appendix B-5) projected by Mussetter's draft Prudent Line Study for the West Branch of the Calabacillas Arroyo for and area of this size.

4.0 Hydrology Methods

TVI North West Site is within Precipitation Zone 1 as defined in Section 22.2 of the DPM. The Mussetter Prudent Line Study used the 6 hour, 100-year return event storm to calculate peak runoff for existing as well as developed conditions. Land treatments were based on "TVI Community College Master Plan for TVI West Campus," developed by DWL Architects & Planners, Inc as well as the recommended values in Table A-5 of DPM Section 22.2.

Projected developed conditions for onsite runoff is based on values presented in the Draft Calabacillas Arroyo Prudent Line Study by Mussetter Engineering, Inc. which uses developed conditions land treatments of 0% A, 40% B, 18% C, and 42% D. Site developed conditions which generate higher flow rates may require some form of routing to attenuate the excess flow rates.

5.0 Conclusions and Recommendations

The incremental development of this site may be successfully accomplished by carefully evaluating the individual runoff requirements of each phase and providing the required infrastructure for future phases that may impact current phases. The equilibrium slope, of the West Branch of the Calabacillas Arroyo, as established by the Mussetter Engineering - West Branch of the Calabacillas Arroyo Prudent Line Study prepared for AMAFCA should be maintained by the construction of the required grade control structures downstream of the discharge point to the arroyo. The type, number and installation of these structures should be negotiated with The Albuquerque Metropolitan Arroyo Flood Control Authority. Storm water discharge from this site should also focus on storm water quality enhancement features such as Stormceptor or equivalent systems to minimize floatable pollutants being discharged from the site.

This Master Drainage Plans is to provide guidelines and the order of development of the various phases that will occur through the next several years and to outline the general requirements that need to be considered with the development of each phase. As each phase develops the drainage patterns, in this Master Plan, for each phase should be confirmed and if necessary, revised to meet the conditions at the time of development.

A detailed grading and drainage plan of each phase will be required to be submitted for review and approval of the involved agencies including County of Bernalillo, AMAFCA and the City of Albuquerque.

As the development of this site occurs coordination with the surrounding developers in the area needs to be maintained and the infrastructure for development shared.

OS-4 Existing Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 7.3 AcC := 0.0

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := 0.0

Total := AcA + AcB + AcC + AcD Total = 7.3 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.27 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 9.417$ cfs

OS-5 Existing Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 3.9 AcC := 0.0

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := 0.0

Total := AcA + AcB + AcC + AcD Total = 3.9 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.14 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 5.031$ cfs

N. W. Tract Existing Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 4.8 AcC := 0.0

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := 0.0

Total := AcA + AcB + AcC + AcD Total = 4.8 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.18 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 6.192$ cfs

N. W. Tract Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 1.4

ExB := .67 ExD := 1.97 AcB := 1.1 AcD := 2.3

Total := AcA + AcB + AcC + AcD Total = 4.8 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.55 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 16.302$ cfs

Phase 1 Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 13.2 AcC := 4.6

ExB := .67 ExD := 1.97 AcB := 2.2 AcD := 8

Total := AcA + AcB + AcC + AcD Total = 28 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 2.3 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 69.656$ cfs

Phase 1 Developed Conditions As per Mussetter Report 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 5

ExB := .67 ExD := 1.97 AcB := 11.2 AcD := 11.8

Total := AcA + AcB + AcC + AcD Total = 28 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 2.98 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 88.652$ cfs

Phase 2 Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 2.7 AcC := 5.5

ExB := .67 ExD := 1.97 AcB := 2.4 AcD := 8.1

Total := AcA + AcB + AcC + AcD Total = 18.7 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 2.02 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 59.537$ cfs

Phase 2 Developed Conditions As per Mussetter Report 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 3.4

ExB := .67 ExD := 1.97 AcB := 7.5 AcD := 7.8

Total := AcA + AcB + AcC + AcD Total = 18.7 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 1.98 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 59.069$ cfs

Phase 3 Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 4.5 AcC := 4.5

ExB := .67 ExD := 1.97 AcB := 1 AcD := 8.4

Total := AcA + AcB + AcC + AcD Total = 18.4 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 1.97 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 57.458$ cfs

Phase 3 Developed Conditions As Per Mussetter Report 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 3.3

ExB := .67 ExD := 1.97 AcB := 7.4 AcD := 7.7

Total := AcA + AcB + AcC + AcD Total = 18.4 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 1.95 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 58.142$ cfs

Phase 4 Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 7.4 AcC := 5.1

ExB := .67 ExD := 1.97 AcB := 4.1 AcD := 9.1

Total := AcA + AcB + AcC + AcD Total = 25.7 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 2.41 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 72.273$ cfs

Phase 4 Developed Conditions As Per Mussetter Report 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 4.6

ExB := .67 ExD := 1.97 AcB := 10.3 AcD := 10.8

Total := AcA + AcB + AcC + AcD Total = 25.7 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 2.73 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 81.307$ cfs

Phase 5 Developed Conditions 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 2.4 AcC := 2.4

ExB := .67 ExD := 1.97 AcB := 1 AcD := 4.7

Total := AcA + AcB + AcC + AcD Total = 10.5 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 1.11 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 32.553$ cfs

Phase 5 Developed Conditions As Per Mussetter Report 100 year 6 hr Volume Zone 1

ExA := .44 ExC := .99 AcA := 0.0 AcC := 1.9

ExB := .67 ExD := 1.97 AcB := 4.2 AcD := 4.4

Total := AcA + AcB + AcC + AcD Total = 10.5 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 1.11 Acre Feet

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 33.207$ cfs

Street Flows

Universe Blvd 100 year 6 hr Volume Zone 1

The typical section for Universe Blvd. taken from the June, 2000 Master Plan for the TVI site has land treatments of 17% C and 83% D.

ExA := .44 ExC := .99 AcA := 0.0 AcC := .17

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := .83

Total := AcA + AcB + AcC + AcD Total = 1 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.15 Acre Feet per acre

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := AcA\cdot Q_A + AcB\cdot Q_B + AcC\cdot Q_C + AcD\cdot Q_D$ $Q_p = 4.115$ cfs per acre

Universe Blvd has a 86 ft. r.o.w. width which works out to one acre every 506.5 ft of length. There fore a cfs per ft. would be

$$CFS := \frac{Q_p}{506.5} \qquad CFS = 0.008 \text{ cfs per ft length}$$

Street Flows

McMahon Blvd 100 year 6 hr Volume Zone 1

The typical section for McMahon Blvd. taken from the June, 2000 Master Plan for the TVI site has land treatments of 35% C and 65% D.

ExA := .44 ExC := .99 AcA := 0.0 AcC := .35

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := .65

Total := AcA + AcB + AcC + AcD Total = 1 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.14 Acre Feet per acre

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 3.845$ cfs per acre

McMahon Blvd has a 156 ft. r.o.w. width which works out to one acre every 279 ft of length. There fore a cfs per ft. would be

$$\text{CFS} := \frac{Q_p}{279} \qquad \text{CFS} = 0.014 \text{ cfs per ft length}$$

Street Flows

Rainbow Blvd 100 year 6 hr Volume Zone 1

The typical section for McMahon Blvd. taken from the June, 2000 Master Plan for the TVI site has land treatments of 35% C and 65% D.

ExA := .44 ExC := .99 AcA := 0.0 AcC := .21

ExB := .67 ExD := 1.97 AcB := 0.0 AcD := .79

Total := AcA + AcB + AcC + AcD Total = 1 Acres

$$\text{WeightedE} := \frac{\text{AcA}\cdot\text{ExA} + \text{AcB}\cdot\text{ExB} + \text{AcC}\cdot\text{ExC} + \text{AcD}\cdot\text{ExD}}{\text{Total}} \qquad \text{Volume} := \frac{\text{WeightedE}\cdot\text{Total}}{12}$$

Volume = 0.15 Acre Feet per acre

Table A-9 C.O.A. DPM

$Q_A := 1.29$ $Q_B := 2.03$ $Q_C := 2.87$ $Q_D := 4.37$

$Q_p := \text{AcA}\cdot Q_A + \text{AcB}\cdot Q_B + \text{AcC}\cdot Q_C + \text{AcD}\cdot Q_D$ $Q_p = 4.055$ cfs per acre

Rainbow Blvd has a 156 ft. r.o.w. width which works out to one acre every 279 ft of length. Therefore a cfs per ft. would be

$$\text{CFS} := \frac{Q_p}{279} \qquad \text{CFS} = 0.015 \text{ cfs per ft length}$$

THE LARKIN GROUP INC
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e-mail: kcmail@larkin-grp.com

Date _____ Page 1
Client TVI
Job No. 2001-0009
Job Title TVI MDP
Made By KB
Chkd. By _____

Phase I offsite

Phase I Developed 70 cfs

Phase II Developed 59 cfs.

Offsite Area OS-1 Developed 93 cfs.

offsite Area OS-5 Developed 13 cfs.

Street flows in Universe Blvd. 15.7 cfs.

Street flows in McMahon Blvd. 30.8 cfs.

281.5 cfs.

Recomend 66" RCP Storm Drain @ 0.7%
having Max Capacity of 303 cfs.

Interim Diversion swale

Offsite OS-1 + Portion of B-3 46.3 cfs.

Reomend 10' Base width section w/ 3:1 SIDES
@ 0.5% slope (Detail sheet) capacity 53 cfs.

Universe Blvd Sorm. Drain
Worksheet for Circular Channel

Project Description	
Project File	k:\2001-0009 -tvi - master drainage plan\calculations\tvi.fm2
Worksheet	Universe Blvd. St Drain
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	66.00	in
Discharge	282.00	cfs

Results		
Channel Slope	0.7053	%
Depth	66.0	in
Flow Area	23.76	ft²
Wetted Perimeter	17.28	ft
Top Width	0.00	ft
Critical Depth	4.65	ft
Percent Full	100.00	
Critical Slope	0.006698	ft/ft
Velocity	11.87	ft/s
Velocity Head	2.19	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	303.35	cfs
Full Flow Capacity	282.00	cfs
Full Flow Slope	0.007053	ft/ft

Typical Swale
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\fmw\tvi.fm2
Worksheet	Typical swale
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.022	
Channel Slope	0.5000	%
Depth	1.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	10.00	ft

Results		
Discharge	53.34	cfs
Flow Area	13.00	ft²
Wetted Perimeter	16.32	ft
Top Width	16.00	ft
Critical Depth	0.88	ft
Critical Slope	0.008048	ft/ft
Velocity	4.10	ft/s
Velocity Head	0.26	ft
Specific Energy	1.26	ft
Froude Number	0.80	
Flow is subcritical.		

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Date _____ Page 2
Client TVI
Job No. 2001-0009
Job Title TVI MDP
Made By KB
Chkd. By _____

Phase II Offsite

Universe Storm Drain

Offsite Area OS-1 Developed	93 cfs.
Offsite Area OS-5 Developed	13 cfs.
Street flows in Universe Blvd.	8 cfs
Street flows in McMahon Blvd.	30.8 cfs.
	144.8 cfs.

Recommend. 54" RCP storm Drain @ 0.5% slope capacity of 156 cfs.

West side diversion swale

Offsite Area OS-1 and Portion of B-3 46 cfs. MAX

Recommend 10' Base section w/ 3:1 SIDES @ 0.5% slope w/ capacity 53 cfs.

Universe at McMahon Intersection
Worksheet for Circular Channel

Project Description	
Project File	k:\2001-0009 -tvi - master drainage plan\calculations\tvi.fm2
Worksheet	Universe Blvd. up stream
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	54.00	in
Discharge	145.00	cfs

Results		
Channel Slope	0.5437	%
Depth	54.0	in
Flow Area	15.90	ft^2
Wetted Perimeter	14.14	ft
Top Width	0.00	ft
Critical Depth	3.54	ft
Percent Full	100.00	
Critical Slope	0.005897	ft/ft
Velocity	9.12	ft/s
Velocity Head	1.29	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	155.98	cfs
Full Flow Capacity	145.00	cfs
Full Flow Slope	0.005437	ft/ft

Typical Swale
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\haestad\fmw\tvi.fm2
Worksheet	Typical swale
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.022	
Channel Slope	0.5000	%
Depth	1.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	10.00	ft

Results		
Discharge	53.34	cfs
Flow Area	13.00	ft²
Wetted Perimeter	16.32	ft
Top Width	16.00	ft
Critical Depth	0.88	ft
Critical Slope	0.008048	ft/ft
Velocity	4.10	ft/s
Velocity Head	0.26	ft
Specific Energy	1.26	ft
Froude Number	0.80	
Flow is subcritical.		

C-9

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Date _____ Page 3
Client TVI
Job No. 2001-0009
Job Title TVI MDP
Made By KB
Chkd. By _____

Phase III Offsite

Offsite Area OS-1 Developed 93 cfs

Offsite Area OS-5 Developed. 12 cfs.

Street flow in McMahon Blvd. 37 cfs.
142 cfs.

Recommend 54" RCP Storm Drain @ 0.5%
having Max Capacity of 153 cfs.

McMahon Blvd Storm Drain
Worksheet for Circular Channel

Project Description	
Project File	k:\2001-0009 -tvi - master drainage plan\calculations\tvi.fm2
Worksheet	McMahon Blvd
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	54.00	in
Discharge	142.00	cfs

Results		
Channel Slope	0.5215	%
Depth	54.0	in
Flow Area	15.90	ft^2
Wetted Perimeter	14.14	ft
Top Width	0.00	ft
Critical Depth	3.50	ft
Percent Full	100.00	
Critical Slope	0.005774	ft/ft
Velocity	8.93	ft/s
Velocity Head	1.24	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	152.75	cfs
Full Flow Capacity	142.00	cfs
Full Flow Slope	0.005215	ft/ft

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Date _____ Page 4
Client TVI
Job No. 2001-0009
Job Title TVI MDP
Made By KB
Chkd. By _____

Phase IV offsite.

Offsite Area OS-2 Developed 196 cfs.

Offsite Area OS-3 Developed 177 cfs.

Offsite Area OS-4 Developed 25 cfs.

Street flows in Rainbow Blvd 33.7 cfs.

431.7 cfs.

Recommend. 78" RCP storm Drain @ 0.7%
having Maximum discharge of 465 cfs.

N.W. Tract.
Developed conditions flows to be drained
w/ onsite storm drain.

NW Tract Developed 16 cfs.

Phase IV Developed 72 cfs.

Phase V Developed 32 cfs.

120 cfs.

Recommend. 42" RCP storm Drain @ 1.4%
w/ Capacity of 129 cfs.

Phase IV offsite

No Additional storm drains Required

Rainbow Blvd. Storm Drain
Worksheet for Circular Channel

Project Description	
Project File	k:\2001-0009 -tvi - master drainage plan\calculations\tvi.fm2
Worksheet	Rainbow Blvd.
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	78.00	in
Discharge	432.00	cfs

Results		
Channel Slope	0.6790	%
Depth	78.0	in
Flow Area	33.18	ft²
Wetted Perimeter	20.42	ft
Top Width	0.00	ft
Critical Depth	5.51	ft
Percent Full	100.00	
Critical Slope	0.006413	ft/ft
Velocity	13.02	ft/s
Velocity Head	2.63	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	464.70	cfs
Full Flow Capacity	432.00	cfs
Full Flow Slope	0.006790	ft/ft

Onsite Storm Drain
Worksheet for Circular Channel

Project Description	
Project File	k:\2001-0009 -tvi - master drainage plan\calculations\tvi.fm2
Worksheet	Onsite St Dr.
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Slope

Input Data		
Mannings Coefficient	0.013	
Diameter	42.00	in
Discharge	120.00	cfs

Results		
Channel Slope	0.014228	ft/ft
Depth	42.0	in
Flow Area	9.62	ft²
Wetted Perimeter	11.00	ft
Top Width	0.00	ft
Critical Depth	3.25	ft
Percent Full	100.00	
Critical Slope	0.012312	ft/ft
Velocity	12.47	ft/s
Velocity Head	2.42	ft
Specific Energy	FULL	ft
Froude Number	FULL	
Maximum Discharge	129.08	cfs
Full Flow Capacity	120.00	cfs
Full Flow Slope	0.014228	ft/ft

C-14

#53981 ORIG. 7

ZAP A-9

GRANT OF EASEMENT
FLOODWAY AND STORM DRAINAGE WORKS

Las Ventanas Limited Partnership, a New Mexico Limited Partnership, whose address is 10 Tramway Loop NE, Albuquerque, New Mexico, 87122 (Grantor), being the owner of the property described herein, for good and valuable consideration, the receipt of which is hereby acknowledged, hereby grants, bargains, sells and conveys to the ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, a political subdivision of the State of New Mexico (AMAFCA), its successors and assigns, the permanent right and easement for drainage, flood control and the conveyance and storage of storm water, and for the construction, reconstruction, operation and maintenance of, and access to, such appurtenant facilities as may be necessary on, in, under, over and across the following described real estate:

The land in which the foregoing rights and easement are granted is located within Tract B, Lands of Massachusetts General subdivision in Bernalillo County, New Mexico, being more particularly described in Exhibit A attached hereto and incorporated herein by reference.

Except with the written approval of AMAFCA, no fence, wall, building, or other obstruction may be placed or maintained in said easement, and there shall be no alteration of the grades or contours in said easement. The granting of this easement shall not obligate AMAFCA to maintain any arroyo, drainage channel or other facility, nor shall this easement require AMAFCA to provide for the protection of property lying outside of the easement granted. AMAFCA shall only maintain property and/or improvements that it specifically agrees, by written agreement filed for public record, to maintain. Unless AMAFCA specifically so agrees to maintain property and/or improvements, all maintenance responsibility shall remain with the Grantor. By accepting this Easement, AMAFCA specifically agrees to operate and maintain the drainage facility and appurtenances being constructed within this Easement with the TVI Northwest Site Off-Site Improvements Project, City Project Number 683981. Landscaping or maintenance work by the Grantor, within the easement hereby conveyed, shall not alter the present flowline, capacity, or permeability of the present flood way area, except in an emergency. If emergency work is performed, Grantor shall notify AMAFCA as soon as practical thereafter. AMAFCA will then determine if the emergency work can remain or must be removed or modified. Safe locations for structures built on lands adjacent to the easement described herein may be substantially outside of the described area.

Grantors covenant and warrant that they are the owners in fee simple of the property and that they have a good and lawful right to grant the easement described herein. The grant and other provisions of this easement constitute covenants running with the land for the benefit of AMAFCA and its successors and assigns until terminated.

Mary Herrera Bern. Co. EASE R 11.00
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5679836
Page: 1 of 3
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TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid, unto AMAFCA, its successors and assigns, to run with the land forever. However, to the extent any portion of the above granted easement area is declared unnecessary for flood control or drainage by the Board of Directors of the Albuquerque Metropolitan Arroyo Flood Control Authority, said portion of the easement shall revert to the Grantor. Any such reversion shall be accomplished by way of a quitclaim deed to Grantor, its successors or assigns.

THERE IS RESERVED to the Grantors, their successors and assigns, the right to use said lands for open space and landscaping. Such open space and landscaping shall not interfere with the rights and easements granted to AMAFCA. Other purposes, which will not interfere with the rights and easements hereby granted, may be permitted, provided that Grantor obtains AMAFCA's written licensed approval for such use, not to be unreasonably withheld.

WITNESS _____ hand__ and seal__ this 20th day of May, 2002.

GRANTORS: Las Ventanas Limited Partnership, a New Mexico Limited Partnership

By: _____
Name: Robert M. Murphy
Title: 5-20-02

ACKNOWLEDGMENT FOR CORPORATIONS/PARTNERSHIPS

STATE OF NEW MEXICO)
)s.s.
COUNTY OF BERNALILLO)

This instrument was acknowledged before me on May 20, 2002 by Robert M. Murphy, President as Sandia Properties Ltd. Co. Managing Partner of Las Ventanas Limited Partnership, a New Mexico Limited Partnership, on behalf of said partnership.

My commission expires:

OFFICIAL SEAL
LISA K. KILBRETH
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires 10-11-04

_____
Notary Public

Mary Herrera Bern. Co. EASE R 11.00
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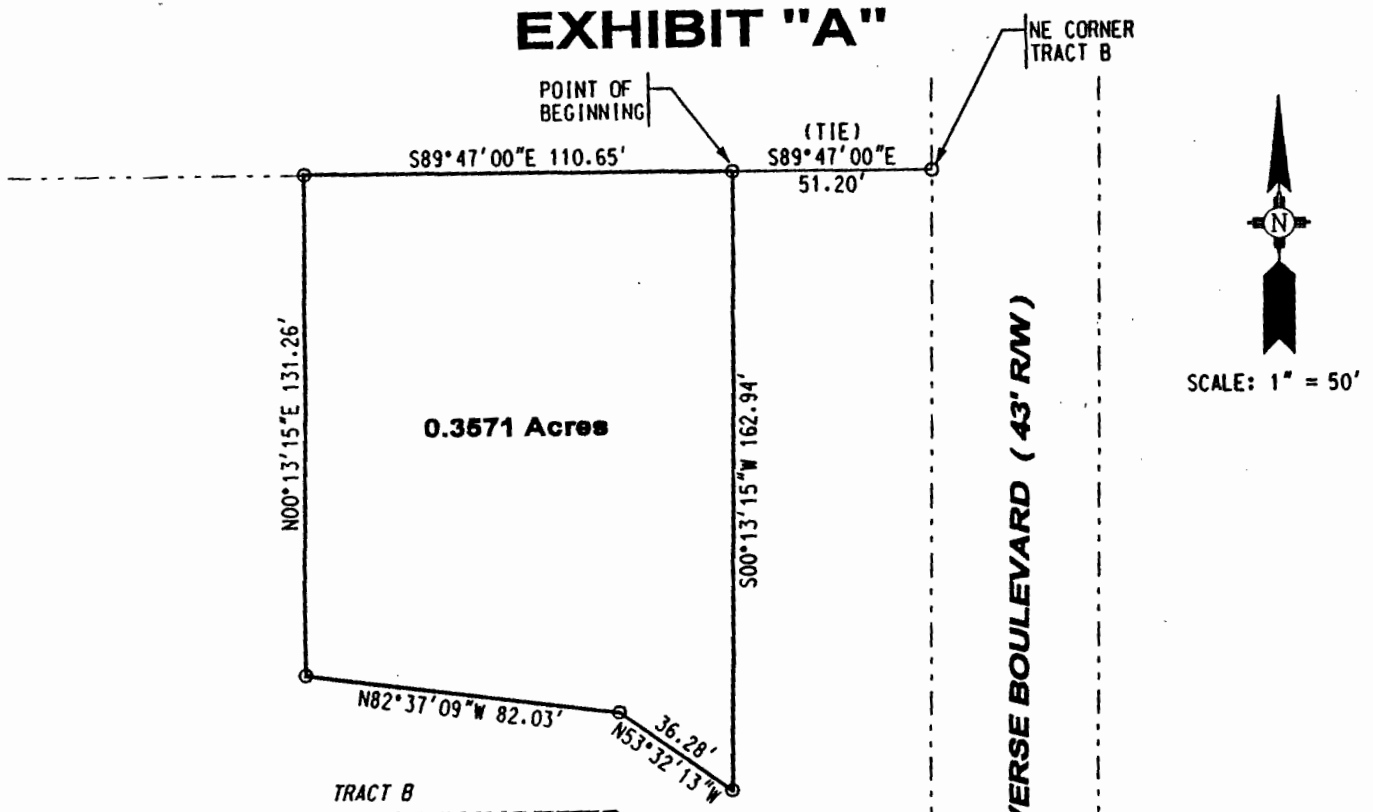
5679036
Page: 2 of 3
06/04/2002 03:31P
Bk-A37 Pg-1695

Revised
May 17, 2002

EXHIBIT "A"



TRACT B
LAND OF MASSACHUSETTS GENERAL HOSPITAL
FILED: JULY 11, 1979
(BK. A7, PG. 111)

DESCRIPTION

A certain tract of land situate within the Town of Alameda Grant, within the southeast one-quarter (SE1/4) of projected Section 4, Township 11 North, Range 2 East, New Mexico Principal Meridian, Bernalillo County, New Mexico, being a northeast portion of Tract B of LANDS OF MASSACHUSETTS GENERAL HOSPITAL, Bernalillo County, New Mexico as the same is shown and designated on the plat thereof, recorded in the office of the County Clerk of Bernalillo County, New Mexico on July 11, 1979 in Book A7, page 111,and being more particularly described by New Mexico State Plane Grid Bearings (Central Zone NAD 1927) and ground distances as follows:

BEGINNING at the northeast corner of the tract herein described, a point on the northerly boundary line of said Tract B, whence the northeast corner of said Tract B bears S89°47'00"E, a distance of 51.20 feet and from said point of beginning leaving said northerly boundary line and running thence along the easterly boundary line of the tract herein described,
S00°13'15"W, a distance of 162.94 feet to the southeast corner of the tract herein described, thence running along the southerly boundary line of the tract herein described,
N53°32'13"W, a distance of 36.28 feet to a point; thence,
N82°37'09"W, a distance of 82.03 feet to the southwest corner of the tract herein described, thence running along the westerly boundary line of the tract herein described,
N00°13'15"E, a distance of 131.26 feet to the northwest corner of the tract herein described, a point on the northerly boundary line of said Tract B, thence running along the northerly boundary line of said Tract B,
S89°47'00"E, a distance of 110.65 feet to point and place of beginning.

Tract contains 0.3571 acres, more or less.

A. Dwain Weaver
N.M.P.S. No. 6544

Date: May 2, 2002

A. DWAIN WEAVER NEW MEXICO 6544 REGISTERED PROFESSIONAL SURVEYOR

Bohannan Huston
Courtyard One
7500 JEFFERSON NE
Albuquerque
NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS
SURVEYORS SOFTWARE DEVELOPERS

JOB NUMBER 01325 002

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ZAP A-10

GRANT OF EASEMENT
FLOODWAY AND STORM DRAINAGE WORKS

West Fork Limited, a New Mexico limited partnership, whose address is 6301 Indian School Rd. NE Suite 208, Albuquerque, New Mexico, 87110 (Grantor), being the owner of the property described herein, for good and valuable consideration, the receipt of which is hereby acknowledged, hereby grants, bargains, sells and conveys to the ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, a political subdivision of the State of New Mexico (AMAFCA), its successors and assigns, the permanent right and easement for drainage, flood control and the conveyance and storage of storm water, and for the construction, reconstruction, operation and maintenance of, and access to, such appurtenant facilities as may be necessary on, in, under, over and across the following described real estate:

The land in which the foregoing rights and easement are granted is located within Tracts 1-B-1, 1-B-2 and 1-C, Seville Subdivision in Bernalillo County, New Mexico, being more particularly described in Exhibit A attached hereto and incorporated herein by reference.

Except with the written approval of AMAFCA, no fence, wall, building, or other obstruction may be placed or maintained in said easement, and there shall be no alteration of the grades or contours in said easement. The granting of this easement shall not obligate AMAFCA to maintain any arroyo, drainage channel or other facility, nor shall this easement require AMAFCA to provide for the protection of property lying outside of the easement granted. AMAFCA shall only maintain property and/or improvements that it specifically agrees, by written agreement filed for public record, to maintain. Unless AMAFCA specifically so agrees to maintain property and/or improvements, all maintenance responsibility shall remain with the Grantor. By accepting this Easement, AMAFCA specifically agrees to maintain the drainage facility that is being built within this Easement with the TVI Northwest Site Off-Site Improvements Project, City Project Number 6839.81. Landscaping or maintenance work by the Grantor, within the easement hereby conveyed, shall not alter the present flowline, capacity, or permeability of the present flood way area, except in an emergency. If emergency work is performed, Grantor shall notify AMAFCA as soon as practical thereafter. AMAFCA will then determine if the emergency work can remain or must be removed or modified. Safe locations for structures built on lands adjacent to the easement described herein may be substantially outside of the described area.

Grantors covenant and warrant that they are the owners in fee simple of the property and that they have a good and lawful right to grant the easement described herein. The grant and other provisions of this easement constitute covenants running with the land for the benefit of AMAFCA and its successors and assigns until terminated.

Mary Herrera Bern. Co. EASE R 15.00
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Page: 1 of 5
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Bk-A37 Pg-1696

TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid, unto AMAFCA, its successors and assigns, to run with the land forever. However, to the extent any portion of the above granted easement area is declared unnecessary for flood control or drainage by the Board of Directors of the Albuquerque Metropolitan Arroyo Flood Control Authority, said portion of the easement shall revert to the Grantor. Any such reversion shall be accomplished by way of a quitclaim deed to Grantor, its successors or assigns.

THERE IS RESERVED to the Grantors, their successors and assigns, the right to use said lands for open space and landscaping. Such open space and landscaping shall not interfere with the rights and easements granted to AMAFCA. Other purposes, which will not interfere with the rights and easements hereby granted, may be permitted, provided that Grantor obtains AMAFCA's written licensed approval for such use, not to be unreasonably withheld.

WITNESS _____ hand__ and seal__ this 29th day of May, 2002.

GRANTORS: Trails Management Inc., General Partner West Fork Limited Partnership, a New Mexico Limited Partnership

By: _____ _____

Name: Stan Strickman

Title: V.P.

ACKNOWLEDGMENT FOR CORPORATIONS/PARTNERSHIPS

STATE OF NEW MEXICO)
)s.s.
COUNTY OF BERNALILLO)

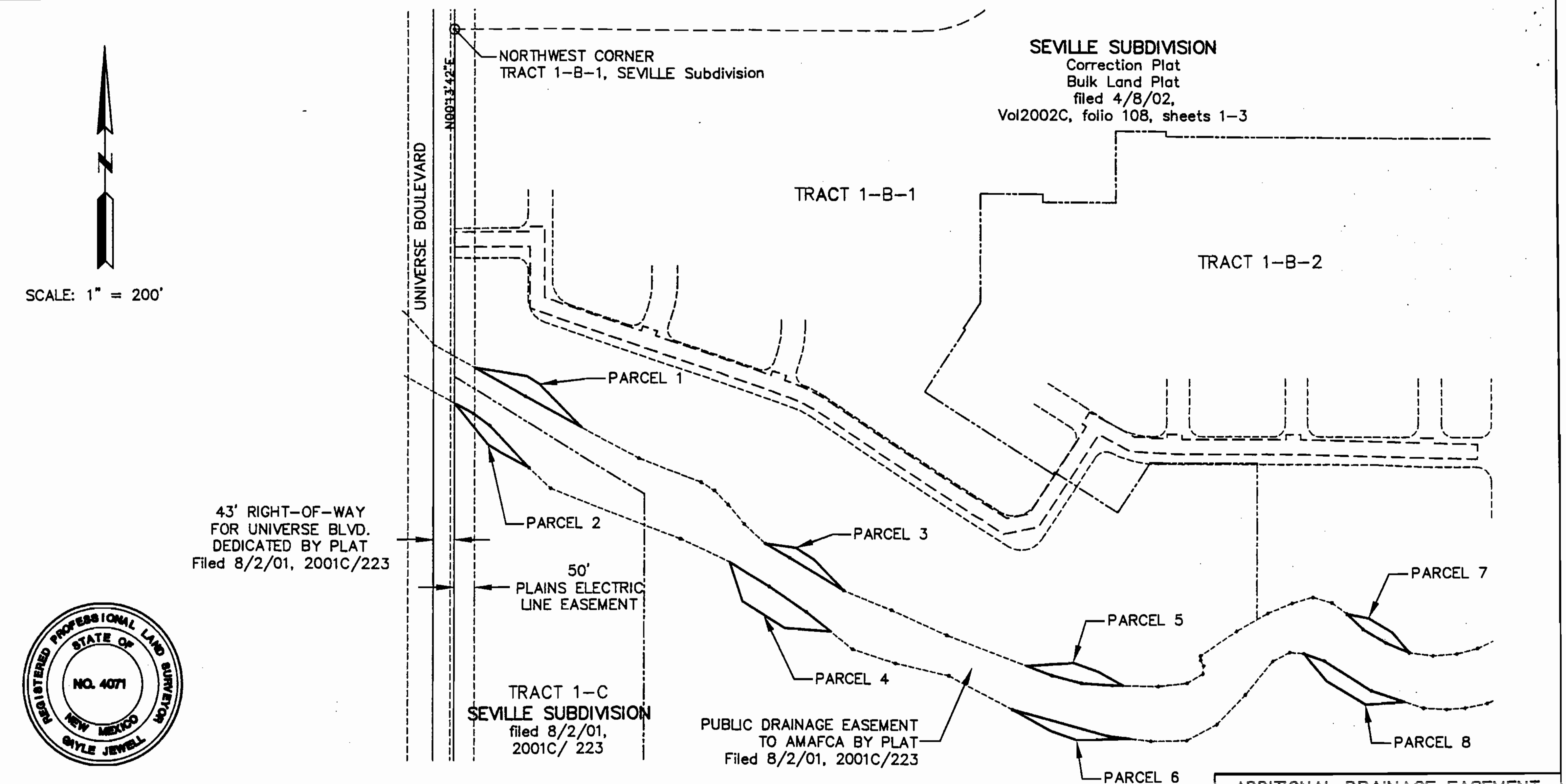
This instrument was acknowledged before me on May 29, 2002 by Stan Strickman as Vice President of Trails Management Inc., General Partner West Fork Limited Partnership, a New Mexico Limited Partnership, on behalf of said partnership.

My commission expires: _____

OFFICIAL SEAL
MARY S. STRICKMAN
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires: 3-9-2003

Mary S. Strickman
Notary Public

Revised
May 24, 2002



REGISTERED PROFESSIONAL LAND SURVEYOR
STATE OF NEW MEXICO
NO. 4071
GAYLE JEWELL

SURVEYOR'S CERTIFICATE

I, Gayle D. Jewell, licensed New Mexico Surveyor No. 4071, do hereby certify that this plat and description were prepared by me or under my supervision and directions, and that the same are true and correct to the best of my knowledge and belief.

[signature] 05/21/02

GAYLE D. JEWELL, NMPLS 4071 — DATE

FOR PARCEL DETAILS AND DESCRIPTIONS
SEE SHEETS 2 OF 3 AND 3 OF 3

ADDITIONAL DRAINAGE EASEMENT
PARCELS GRANTED TO A.M.A.F.C.A.

LARKIN GROUP, INC
8500 MENAUL NE. SUITE A-440
ALBUQUERQUE, NEW MEXICO 87112
TELEPHONE (505) 275-7500
FAX (505) 275-0748

EXHIBIT A — SHEET 1 OF 3

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Page: 3 of 5
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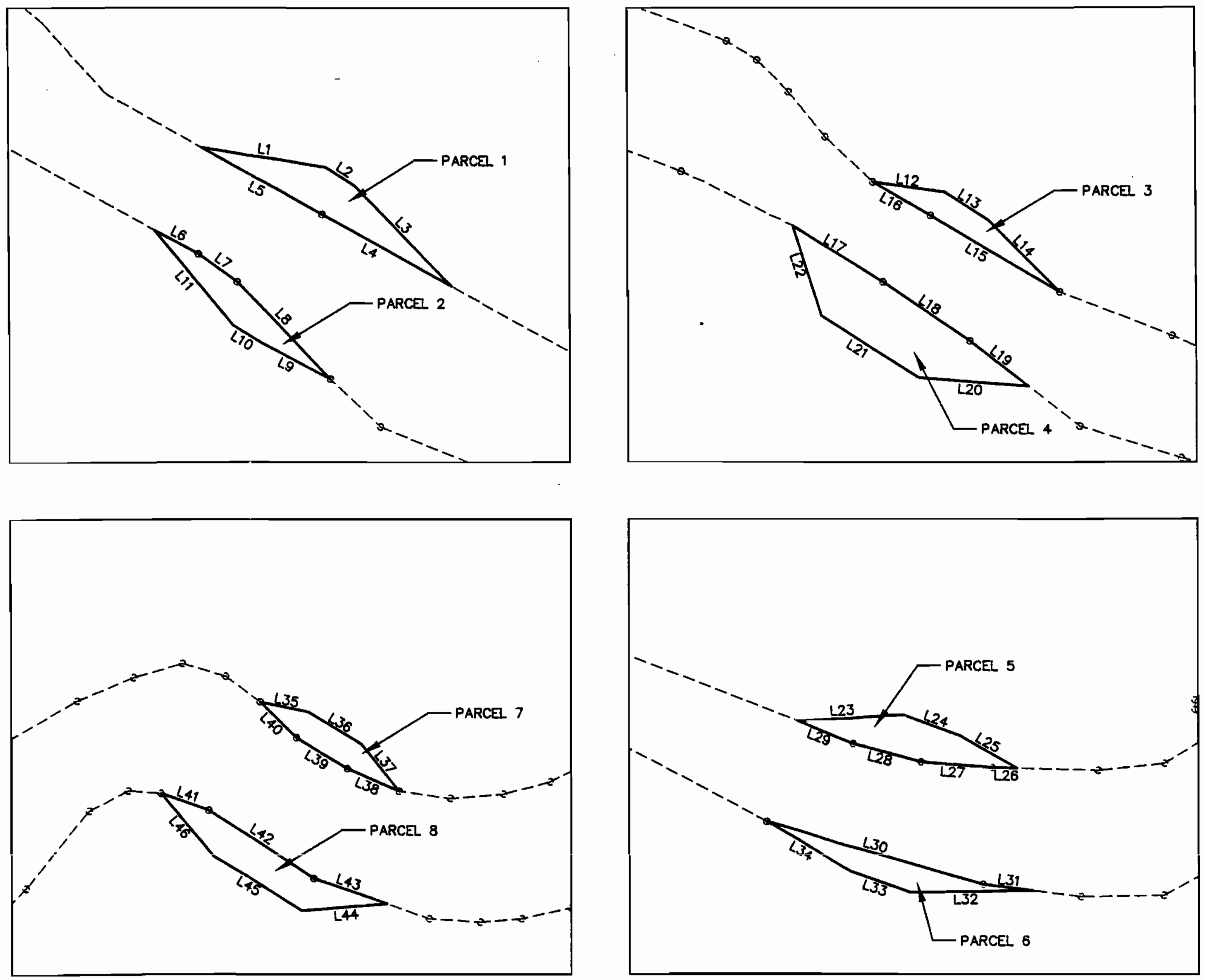
Mary Herrera Bern. Co. EASE R 15.00 Bk-A37 Pg-1696



PARCEL DETAILS

L1	S80°38'02"E	110.69'
L2	S57°50'42"E	29.97'
L3	S44°41'19"E	122.80'
L4	N61°31'16"W	130.99'
L5	N60°56'07"W	121.06'
L6	S61°22'33"E	43.96'
L7	S54°06'17"E	41.80'
L8	S43°48'48"E	118.07'
L9	N62°30'20"W	67.64'
L10	N57°50'42"W	29.97'
L11	N39°33'54'W	108.75'
L12	S82°16'07"E	63.20'
L13	S57°33'17"E	45.48'
L14	S44°42'21"E	87.92'
L15	N59°26'49"W	131.06'
L16	N60°04'54"W	57.68'
L17	N58°34'22"W	95.11'
L18	S55°55'09"E	91.64'
L19	S52°02'35"E	64.37'
L20	N85°41'10"W	96.30'
L21	N57°37'12"W	101.04'
L22	N18°28'26"W	83.48'
L23	N86°20'16"E	92.96'

L24	S70°16'38"E	53.38'
L25	S60°10'54"E	57.13'
L26	N88°29'58"W	21.59'
L27	N85°49'02"W	62.28'
L28	N74°56'21"W	61.18'
L29	N68°38'23"W	53.48'
L30	S74°10'17"E	198.40'
L31	S82°58'31"E	43.19'
L32	S88°55'22"W	106.65'
L33	N70°25'14"W	54.08'
L34	N60°23'20"W	87.59'
L35	S87°34'42"E	43.44'
L36	S58°35'05"E	54.65'
L37	S39°19'17"E	52.86'
L38	N66°55'33"W	50.22'
L39	N58°37'23"W	52.35'
L40	N45°42'19"W	44.45'
L41	S70°09'16"E	44.69'
L42	S57°10'07"E	109.78'
L43	S71°11'04"E	67.94'
L44	S85°27'23"W	75.39'
L45	N58°35'05"W	90.68'
L46	N39°46'51"W	71.97'

N

SCALE: 1" = 100'

ADDITIONAL DRAINAGE EASEMENT
PARCELS GRANTED TO A.M.A.F.C.A.

LARKIN GROUP NM, INC
8500 MENAUL NE. SUITE A-440
ALBUQUERQUE, NEW MEXICO 87112
TELEPHONE (505) 275-7500
FAX (505) 275-0748

EXHIBIT A SHEET 2 OF 3

PARCEL 1

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N03°16'56"W, a distance of 682.65 feet; thence from said point of beginning, S80°38'02"E, a distance of 110.69 feet to a point; thence, S57°50'42"E, a distance of 29.97 feet to a point; thence, S44°41'19"E, a distance of 122.80 feet to a point; thence, N61°31'16"W, a distance of 130.99 feet to a point; thence, N60°56'07"W, a distance of 121.06 feet to the point of beginning; containing 5399 square feet, more or less.

PARCEL 2

A certain parcel of land situated within and a portion of Tract 1-C as the same is shown and designated on the Bulk Land Plat of Tracts 1-A, 1-B, 1-C, and 1-D of Seville filed August 2, 2001 in plat book 2001C, page 223, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-C bears N00°13'42"E, a distance of 53.88 feet; thence from said point of beginning, S61°22'33"E, a distance of 43.96 feet to a point; thence, S54°06'17"E, a distance of 41.80 feet to a point; thence, S43°48'48"E, a distance of 118.07 feet to a point; thence, N62°30'20"W, a distance of 67.64 feet to a point; thence, N57°50'42"W, a distance of 29.97 feet to a point; thence, N39°33'54"W, a distance of 108.75 feet to the point of beginning; containing 3522 square feet, more or less.

PARCEL 3

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N31°08'45"W, a distance of 112.57 feet; thence from said point of beginning, S82°16'07"E, a distance of 63.20 feet to a point; thence, S57°33'17"E, a distance of 45.48 feet to a point; thence, S44°42'21"E, a distance of 87.92 feet to a point; thence, N59°26'49"W, a distance of 131.06 feet to a point; thence, N60°04'54"W, a distance of 57.68 feet to the point of beginning; containing 2671 square feet, more or less.

PARCEL 4

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N27°16'30"W, a distance of 1209.99 feet; thence from said point of beginning, S58°34'22"E, a distance of 95.11 feet to a point; thence, S55°55'09"E, a distance of 91.64 feet to a point; thence, S52°02'35"E, a distance of 64.37 feet to a point; thence, N85°41'10"W, distance of 96.30 feet to a point; thence, N57°37'12"W, a distance of 101.04 feet to a point; thence, N18°28'26"W, a distance of 83.48 feet to the point of beginning; containing 9412 square feet, more or less.

PARCEL 5

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N42°05'28"w, a distance of 1730.32 feet; thence, from said point of beginning, N86°20'16"E, a distance of 92.96 feet to a point; thence, S70°16'38"E, a distance of 53.38 feet to a point; thence, S60°10'54"E a distance of 57.13 feet to a point; thence, N88°29'58"W, a distance of 21.59 feet to a point; thence, N85°49'02"W, a distance of 62.28 feet to a point; thence, N74°56'21"W, a distance of 61.18 feet to a point; thence, N68°38'23"W, a distance of 53.48 feet to a point of beginning; containing 4122 square feet, more or less.

PARCEL 6

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N39°30'48"W, a distance of 1779.01 feet; thence from said point of beginning, S74°10'17"E, a distance of 198.40 feet to a point; thence, S82°58'31"E, a distance of 43.19 feet to a point; thence, S88°55'22"W, a distance of 106.65 feet to a point; thence, N70°25'14"W, a distance of 54.08 feet to a point; thence, N60°23'20"W, a distance of 87.59 feet to the point of beginning; containing 3158 square feet, more or less.

PARCEL 7

A certain parcel of land situated within and a portion of Tract 1-B-2 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N56°54'04"W, a distance of 2162.69 feet; thence from said point of beginning, S87°34'42"E, a distance of 43.44 feet to a point; thence, S58°35'05"E, a distance of 54.65 feet to a point; thence, S39°19'17"E, a distance of 52.86 feet to a point; thence, N66°55'33"W, a distance of 50.22 feet to a point; thence, N58°37'23"W, a distance of 52.35 feet to a point; thence, N45°42'19"W, a distance of 44.45 feet to the point of beginning; containing 2437 square feet, more or less.

PARCEL 8

A certain parcel of land situated within and a portion of Tract 1-B-1 as the same is shown and designated on the Correction Plat, Bulk Land Plat of Tracts 1-B-1 and 1-B-2 of Seville filed April 8, 2002 in plat book 2002C, page 108, being more particularly described as follows:

Beginning at the Westerly corner of the herein described parcel, from whence the Northwest corner of said Tract 1-B-1 bears N53°49'39"W, a distance of 2136.25 feet; thence from said point of beginning, S70°09'16"E, a distance of 44.69 feet to a point; thence, S57°10'07"E, a distance of 109.78 feet to a point; thence S71°11'04"E, a distance of 67.94 feet to a point; thence, S85°27'23"W, a distance of 75.39 feet to a point; thence, N58°35'05"W, a distance of 90.68 feet to a point; thence, N39°46'51"W, a distance of 71.97 feet to the point of beginning; containing 4894 square feet, more or less.

PARCEL DESCRIPTIONS

ADDITIONAL DRAINAGE EASEMENT PARCELS GRANTED TO A.M.A.F.C.A.

LARKIN GROUP NM, INC
8500 MENAUL NE. SUITE A-440
ALBUQUERQUE, NEW MEXICO 87112
TELEPHONE (505) 275-7500
FAX (505) 275-0748

EXHIBIT A SHEET 3 OF 3

#683981

A9/D001

PERMANENT EASEMENT

3/25/2002

Grant of Permanent Easement, between Albuquerque Technical Vocational Institute ("Grantor"), whose address is 525 Buena Vista SE, Albuquerque, NM 87106 and the City of Albuquerque, a New Mexico municipal Corporation ("City"), whose address is P.O. Box 1293, Albuquerque, New Mexico, 87103.

Grantor grants to the City an exclusive, permanent easement ("Easement") in, over, upon and across the real property described on Exhibit "A" attached hereto ("Property") for the construction, installation, maintenance, repair, modification, replacement and operation of Public roadway, drainage and utilities (Universe Boulevard), together with the right to remove trees, bushes, undergrowth and any other obstacles upon the Property if the City determines they interfere with the appropriate use of this Easement.

In the event Grantor constructs any improvements ("Improvements") within the Easement, the City has the right to enter upon Grantors property at any time and perform whatever inspection, installation, maintenance, repair, modification or removal ("Work") it deems appropriate without liability to the City. If the Work effects any Improvements or encroachments made by the Grantor, the City will not be financially or otherwise responsible for rebuilding or repairing the Improvements or encroachments. If in the opinion of the City, the Work to be performed by the City could endanger the structural integrity or otherwise damage the Improvements or encroachments, the Grantor shall, at its own expense, take whatever protective measures are required to safeguard the Improvements or encroachments.

Grantor covenants and warrants that Grantor is the owner in fee simple of the Property, that Grantor has a good lawful right to convey the Property or any part thereof and that Grantor will forever warrant and defend the title to the Property against all claims from all persons or entities.

The grant and other provisions of this Easement constitute covenants running with the Property for the benefit of the City and its successors and assigns until terminated.

This Easement shall not be effective until approved by the City Engineer in the signature block below.

WITNESS by hand and seal this 14th day of March, 2002.

APPROVED:

City Engineer

3-26-02

Dated

3/21/02

GRANTOR: Albuquerque Technical Vocational Institute
A New Mexico Technical Vocational Institute

By: Michael J. Gleason

President

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Page: 1 of 3
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Mary Herrera Bern. Co. EASE R 11.00

INDIVIDUAL

STATE OF _____)
)ss
COUNTY OF _____)

This instrument was acknowledged before me on _____ day of _____, 20____ by _____.

_____
Notary Public

My Commission Expires:

_____

~~CORPORATION~~

STATE OF New Mexico
)ss
COUNTY OF Bernalillo

This instrument was acknowledged before me on 14 day of March, 2002 by Michael J Glennon, President
Of Albuquerque Technical Vocational Institute, A New Mexico Technical Vocational Institute

Diana R Chavez
Notary Public

My Commission Expires:
February 26, 2005

PARTNERSHIP

STATE OF _____)
)ss
COUNTY OF _____)

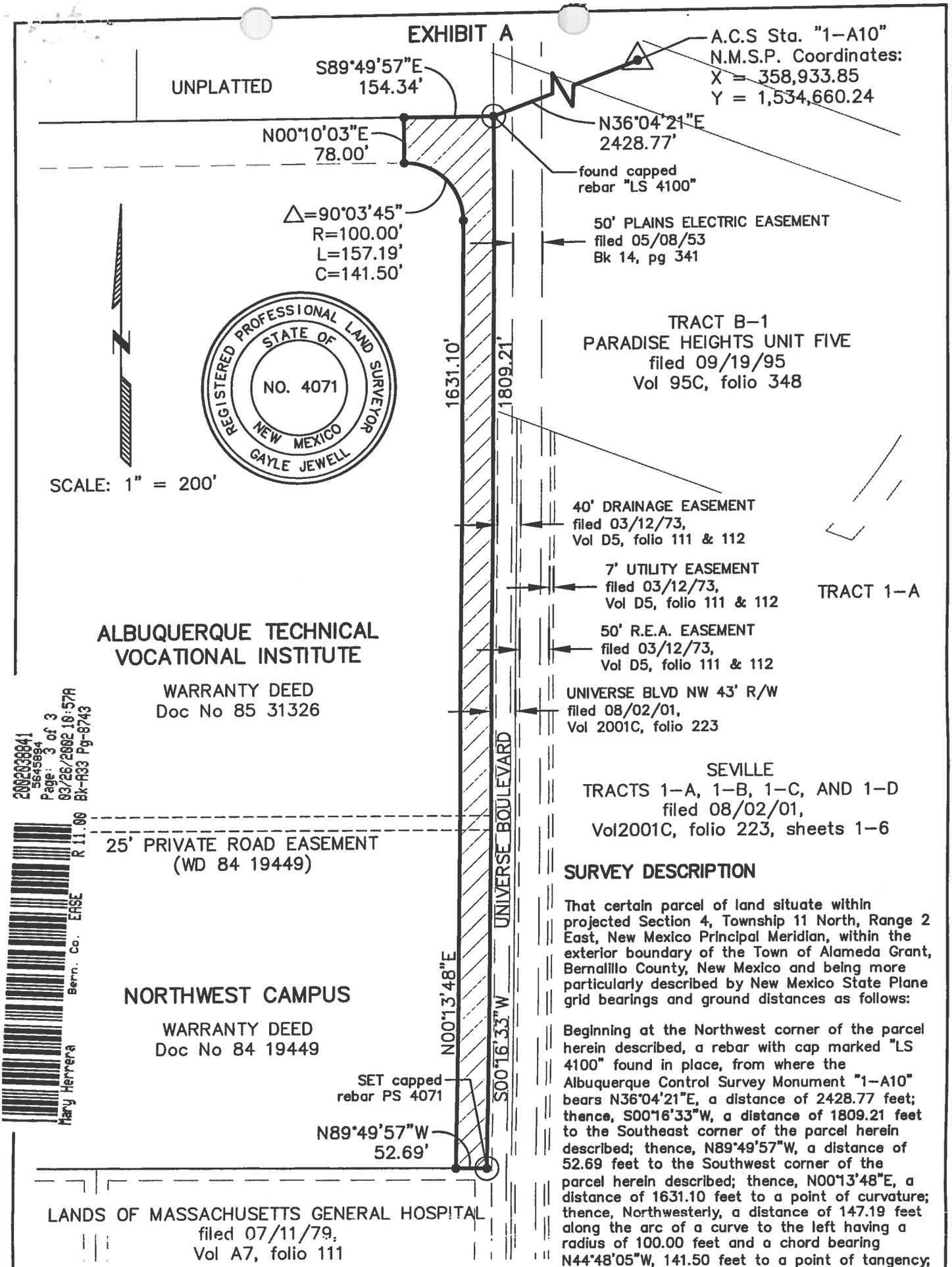
This instrument was acknowledged before me on _____ day of _____, 20____ by _____.

_____
Notary Public

My Commission Expires:

_____

EXHIBIT A



SURVEY DESCRIPTION

That certain parcel of land situate within projected Section 4, Township 11 North, Range 2 East, New Mexico Principal Meridian, within the exterior boundary of the Town of Alameda Grant, Bernalillo County, New Mexico and being more particularly described by New Mexico State Plane grid bearings and ground distances as follows:

Beginning at the Northwest corner of the parcel herein described, a rebar with cap marked "LS 4100" found in place, from where the Albuquerque Control Survey Monument "1-A10" bears N36°04'21"E, a distance of 2428.77 feet; thence, S00°16'33"W, a distance of 1809.21 feet to the Southeast corner of the parcel herein described; thence, N89°49'57"W, a distance of 52.69 feet to the Southwest corner of the parcel herein described; thence, N00°13'48"E, a distance of 1631.10 feet to a point of curvature; thence, Northwesterly, a distance of 147.19 feet along the arc of a curve to the left having a radius of 100.00 feet and a chord bearing N44°48'05"W, 141.50 feet to a point of tangency; thence, N00°10'03"E, a distance of 78.00 feet to the Northwesterly corner of the parcel herein described; thence, S89°49'57"E, a distance of 154.34 feet to the Northeast corner and point of beginning of the parcel herein described; containing 2.4066 acres, more or less.

SURVEYOR'S CERTIFICATE

I, Gayle D. Jewell, licensed New Mexico Surveyor No. 4071, do hereby certify that this plat and description were prepared by me or under my supervision and directions, and that the same are true and correct to the best of my knowledge and belief.

Gayle D. Jewell 03/13/02

GAYLE D. JEWELL, NMPLS 4071 DATE

LARKIN GROUP, PLLC, INC.
8500 MENAUL NE. SUITE A-440
ALBUQUERQUE, NEW MEXICO 87112
TELEPHONE (505) 275-7500
FAX (505) 275-0748