procedures set forth in the Construction Contract. The Project shall be constructed by the District in accordance with the provisions of the Construction Contract and, upon completion thereof, shall be dedicated to the City. Upon such dedication, all right, title and interest of the District in and to the Project shall vest in the City. The City agrees that, upon completion of the Project, adequate distribution capacity shall be reserved by the City to serve all land within the District.

ARTICLE II

WATER SUPPLY

A. At the times and in the manner requested by the District, the City agrees to sell and deliver to the District all water which may be reasonably required by inhabitants of the District for domestic and commercial purposes. The City agrees that water service to the District shall immediately, upon execution of this Agreement by the City, be made available to the District from the City's Jollyville Reservoir. All such water shall be supplied from the City's water distribution system, as extended by the District, to a point or points of delivery adjacent to the boundaries of the District, as designated by the District's engineer and approved by the City. The sale and furnishing of water to the District shall be nondiscriminatory and uniform with the policy or policies of the City relating to utilities inside the City's utility service area as established by Ordinance Number 810820-B, as now in effect or hereafter amended. Water supplied to the District pursuant to this Agreement shall be at the rate or rates established by the City for water supplied to water districts generally. The District specifically agrees that the supply of water to the District may be reasonably limited by the City on the same basis and to the same extent as the supply of water to any other customer within the City's service area. "Water", as used in this Article II, shall mean potable water meeting the requirements of the Texas Department of Health for human consumption and other domestic uses. The City agrees to use reasonable efforts to acquire and maintain a supply of water adequate to provide service to the District. This Agreement shall serve in lieu of an approved approach main request for water service under the City's approach main policy.

B. Metering equipment and related facilities, including a meter loop, a meter house or pit, and standard-type devices required for properly measuring the quantity of water delivered to the District, shall be installed at each point of delivery of water to the District. The District, at its expense, shall install and provide the meter loop and the meter house or pit. The City, at the District's expense, shall provide and install

Second Amendment to Consent Agreement and Ordinance for Approval

Significance: Ordinance approving Second Amendment reiterates City of Austin's agreement to "provide reliable water service to the District".

CITY OF AUSTIN, TEXAS

ORDINANCE NO. 890601-D

AN ORDINANCE AMENDING ORDINANCES NOS. 890420-B, 880505-E, 860130-D, AND 830505-O TO AMEND UTILITY CONSTRUCTION CONTRACT BETWEEN THE CITY OF AUSTIN AND NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1; WAIVING THE RULE REQUIRING THE READING OF ORDINANCES ON THREE (3) SEPARATE DAYS; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, by Ordinance No. 830505-O, the City consented to the creation of the North Austin Municipal Utility District No. 1 (hereinafter the "District") and authorized the execution of the "Agreement Concerning Creation and Operation of the North Austin Municipal Utility District No. 1" (hereafter the "Consent Agreement") and the "Utility Construction Contract between the City of Austin and the North Austin Municipal Utility District No. 1" (hereafter the "Construction Contract") by and among the parties thereto; and

WHEREAS, the Consent Agreement and the Utility Construction Contract were executed by the City, the District and the landowner to be effective February 21, 1984; and

WHEREAS, the Construction Contract was previously amended by Ordinance No. 890420-B to make changes in certain obligations of the City and the District with respect to water utility facilities and services to benefit all parties and provide reliable water service in the District; and

WHEREAS, the parties now desire to amend certain obligations of the parties as to the issuance of bonds for the projects of the Construction Contract to include refunding bonds and to modify the City's approval of bond resolutions for such refunding bonds; and

WHEREAS, the parties to the Construction Contract, as previously amended, desire to execute a second amendment to the Contract; Now, Therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

PART 1. That the Second Amendment to the Utility Construction Contract Between the City of Austin and North Austin Municipal Utility District No. 1, attached hereto as Exhibit "A" is hereby approved.

PART 2. The City Manager or her authorized designee, is hereby authorized to execute such Amendment Utility Construction Contract and to do all things necessary to carry out such Contract.

PART 3. The requirement imposed by Section 2-2-3 of the Austin City Code of 1981 that this Ordinance be read on three (3) separate days shall be waived by the affirmative vote of five (5) members of the City Council to pass this Ordinance through more than one reading on a single vote.

PART 4. This Ordinance shall be effective ten (10) days following the date of its final passage.

PASSED AND APPROVED: $
$
$
June 1, 1989 $

Lee Cooke
Mayor

APPROVED: Iris J. Jones
Acting City Attorney

ATTEST: James E. Aldridge
City Clerk

01JUN89
SKL:jkg
2839

SECOND AMENDMENT TO UTILITY CONSTRUCTION CONTRACT
BETWEEN THE CITY OF AUSTIN, TEXAS AND NORTH
AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1

STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
COUNTIES OF TRAVIS AND §
WILLIAMSON §

This Second Amendment to Utility Construction Contract between the City of Austin, Texas and North Austin Municipal Utility District No. 1 (this "Amendment") is made and entered into as of the ____ day of _____, 1989, by and between the City of Austin, Texas (the "City"), a home-rule city located in Travis County, Texas, acting herein by and through its undersigned duly authorized City Manager, as authorized by specific action of its City Council and North Austin Municipal Utility District No. 1 (the "District"), a conservation and reclamation district created on the 15th day of November, 1983, by order of the Texas Water Commission and operating pursuant to Chapter 54 of the Texas Water Code.

W I T N E S S E T H:

WHEREAS, by Ordinance adopted by the City Council of the City on May 5, 1983, the City consented to the creation of the District and authorized the execution of an "Agreement Concerning Creation of North Austin Municipal Utility District No. 1" (the "Consent Agreement") and the "Utility Construction Contract" ("Construction Contract"); and

WHEREAS, the City and the District executed the Agreement Amending Agreement Concerning Creation and Operation of North Austin Municipal Utility District No. 1 and "Utility Construction Contract between the City of Austin and North Austin Municipal Utility District No. 1" which served as the first amendment to the Construction Contract; and

WHEREAS, the City and the District desire to issue contract revenue refunding bonds to refund a portion of the outstanding contract revenue bonds issued in 1985; and

WHEREAS, the parties desire to amend the Construction Contract to include within the definition of "Bonds" the issuance of refunding bonds; and

WHEREAS, the City and the District are authorized to make and enter into this Amendment in accordance with the laws of the State of Texas, including Article 1109j, Texas Civil Statutes, and Chapter 54 of the Texas Water Code;

NOW, THEREFORE, that for and in consideration of the mutual obligation, promises and benefits contained herein, the sufficiency of which is hereby acknowledged, the City and the District agree to amend the Construction Contract as follows:

I.

Article I, Definitions, Section 1.03 is amended to read as follows:

"1.03 "Bonds" shall mean and refer to the Bonds issued by the District for acquiring, by purchase and/or construction, the Projects, and any bonds issued to refund the Bonds, whether in one or more series or issues."

II.

Article III, District's Obligation to Provide Financing for Projects, Section 3.02 is amended to read as follows:

3.02 Prior to the passage by the Board of Directors of the District of any resolution authorizing the issuance of the Bonds, a draft of the resolution in substantially final form and content shall be delivered to the City Manager of the City in conformity with the timetable set out in Interim Land Development Code Secs. 13-1-370 and 13-1-371 before the proposed date of sale of such Bonds and approved by the City Council with the City. Such draft shall set forth the principal amount and the maturities of the Bonds to be used. In the event of a negotiated bond sale for refunding bonds such draft shall set forth the estimated principal amount and the anticipated maturities of the Bonds to be issued. It is recognized and agreed that when pricing is done on a negotiated sale for refunding bonds, that the principal amount of the bonds and the maturity schedule may change. In such event, the City's approval of such substantial draft of the Bond Resolution shall constitute approval of such changes so long as a present net value savings is accomplished as set forth in the City's approval of such substantial draft of the Bond Resolution or Order and such savings are approximately uniform for each year of maturity of the Bonds. Such draft shall also set forth the special funds created from the payment and security of the Bonds, including provision relating to the creation and establishment of a special escrow fund for the deposit of the proceeds of the sale of the Bonds; and the procedures to be followed for the disbursement or withdrawal of the funds deposited in such accounts. The necessity and amount of capitalized interest on the Bonds shall, after the first issue of Bonds, be reviewed and determined by the District and Director of Finance of the City.

III.

All other provisions of the Construction Contract shall be and remain in full force and effect as therein written, except as otherwise expressly provided herein.

EXECUTED in multiple counterparts, each of which shall constitute an original, to be effective on the latest day this Amendment is executed by a party hereto, being the ____ day of _____, 1989.

ATTEST:

By:_____
City Clerk

CITY OF AUSTIN:

By:_____
City Manager

APPROVED:

BY:_____
Assistant City Attorney

ATTEST:

By:_____
Secretary
Board of Directors

(Seal)

NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1.

By:_____
President
Board of Directors

STATE OF TEXAS §
§
COUNTY OF TRAVIS §

This instrument was acknowledged before me on the ____ day of _____, 1989, by _____, _____ of the City of Austin, Texas, on behalf of said City.

_____
Notary Public, State of Texas

_____
(Name - Typed or Printed)

My Commission Expires: _____

STATE OF TEXAS §
§
COUNTY OF TRAVIS §

This instrument was acknowledged before me on the ____ day of _____, 1989, by _____, _____ of North Austin Municipal Utility District No. 1, on behalf of said District.

_____
Notary Public, State of Texas

_____
(Name - Typed or Printed)

My Commission Expires: _____

THE STATE OF TEXAS §

COUNTY OF TRAVIS §

I, Betty G. Brown, Deputy City Clerk of the City of Austin, Texas, do hereby certify that the foregoing instrument is a true and correct copy of Ordinance No. 890601-D, consisting of 6 page(s), passed by the City Council of Austin, Texas, at a regular meeting on the 1st day of June, 19 89, as on file in the City Clerk's Office this 20th day of June, 19 89.

Betty G. Brown

BETTY G. BROWN
DEPUTY CITY CLERK, CITY OF AUSTIN, TEXAS

Third Amendment to Consent Agreement

Significance: In exchange for District dedicating utilities to City and canceling a water pressure project, the City agrees to provide adequate water service for full development of the District.

AGREEMENT CONCERNING THE THIRD AMENDMENT TO THE
AGREEMENT CONCERNING CREATION AND OPERATION OF
NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1 AND THE
FIRST AMENDMENT TO THE UTILITY CONSTRUCTION CONTRACT BETWEEN
THE CITY OF AUSTIN AND
NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
COUNTIES OF TRAVIS §
AND WILLIAMSON §

This agreement ("Agreement") amending "Agreement Concerning Creation and Operation of North Austin Municipal Utility District No. 1" and amending "Utility Construction Contract Between the City of Austin and North Austin Municipal Utility District No. 1" is made and entered into by and among North Austin Municipal Utility District No. 1 (the "District"), a municipal utility district created by order of the Texas Water Commission on November 15, 1983, and operating pursuant to Chapter 54 of the Texas Water Code, the City of Austin (the "City"), a home-rule City located in Travis and Williamson Counties, Texas and Austin White Lime, a Texas general partnership, Robinson Ranch, a Texas general partnership and Milwood Joint Venture, a Texas joint venture (hereinafter collectively referred to as "Milwood") and San Antonio Savings Association ("SASA"), subsequent holder of title to the certain tract of 177 acres within the boundaries of the District.

W I T N E S S E T H

WHEREAS, the District, the City and Milwood entered into that certain "Agreement Concerning Creation and Operation of North Austin Municipal Utility District No. 1" (the "Consent Agreement") on February 21, 1984, and two subsequent amendments thereto which provide for, among other things, the provision of water and wastewater utility services and financing for system improvements for same; and

WHEREAS, the District and the City entered into that "Utility Construction Contract Between the City of Austin, Texas and North

Austin Municipal Utility District No. 1 (the "Construction Contract") on February 21, 1984, which provides for, among other things, the provision of water and wastewater utility services and the financing for utility system improvements to provide such services through the issuance of contract revenue bonds; and

WHEREAS, the Consent Agreement, as amended, and Construction Contract contain certain obligations by the parties for construction, ownership and financing of certain water improvements to provide adequate water supply to the District; and

WHEREAS, the parties acknowledge that the District has financed and constructed the 24-Inch Parmer Lane Transmission Main and the 36-Inch McNeil Road Transmission Main at a combined cost of $4,900,000 and that the City has financed and constructed approximately $23,600,000 of water improvements to provide Northwest B pressure plane water service to the general area; and

WHEREAS, the parties now desire to amend or delete certain obligations of the parties with respect to water utility facilities and services to benefit all parties and provide reliable water service in the District; and

WHEREAS, the parties desire to designate this Agreement as the third amendment to the Consent Agreement and as the first amendment to the Construction Contract;

NOW, THEREFORE, for the mutual promises, obligations and releases set forth below, the parties agree as follows:

I.

PRIOR AGREEMENTS

1.01 Provision of Water Utility Service and System Improvements.

A. The Consent Agreement and Construction Contract provide for the design, financing, construction, ownership, and operation and maintenance of certain water main extensions and other water improvements (the "Project"). Water improvements designated as Project items include:

1. 36-Inch McNeil Road Transmission Main from the Jollyville Reservoir along McNeil Road to the 24-Inch Transmission Main in Parmer Lane. The parties acknowledge that this facility has been constructed by the District with its funds and is owned and operated by the District.

2. 24-Inch Parmer Lane Transmission Main from the terminus of the 36-Inch McNeil Road Transmission Main along the right-of-way of Parmer Lane to FM 620. The parties acknowledge that this facility has been constructed by the District with its funds and is owned and operated by the District.

3. Cost participation in the oversize of the Research Boulevard Transmission Main. The parties acknowledge that the Research Boulevard Transmission Main has been constructed by the City with its funds and is owned and operated by the City.

4. 2,700,000 Gallon Northwest "A" System Elevated Reservoir. The parties acknowledge that this facility has not been constructed and its funding

was to be provided through the issuance of contract revenue bonds.

5. 48-Inch Spicewood Springs Transmission Main and Discharge Piping from Spicewood Springs Pump Station to U.S. Highway 183. The parties acknowledge that the Transmission Main has not been constructed and does not need to be constructed. Its funding was to be provided through the issuance of contract revenue bonds. The parties further acknowledge that the Discharge Piping has been constructed and funded from other sources.

B. The City, pursuant to Article III of the Consent Agreement, agreed to "sell and deliver to the District all water which may be reasonably required ... for domestic and commercial uses" of the District. The City and District in the Consent Agreement and Construction Contract agreed to the construction of the Project to provide the facilities for the provision of the water service to the District by the City. Portions of the Project were to be funded solely by the District through its bonds and other portions were to be funded through the issuance of contract revenue bonds.

II.
REVISIONS TO THE WATER UTILITY SERVICE PLAN

2.01 Ownership of 24-Inch and 36-Inch Transmission Mains. The parties acknowledge that the 24-Inch Parmer Lane Transmission Main and the 36-Inch McNeil Road Transmission Main (collectively the "Mains") are currently owned, operated and maintained by the District. The District agrees to dedicate the Mains to the City upon execution of this Agreement. The City agrees to accept the

Mains and to operate and maintain the Mains upon such dedication by the District and that adequate distribution capacity shall be reserved by the City to serve all land within the District. The City specifically agrees to relocate at its sole expense any and all appurtenances on the 36-Inch McNeil Road Transmission Main necessary for roadway improvements on McNeil Road and constructed after the execution of this Agreement. Such relocations shall be subject to standard City policies and procedures for relocating water mains.

2.02 Provision of Northwest B Water. The City agrees to provide Northwest B pressure plane water to the District through the connection of the City's Northwest B Water System to the District's facilities. The provision of such water shall be accomplished by the construction of approximately 1,000 feet of 16-inch water main from the existing 24-inch water main located at the intersection of FM 620 and Broadmeade Avenue generally down the right-of-way of FM 620 to the boundary of the District. The construction, engineering and inspection costs of the 16-inch main shall be provided by the City and the City hereby agrees to pay for the construction, design and inspection of the 16-inch main. It is understood and acknowledged by the parties that the City will have money available to fund the design, construction and inspection of the 16-inch main not sooner than October, 1989 but no later than January, 1990. The parties further understand and acknowledge that SASA may require water service from the completed 16-inch main for its property within the District prior to 1990 when City funding is available. Therefore, the parties agree that:

a. In the event design and construction of the 16-inch main is not necessary to serve customers within the District until January, 1990, the City shall and agrees to act as the project manager and shall obtain or provide engineering services for the design, construction and

inspection of the 16-inch main. The City further agrees to obtain easements for the 16-inch main. In the event portions of the 16-inch main cannot be located in existing right-of-way or donated easements, the City shall acquire easements through purchase at its cost or, if necessary, condemnation. The City shall then proceed to bid, award and to enter into a construction contract with the low responsible bidder.

b. If the City fails to initiate design of the 16-inch main within 45 days after approval of this Agreement by the City Council or fails to proceed in an uninterrupted fashion and within reasonable time limits with the design phase, easement acquisition, advertisement for bids phase and construction phase consistent with standard engineering design practice and the time limits for bidding and award practices as set out by ordinance or State law, then SASA may elect to commence or complete all of the phases that the City has failed to complete, which may include actions to acquire easements, design and construct the 16-inch main at their cost which shall then be reimbursed to SASA after completion and acceptance by the City, which acceptance shall not be unreasonably withheld. Provided, however, notwithstanding anything to the contrary herein, the City shall not be required to proceed with construction prior to November, 1989. SASA agrees to notify the District and the City in writing that SASA believes that it will need water service from the 16-inch main prior to the City's schedule for design and construction. At such time, SASA may engage the services of an engineer to design the 16-inch main at a fee schedule to be approved in advance by the City Director of Water and Wastewater. In the event easements must be acquired, SASA shall obtain a letter

of appraised value for the easement from an MAI appraiser and shall not pay an amount higher than the appraised value without the City's consent. Provided, however, SASA shall have the option to pay a higher amount so long as SASA agrees to waive reimbursement from the City for the difference between the appraised amount and the purchase price of the easement. All easements shall be obtained in the name of the City. In the event condemnation of such easement or easements is required, the District agrees to proceed to condemn the easements at the cost of SASA. The District agrees to convey any such easements obtained by condemnation to the City upon the City's acceptance of the completed 16-inch main. After completion of design, approval of the design by the City and acquisition of all necessary easements for the 16-inch main, SASA may then bid the construction of the 16-inch main pursuant to completion bidding requirements for municipalities and shall award the contract to the low responsible bidder. The construction contract shall be entered into between SASA and the construction contractor. SASA shall be responsible for all payments coming due under the contract and shall pay all applicable City inspection fees. After completion of the construction and acceptance by the City, SASA shall dedicate the 16-inch main to the City for operation and maintenance. SASA agrees to provide an accounting of all expenditures for reimbursement. The City agrees to reimburse SASA for engineering, easement acquisition whether by purchase or condemnation, construction and inspection costs expended for the 16-inch main not later than January 31, 1990 or completion and acceptance of the 16-inch main, whichever occurs later.

The City agrees and represents to the District that neither the District nor any of its customers within its boundaries shall be required to pay subsequent user fees for utilizing Northwest B pressure plane water through the Maconda Park reservoir and transmission main.

2.03 Deletion of Certain Facilities. The parties agree that upon execution of this Agreement, the District shall have no further obligations with regard to the acquisition, construction and financing of the 2,700,000 Gallon Northwest "A" System Elevated Reservoir or the 48-Inch Spicewood Springs Transmission Main and Discharge Piping from Spicewood Springs Pump Station to U.S. Highway 183 described in the Consent Agreement and the Construction Contract. The parties further agree that the District shall be released from its obligation to fund the oversize costs of the Research Boulevard (U.S. Highway 183) Transmission Main constructed by the City described in the Consent Agreement and the Construction Contract.

III.
WATER SUPPLY

3.01 Water Service to the District. The City agrees to reserve and to guarantee to the District adequate water capacity for the District and its customers at full development.

3.02 Metering of Water Supply. The District agrees to install at its sole expense any new master meters to record flows of potable water from the City to the District necessitated by the revisions to the water service plan set forth in this Agreement. The City Water and Wastewater Department Director or his designee and the District's Engineer shall determine a mutually agreeable location for any new master meter.

IV.

MISCELLANEOUS PROVISIONS

4.01 Conflict. To the extent that this Agreement conflicts with any term or provision in the Consent Agreement and/or the Construction Contract, this Agreement is controlling. All other provisions of the Consent Agreement, as amended to date, and the Construction Contract shall remain in effect.

4.02 Force Majeure. The parties agree that the provisions regarding Force Majeure set out in the Utility Construction Contract between the City of Austin and North Austin Municipal Utility District No. 1 are specifically incorporated herein and are a part of this Agreement.

4.03 Assignment of Agreement. None of the parties shall assign this Agreement without the prior written consent of the other parties hereto.

4.04 Term or Agreement. This Agreement shall be in force and effect for a term of forty (40) years from the date of execution.

4.05 Regulatory Authorities. This Agreement and the acquisition and/or construction of the water facilities shall be subject to all valid rules, regulations and laws applicable thereto, of the United States of America, the State of Texas, or any governmental or regulatory body having lawful jurisdiction.

4.06 Benefits of Agreement. This Agreement is for the benefit of the parties hereto and shall not be construed to confer any benefits on any other party except as expressly provided herein.

4.07 Severability and Enforceability. In the event that any provision hereof is subsequently determined to be invalid, illegal

or unenforceable, such provision shall be severed from the remaining portions of this Agreement and the remainder of the Agreement shall remain in full force and effect. If the Texas Water Commission or any court of competent jurisdiction determines that any portion of this Agreement is beyond the scope or authority of the Texas Water Code or other applicable Texas law, the parties agree to amend immediately this Agreement so as to conform to such ruling or decision in the manner most consistent with the original intent hereof.

4.08 Entire Agreement. The above and foregoing Agreement, including any exhibits which are attached hereto and made a part hereof, contain the entire agreement between the parties hereto and shall in no way be conditioned, modified or supplemented except by written agreement executed by the parties.

IN WITNESS WHEREOF, the City and the District, acting under authority of their respective governing bodies, and Milwood and SASA have caused multiple copies of this Agreement to be duly executed, each of which shall be of equal dignity, all as of the _____ day of _____, 1989.

THE CITY OF AUSTIN, TEXAS

By: _____,
City Manager

APPROVED AS TO FORM:

By: _____,
Asst City Attorney

NORTH AUSTIN MUNICIPAL UTILITY
DISTRICT NO. 1

By: _____
Steve D. Pena,
President, Board of
Directors

ATTEST:

By: _____
Dennis Miller,
Secretary, Board of
Directors

AUSTIN WHITE LIME COMPANY

By: _____
A.H. Robinson, Jr., Partner

By: _____
George E. Robinson, Partner

ROBINSON RANCH

By: _____
A.H. Robinson, Jr., Partner

By: _____
George E. Robinson, Partner

MILWOOD JOINT VENTURE

By: _____
Bill Milburn, Venturer

By: Palmar Associates,
Venturer

By: A.H. Robinson III
A.H Robinson, III

SAN ANTONIO SAVINGS
ASSOCIATION, a Texas financial
institution

By: _____

Its: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 28th day of April, 1989, by Joseph L. Lessard, City Manager of the City of Austin, a Texas political subdivision, on behalf of said political subdivision.

JANIS M. EBLEN
Notary Public, State of Texas
My Commission Expires Aug. 26, 1991

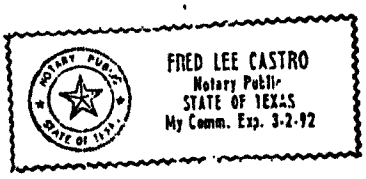
Janis M. Eblen
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 30th day of August, 1989, by Steve D. Pena, President, Board of Directors of North Austin Municipal Utility District No. 1, a Texas political subdivision, on behalf of said political subdivision.



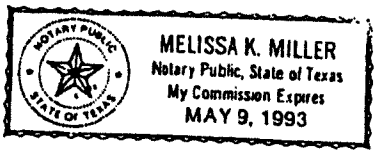
Fred Lee Castro
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 10th day of July, 1989, by A.H. Robinson, Jr., Partner of Austin White Lime Company, a Texas general partnership, on behalf of said partnership.



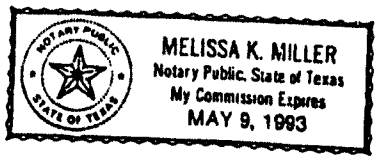
Melissa K. Miller
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 10th day of July, 1989, by George E. Robinson, Partner of Austin White Lime Company, a Texas general partnership, on behalf of said partnership.



Melissa K. Miller
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 10th day of July, 1989, by A.H. Robinson, Jr., Partner of Robinson Ranch, a Texas general partnership, on behalf of said general partnership.

MELISSA K. MILLER
Notary Public, State of Texas
My Commission Expires
MAY 9, 1993

Melissa K. Miller
Notary Public, State of Texas

Name Printed:_____

Commission Expires:_____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 10th day of July, 1989, by George E. Robinson, Partner of Robinson Ranch, a Texas general partnership, on behalf of said partnership.

MELISSA K. MILLER
Notary Public, State of Texas
My Commission Expires
MAY 9, 1993

Melissa K. Miller
Notary Public, State of Texas

Name Printed:_____

Commission Expires:_____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 12 day of July, 1989, by Bill Milburn, Venturer of Milwood Joint Venture, a Texas joint venture, on behalf of said joint venture.

PATRICIA L. BEARD
Notary Public, State of Texas
My Commission Expires 3-24-90

Patricia L. Beard
Notary Public, State of Texas

Name Printed:_____

Commission Expires:_____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this 10th day of July, 1989, by A.H. Robinson, III, of Palmar Associates, Venturer of Milwood Joint Venture, on behalf of said joint venture.

MELISSA K. MILLER
Notary Public, State of Texas
My Commission Expires
MAY 9, 1993

Melissa K. Miller
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

THE STATE OF TEXAS §
COUNTY OF TRAVIS §

This instrument was acknowledged before me this _____ day of _____, 1989, by _____, _____ of San Antonio Savings Association, a Texas financial institution, on behalf of said financial institution.

_____
Notary Public, State of Texas

Name Printed: _____

Commission Expires: _____

289-17.3

TCEQ Rules and Regulations

Significance: TCEQ defines water system capacity to include pressure

SUBCHAPTER D: RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS
§§290.38, 290.39, 290.41 - 290.47
Effective February 19, 2004

§290.38. Definitions.

The following words and terms, when used in this chapter shall have the following meanings, unless the context clearly indicates otherwise. If a word or term used in this chapter is not contained in the following list, its definition shall be as shown in Title 40 Code of Federal Regulations (CFR) §141.2. Other technical terms used shall have the meanings or definitions listed in the latest edition of *The Drinking Water Dictionary*, prepared by the American Water Works Association.

(1) **Air gap** -- The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying water to a tank, fixture, receptor, sink, or other assembly and the flood level rim of the receptacle. The vertical, physical separation must be at least twice the diameter of the water supply outlet, but never less than 1.0 inch.

(2) **ANSI standards** -- The standards of the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

(3) **Approved laboratory** -- A laboratory certified and approved by the commission to analyze water samples to determine their compliance with maximum allowable constituent levels.

(4) **ASME standards** -- The standards of the American Society of Mechanical Engineers, 346 East 47th Street, New York, New York 10017.

(5) **ASTM standards** -- The standards of the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19102.

(6) **Auxiliary power** -- Either mechanical power or electric generators which can enable the system to provide water under pressure to the distribution system in the event of a local power failure. With the approval of the executive director, dual primary electric service may be considered as auxiliary power in areas which are not subject to large scale power outages due to natural disasters.

(7) **AWWA standards** -- The latest edition of the applicable standards as approved and published by the American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.

(8) **Certified laboratory** -- A laboratory certified by the commission to analyze water samples to determine their compliance with maximum allowable constituent levels.

(9) **Community water system** -- A public water system which has a potential to serve at least 15 residential service connections on a year-round basis or serves at least 25 residents on a year-round basis.

during intermittent use. Hoses must be properly stored between uses and must be provided with caps and keeper chains or have the ends connected together.

(I) The tank shall be disinfected monthly and at any time that contamination is suspected.

(J) At least one sample per month from each tank shall be collected and submitted for microbiological analysis to one of the commission's approved laboratories for each month of operation.

(K) A minimum free chlorine residual of 0.5 mg/L or, if chloramines are used as the primary disinfectant, a chloramine residual of 1.0 mg/L (measured as total chlorine) shall be maintained in the water being hauled. Chlorine or chlorine containing compounds may be added on a "batch" basis to maintain the required residual.

(L) Operational records detailing the amount of water hauled, purchases, microbiological sampling results, chlorine residual readings, dates of disinfection, and source of water shall be maintained.

Adopted January 28, 2004 Effective February 19, 2004

§290.45. Minimum Water System Capacity Requirements.

(a) General provisions.

(1) The requirements contained in this section are to be used in evaluating both the total capacities for public water systems and the capacities at individual pump stations and pressure planes which serve portions of the system that are hydraulically separated from, or incapable of being served by, other pump stations or pressure planes. The capacities specified in this section are minimum requirements only.

(2) The executive director will require additional supply, storage, service pumping, and pressure maintenance facilities if a normal operating pressure of 35 pounds per square inch (psi) cannot be maintained throughout the system, or if the system's maximum daily demand exceeds its total production and treatment capacity. The executive director will also require additional capacities if the system is unable to maintain a minimum pressure of 20 psi during fire fighting, line flushing, and other unusual conditions.

(3) The executive director may establish additional capacity requirements for a public water system using the method of calculation described in subsection (g)(2) of this section if there are repeated customer complaints regarding inadequate pressure or if the executive director receives a request for a capacity evaluation from customers of the system.

(4) Throughout this section, total storage capacity does not include pressure tank capacity.

Correspondence Describing Water Pressure Problem

MEC

Murfee Engineering Company

September 7, 2004

North Austin MUD No. 1
c/o Armbrust & Brown, LLP
100 Congress Ave. – Suite 1300
Austin, Texas 78701
Attn: Alan McNeil, President
& Board of Directors

Dear Mr. McNeil and Board of Directors:

Utility customers within the North Austin MUD No. 1 (District) service area derive water service from either the City of Austin's northwest A or (1015 feet MSL) or Northwest B (1140 feet MSL) pressure zone water supply facilities. The majority of the District's customers including all of the residential customers are served exclusively by the Northwest A pressure zone system. The District actually obtains water service from the City of Austin through wholesale water supply agreements and transmits this water to its customers on a retail basis. As the District does not maintain or operate any water pressure booster systems or water treatment facilities, the District relies exclusively on the City of Austin for adequate water capacity at this time. All of the District's subdivisions were designed and subsequently approved by the City of Austin based partially on the available capacity represented by the City.

Over the past year, the District's manager, Eco Resources, Inc., has received numerous complaints from District customers with respect to domestic water pressure. Subsequent spot field measurements by the District manager indicate that distribution domestic water pressures fall below the State standard of 35 psig on occasion over a limited period. Follow up conversations with the City of Austin utility operations staff reveals that these low observed pressures are a result of a change in operations by the City. More specifically, the City operations staff deliberately operates the Northwest A pressure zone elevated storage tank at lower than design levels in an effort to maintain water quality, i.e., sufficient chlorine residual. The results of District water distribution system model simulations confirms that the City's operations are responsible for the District's occasional low domestic pressure water service. In addition the results of the model simulations strongly suggests that the observed and measured low domestic pressure is a result of insufficient capacity at the wholesale supply point rather than internally within the District.

In an effort to resolve the problem, the District in concert with the City staff initiated an investigation of alternatives to increase wholesale domestic water pressure to the District. These alternatives included recomissioning an abandoned water main on McNeil Drive to

B

deliver an intermediate water pressure to the District and adjacent City customers, installing rechlorination facilities at the City of Austin Martin Hill Reservoir to restore full capacity operation of City facilities, and extending a new 5500 linear foot intermediate pressure water supply main to a connection with the District. The first two alternatives were determined by the City of Austin staff to be unfeasible for a number of technical as we all as terrorist and safety related reasons. The third alternative to extend a dedicated interim pressure main was determined to be economically unfeasible by the District with an estimated cost of over $1,600,000. It is understood that this cost exceeds the District's available financial resources at this time.

A fourth apparently technically and economically feasible alternative is the design and installation of two strategically located interim variable speed booster stations inside the District. The District engineer recommends that the District Board consider employing its District Manager to construct these facilities as quickly as possible due to the apparent emergency nature of the problem. It is understood that the District currently has sufficient funds to support this alternative. The District would operate these facilities at the District's expense for a temporary period until the City of Austin can resolve its current water pressure delivery problem and restore its operations to full design capacity in this geographic area.

As it is the District's obligation to provide sufficient water capacity service to its customers, it is important that this occasional low domestic pressure problem be resolved as quickly as possible. Such response will require cooperation and support by City of Austin staff to quickly restore adequate pressure throughout the District to avoid any future health or safety concerns.

Sincerely,

David Malish, P.E.
District Engineer

cc: Sharlene Collins, Armbrust & Brown LLP
Gary Spoonts, Eco Resources Inc.

Mecfiles/malish/wordfile/namud/water pressure

MONTHLY ENGINEERING REPORT
NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1

Prepared on Wednesday, September 15, 2004
For Meeting on Wednesday, September 22, 2004

By David Malish P.E., District Engineer

District Water Pressure

Following a somewhat exhaustive and time consuming alternative development and assessment for improving domestic water pressure within the District, the District Board at its August meeting selected to pursue the design and construction of two temporary internal water pressure booster systems strategically located on sites currently controlled/owned by the District. These sites include the "fire station" site on Dallas Drive and the District's lot on the northwest corner of Parmer and Tamayo. The selected lot on Dallas is currently unplatted while the lot on Parmer/Tamayo is platted. The unplatted lot will probably need to be platted but the District should seek the advice of its attorney. The cost of platting this lot through the short form process is estimated to approximate $8000.

The District engineer recently (August 21st) completed a fire flow test near the intersection of Parmer and Anderson Mill Road in support of a request from representatives of the Milwood Village development. A residual domestic water pressure of 37 psig was observed. This low pressure at this location indicated that the District, at that time, was experiencing water pressures in more critical locations of the District below the State minimum standard of 35psig. The observed water pressure measurement is perhaps the lowest pressure ever measured by the District's engineer within the District and confirms the City of Austin's intended practice to continue lowering northwest pressure zone A water pressure.

The District engineer has previously represented that this low pressure problem can most readily quickly be resolved with the installation of the two previously referenced booster stations. The District engineer recently met with Mr. Brian Gil of Hydro-Con Systems to discuss equipment availability. It was mutually agreed that the design and construction of skid mounted variable speed split case pumps would offer not only a quick response but also an economical and reliable solution within the current available financial resources of the District. Attached is a preliminary cost estimate provided by HydroCon Systems for the delivery of sled mounted systems. The estimated cost is $150,000 per each delivered to the site. Note that minimal work would be required to install the stations. To further minimize costs, these facilities can be located in open air but shielded on three sides with a decorative landscaped wall and ultimately secured with a rear and ceiling security fence. Backup generators would not be necessary for in the event of a power failure, the system will be automatically removed from service and the District will be served exclusively via City water pressure temporarily until power is restored. In addition for this event, power at both stations must be lost simultaneously. Finally, it is estimated that these systems can be designed and constructed for operations in approximately a six month period.

It is very important to note that while these systems are highly reliable and efficient; this design will not meet City of Austin criteria. The City of Austin consent to creation of the District requires that all water and wastewater utilities constructed within the District be reviewed and approved by the City implying the imposition of City criteria. This imposition will significantly increase the costs beyond the District's current financial resources, and will perhaps double the construction period while it is doubtful that reliability will be enhanced. A major concern of the City staff is that in the event the District is annexed into he corporate limits, the City would be required to operate the facilities. Alternatively, it is reasonable to expect the City of Austin to resolve the area wide geographic low water pressure problem prior to any annexation considerations. The City staff have verbally recognized that other adjacent areas wholly within the City's service area also experience low pressure water problems.

AGENDA ITEM # 13

94002.168

MEC

Murfee Engineering Company

June 10, 2005

Chris Lippe, P.E., Director
City of Austin Water and Wastewater Department
625 E. 10th Street, Suite 415
Austin, Texas 78701

Re: ***North Austin MUD No. 1***
Temporary Water Pressure Booster Station

Dear Mr. Lippe,

Enclosed for your review are construction plans for two temporary variable speed booster stations proposed for immediate installation within North Austin MUD No. 1. As you are aware, the District engineer and the City staff, in concert, conducted an exhaustive alternatives analysis to resolve the current low domestic water pressure concerns within the District. Alternatives analyzed included creating an intermediate pressure zone with the use of existing facilities and mains as well as extending new mains, and/or "freshening" the water in the Martin Hill Reservoir with rechlorination. All City of Austin alternatives identified were determined to be unfeasible.

The District currently observes domestic water pressures below the State standard of 35psi approaching near 20psi on occasion in some locations. Such low pressures constitutes a human health and safety concern and the District manager has received several complaints. Adequate pressures were once available in all of the District's subdivisions at the time of construction approval, but domestic pressures have now been lowered as a result of operational changes at Martin Hill Reservoir. It is understood that once city water demands in the geographical area of the Martin Hill Reservoir are substantially increased, full operation of the Martin Hill Reservoir will be restored and the District will again have adequate domestic pressure.

The temporary water pressure booster stations need to be installed as quickly as possible to resolve the current health and safety concerns. It is recognized that this design may not specifically meet current City standards or criteria, but it is doubtful that the City of Austin will ever operate or maintain these temporary facilities. Please note that the booster stations are located wholly within the District serving only geographical areas within the District. In addition, it is estimated that these facilities can be constructed with funds currently available which are in the range of $700,000 to $800,000 total. Any costs for such facilities in excess of this amount will require seeking additional funding sources which will result in a substantial delay.

I will appreciate an expedited review and comment on these plans. If you have any questions please call.

Sincerely,

David Malish, P.E.
District Engineer

Mecfiles/malish/wordfile/namud/lippe-booster stations

1101 Capitol of Texas Highway South • Building D, Suite 110 • Austin, Texas 78746 • 512/327-0904

MEC

Sept 13, 05

Murfee Engineering Company

David D. Laughlin, P.E.
Texas Commission on Environmental Quality
Utility Technical Review Team
Water Supply Division MC-153
P.O. Box 13087
Austin, TX 78711-3087

Ron Humphrey, P.E.
City of Austin
Austin Water Utility
625 E 10th St, Suite 415
Austin, TX 78701

Re: **North Austin MUD #1**
Low Domestic Water Pressure
Proposed Resolution with Installation of VFD Booster Pumps

Dear Gentleman,

After reviewing the design comments received from both the City of Austin and TCEQ, it has become apparent that there is perhaps some misunderstanding of the operational characteristics and performance of variable frequency drive (VFD) technology when used for domestic water supply purposes. Both the City of Austin and TCEQ staff have expressed or implied a concern that the imposition of this technology to solve the low domestic water pressure problem within North Austin MUD No. 1 may result in severely reduced pressure in the City of Austin's water supply mains. While no actual explanation is provided, it is suspected that the reviewers have reason to believe that the in-line pumps will attempt to withdraw or divert water for service within the District at a rate significantly exceeding the original design capacity of the water supply main thereby causing a possible collapse of the main.

Any requirement for the installation of a ground storage tank with an air gap is not only technically unjustified in this case considering the employment of VFD technology, but will also eliminate this alternative from further consideration as it becomes technically, economically, and socially unfeasible. The installation of an air gap will require the installation of not only large ground storage tanks but also fire demand pumps with backup emergency power. Fire protection from the City of Austin system will no longer be available and will have to be reproduced mechanically, which is less reliable. In addition, it becomes questionable if any elevated storage is provided to the District which serves in excess of 2,500 connections and perhaps on-site elevated storage will now be required. A former plan to install an elevated storage tank was previously eliminated from consideration at the request of the City of Austin as referenced in the third amendment to the consent for creation agreement between the District and the City.

The addition of ground storage tanks, fire pumps, enclosed structures with HVAC systems, back-up power facilities possibly an elevated storage tank and an on-site water quality and detention ponds will

increase the cost of this alternative by several million dollars and will require the acquisition of additional adjacent properties at both sites. In addition, at this time, the installation of these facilities will be delayed a minimum of two (2) years owing to the permitting and plan approval process that will need to be re-initiated. With this increased cost and time considerations, other previously rejected alternatives should possibly be reconsidered.

The following discussion is provided to assist in more clearly understanding the use of VFD technology in an effort to support reconsideration of the required air gap and the subsequent facilities requirement consequence. It is unnecessary to address any other issues at this time as this alternative becomes unfeasible with the requirement of an air gap. Therefore, other issues will only be addressed if the requirement for the air gap is reconsidered. It should also be completely understood that the District and consultants have no intention to jeopardize in any way the integrity or operation of the City of Austin's water supply facilities.

The use of VFD technology to increase domestic water pressure will not effect domestic demands or result in increased domestic flows at any time. Instantaneous flows in the City of Austin water supply mains will remain essentially unaffected with or without the installation of the proposed VFD motors/pumps. VFD water pressure boosting systems are configured and designed to maintain a set or specified discharge pressure. The actual motor/pump speed will vary directly and simultaneously with system water demand to deliver a water demand rate precisely coinciding with actual system demands. As no internal storage facilities exist within the District, the VFD facilities cannot pump or deliver flow rates in excess of system demands at any time.

It is important to note that the District currently receives water supply at four locations through water master meters as shown in Figure 1. Water supply at Amarillo is delivered from a 36" main along McNeil Drive, at Dallas Drive from a 36"/24" main along Parmer Lane, and at Tamayo Drive and Anderson Mill from the 24" main along Parmer Lane. With the installation of the proposed booster stations, water supply locations to the District will be reduced to two sites as shown in Figure 2. Note that the current water supply to the District at the intersection of McNeil Drive and Amarillo will essentially be eliminated with the installation of a check valve. To satisfy current and projected water demands within the District, water supply currently entering the District at this intersection must be redirected to one of the two entry (booster station) sites along Parmer Lane at either Dallas Drive or Tamayo Drive. In either case, additional flows, equal to that eliminated at the McNeil Drive/Amarillo intersection, will be redirected for supply through the 36"/24" transmission main in Parmer Lane.

To assess the impact of this system supply modification, water model simulations were used to determine projected domestic flows through water supply mains under existing conditions and under reconfigured and rerouted conditions. The results of the water models are provided in Table 1. As is shown, approximately 1365 gpm of domestic flow under peak hours use conditions will be diverted from the intersection at McNeil Drive and Amarillo to a point of supply to the District at the intersection of Dallas Drive and Parmer Lane. It is interesting to note that the actual flow through the 24" main along Parmer Lane from the intersection with Dallas to Tamayo is projected to actually decrease by approximately 400 gpm. The estimated effect on headloss and the subsequent reduction in pressure in

the City of Austin water supply mains is summarized in Table 2. As is shown, the reduction in pressure in the 36"/24" to Dallas is negligible. Pressure in the City of Austin 24" main is also negligible.

The pumps selected for this application are designated as Flowserve 10LR-16A. The variable speed curves for this pump using a 12.75" propeller are provided in Figure 3. These pumps were selected in an effort to deliver up to collectively approximately 6600 gpm of water flow to the District at a discharge pressure of near 60 psi.

Referencing the pump performance curves, it is shown that the three pumps can each deliver approximately 3800gpm at near pump cavitation. This situation, however, will only occur if all pump controls fail during a low water pressure period with a coincidental peak demand of 11400 gpm – an unlikely if not impossible condition. At this point, cavitations will be initiated. Assuming an 11,400 gpm flow through the City of Austin's 36"/24" water supply main in Parmer Lane from McNeil Drive to Dallas Drive, a total estimated pressure drop of only 3 psi will be observed under this extreme condition. Assuming a minimum delivery pressure of 35 psi, a low pressure of 32 psi will result in the main. Little, if any, headloss will be observed in the City's water supply mains. Even under these extreme and unlikely conditions a pressure decrease to 20 psi in the City water supply mains cannot result from the installation of the proposed booster pumps. Again, it is reiterated that the imposition of variable speed technology will not increase flows but will only supply flows as dictated by demand which is independent of the proposed booster station installation.

The TCEQ staff has expressed additional concern that adequate surge protection has not been considered. Water hammer from surge results from a sudden significant decrease in pipeline velocity generally caused by rapid valve closure, a sudden loss of power at a pump station or any other situation which suddenly disrupts the velocity of the water. The resulting pressure from water hammer is directly related to the water velocity at the time of disruption of flow.

As discussed previously, VFD pumps are controlled by a set discharge pressure. The speed of the pumps and consequently the resulting flow will vary precisely with system demands as dictated by routine operations. As system demand increases the motor/pump speed increases in an effort to maintain the set discharge pressure.

The more recent advances in VFD technology over the last decade have allowed motor speeds to slow significantly before forced shut off. Low flows in the range of 200 to 300 gpm can be maintained by the specified pumps. With a statistical user base of approximately 2900 connections it is anticipated that the pumps will run continuously as the low flow delivered will range from 0.07 to 0.10 gpm per connection. In any event, system flows in the range of 200 to 300 gpm range will be observed at system shut off if it ever occurs.

In the event of a line break or an unusual system demand such as a major fire flow, the motor/pump speed will quickly increase in an effort to maintain the set discharge pressure of near 60 psi. The pump will deliver flows at precisely the system demand. In an effort to protect the pumps from possible cavitation, the pump controls are designed to deactivate the pumps when a discharge pressure of 53.5 psi

cannot be maintained. At the time of shut off, the integrated check valves will open and system demand will be provided exclusively from the City of Austin system as if the booster stations were never installed. Water hammer from surge will not occur under this situation as water pressure and flows will be released at the line break or fire hydrant at the time of pump shut off. This situation does not represent a sudden valve closure.

In the event of a sudden power outage during normal operating conditions, the pumps will also suddenly deactivate and the integrated check valve will open with water supplied directly from City of Austin system as is the current situation. As the VFD pumps will only discharge a precise flow equal to the instantaneous system demands as dictated by the current valve openings (or breaks) throughout the District, surge cannot be expected as pressure and flow will be instantaneously released through the open valves which are imposing the demand at the time of deactivation. Again, this situation does not represent sudden valve closure or disruption of velocity until all energy is released.

Based on this analysis and understanding of VFD technology, it is difficult to technically justify low suction pressure or discharge surge (water hammer) concerns with this application. It will be unfortunate to deny this technically or economically feasible alternative for resolving the on-going low pressure problem following an extensive alternative analysis if such denial is based on the misunderstanding of system operation. Again the District does not intend to jeopardize the integrity of the City of Austin's water supply facilities in any way. If such concerns remain, perhaps a special condition or situation has been over-looked, please advise.

I will be glad to discuss this analysis with you at your convenience, however, if the requirement for an air gap remains, this alternative becomes unfeasible and no additional response to other comments is necessary at this time. I look forward to your response.

Sincerely,

David Malish, P.E.
Vice President
Murfee Engineering

Cc: Sharlene Collins – Armbrust and Brown
Gary Spoonts – Eco Resources

[Table 1]

Scenario 1:
EXISTING CONDITIONS @ 980' HGL
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	From Node	To Node	Hazen-Williams C
P-3	50.00	6	0.00	0.00	0.00	0.00	J-725	PMP-2 Tamayo	100.0
P-5	1,436.00	36	3,301.63	1.04	0.26	0.18	SR-1	J-5	100.0
P-15	205.00	12	1,364.67	3.87	1.50	7.33	J-5	J-15	100.0
P-1390	1,739.00	36	1,936.96	0.61	0.12	0.07	J-5	J-90	100.0
P-1395	294.00	24	3,271.97	2.32	0.37	1.26	SR-2	J-90	100.0
P-195	1,637.00	36	5,208.93	1.64	0.68	0.42	J-100	J-165	100.0
P-205	77.00	16	2,575.09	4.11	0.45	5.85	J-165	J-170	100.0
P-975	2,737.00	24	2,633.84	1.87	2.32	0.85	J-180	J-725	100.0
P-980	1,755.00	24	823.26	0.58	0.17	0.10	J-725	J-1145	100.0
P-1150	187.00	12	1,810.58	5.14	2.31	12.37	J-725	J-720	100.0
P-1530	1,322.00	12	823.26	2.34	3.80	2.87	J-1145	J-1080	100.0
P-220	634.00	16	2,036.09	3.25	2.40	3.79	J-170	J-185	100.0
P-8	53.00	16	0.00	0.00	0.00	0.00	J-2	J-185	100.0

Scenario 2:
PRESSURE INCREASE OF 25 PSI @ TAMAYO AND DALLAS MASTER METERS
Steady State Analysis
Pipe Report

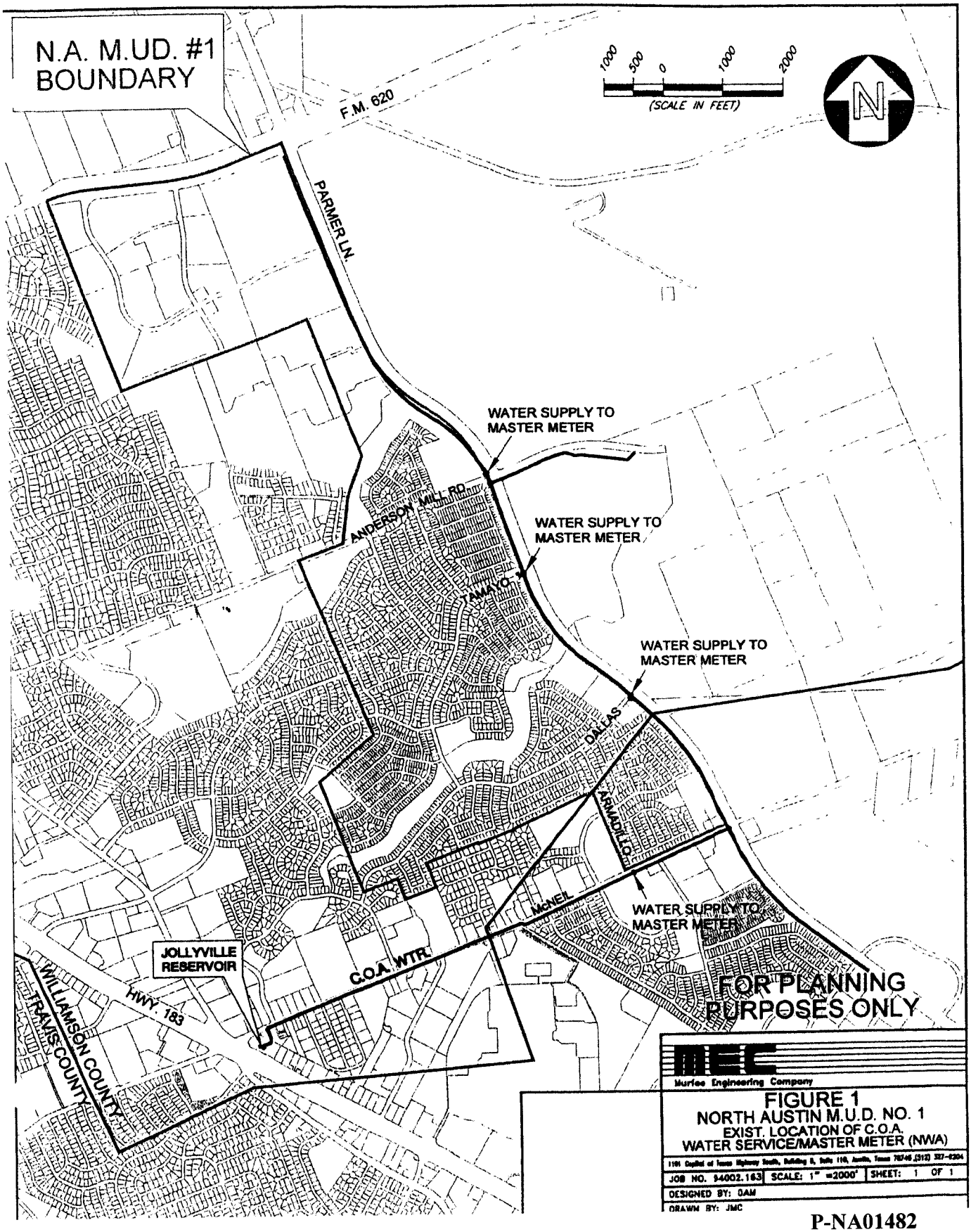
Label	Length (ft)	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	From Node	To Node	Hazen-Williams C
P-3	50.00	16	2,215.79	3.54	0.22	4.43	J-725	PMP-2 Tamayo	100.0
P-5	1,436.00	36	3,301.63	1.04	0.26	0.18	SR-1	J-5	100.0
P-15	205.00	12	0.00	0.00	0.00	0.00	J-5	J-15	100.0
P-1390	1,739.00	36	2,929.31	0.92	0.25	0.14	J-5	J-90	100.0
P-1395	294.00	24	3,644.29	2.58	0.45	1.54	SR-2	J-90	100.0
P-195	1,637.00	36	6,573.60	2.07	1.05	0.64	J-100	J-165	100.0
P-205	77.00	16	4,357.82	6.95	1.19	15.50	J-165	J-170	100.0
P-975	2,737.00	24	2,215.79	1.57	1.68	0.61	J-180	J-725	100.0
P-980	1,755.00	24	-0.00	0.00	0.00	0.00	J-725	J-1145	100.0
P-1150	187.00	12	0.00	0.00	0.00	0.00	J-725	J-720	100.0
P-1530	1,322.00	12	0.00	0.00	0.00	0.00	J-1145	J-1080	100.0
P-220	634.00	16	0.00	0.00	0.00	0.00	J-170	J-185	100.0
P-8	53.00	16	3,818.82	6.09	0.64	12.14	J-2	J-185	100.0

Pipe Flow Mass Balance
P-15 @ Amarillo Dr & P-195 @ Parmer Ln
Scenario 1—P-15 = 0gpm & Scenario 2—P-15 = 1.364.67gpm
Scenario 1—P-195 = 6,573.6gpm & Scenario 2—P-195=5,208.93gpm
Scenario 1—P-195 – Scenario 2—P-195 = Scenario 2—P-15 = 1.364.67gpm

[Table 2]

An Analysis of the Effect on Suction Pressure with the Installation Of Variable Frequency Drive Booster Stations Along Palmer Lane North from McNeil Drive North Austin MUD 1

Transmission Main Analysis	Scenario	Q_{DESIGN} (gpm)	Total Friction Loss (ft)	Change in Pressure	
				ft	psi
2615 lf – 36" ø and 214 lf – 24" ø Palmer Lane Main from McNeil to Near Dallas Drive	Existing Condition	5309	1.7	-0.1	-.04
	Installed VFD Booster Station	6574	1.8		
2841 lf – 24" ø Palmer Lane Main from Dallas Drive to Tamayo	Existing Condition	2634	2.42	+0.66	+0.29
	Installed VFD Booster Station	2216	1.76		



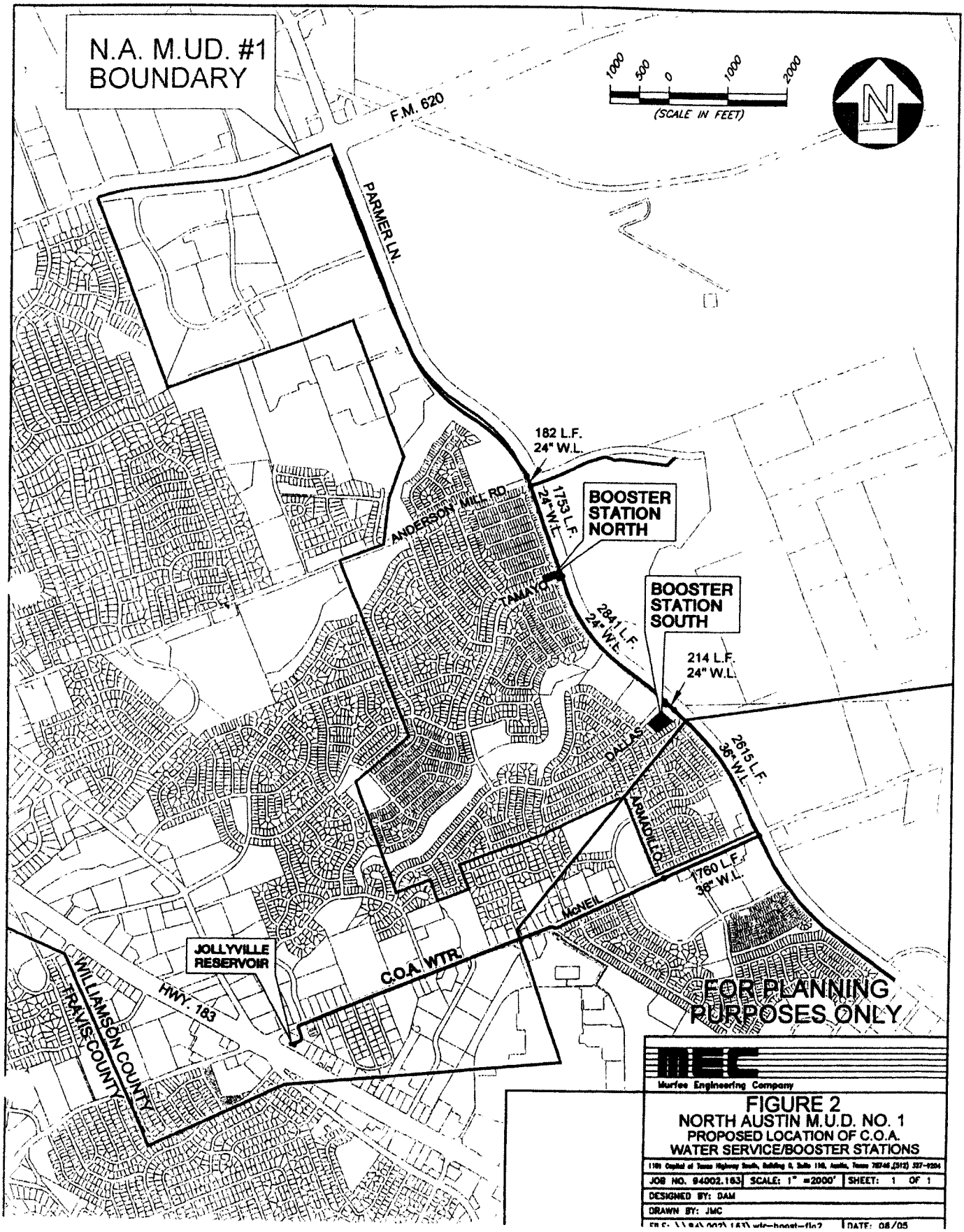
Murfee Engineering Company

FIGURE 1
NORTH AUSTIN M.U.D. NO. 1
EXIST. LOCATION OF C.O.A.
WATER SERVICE/MASTER METER (NWA)

1101 Capital of Texas Highway South, Building B, Suite 110, Austin, Texas 78746 (512) 327-9204

JOB NO. 94002.163	SCALE: 1" =2000'	SHEET: 1 OF 1
DESIGNED BY: DAM		
DRAWN BY: JMC		

P-NA01482

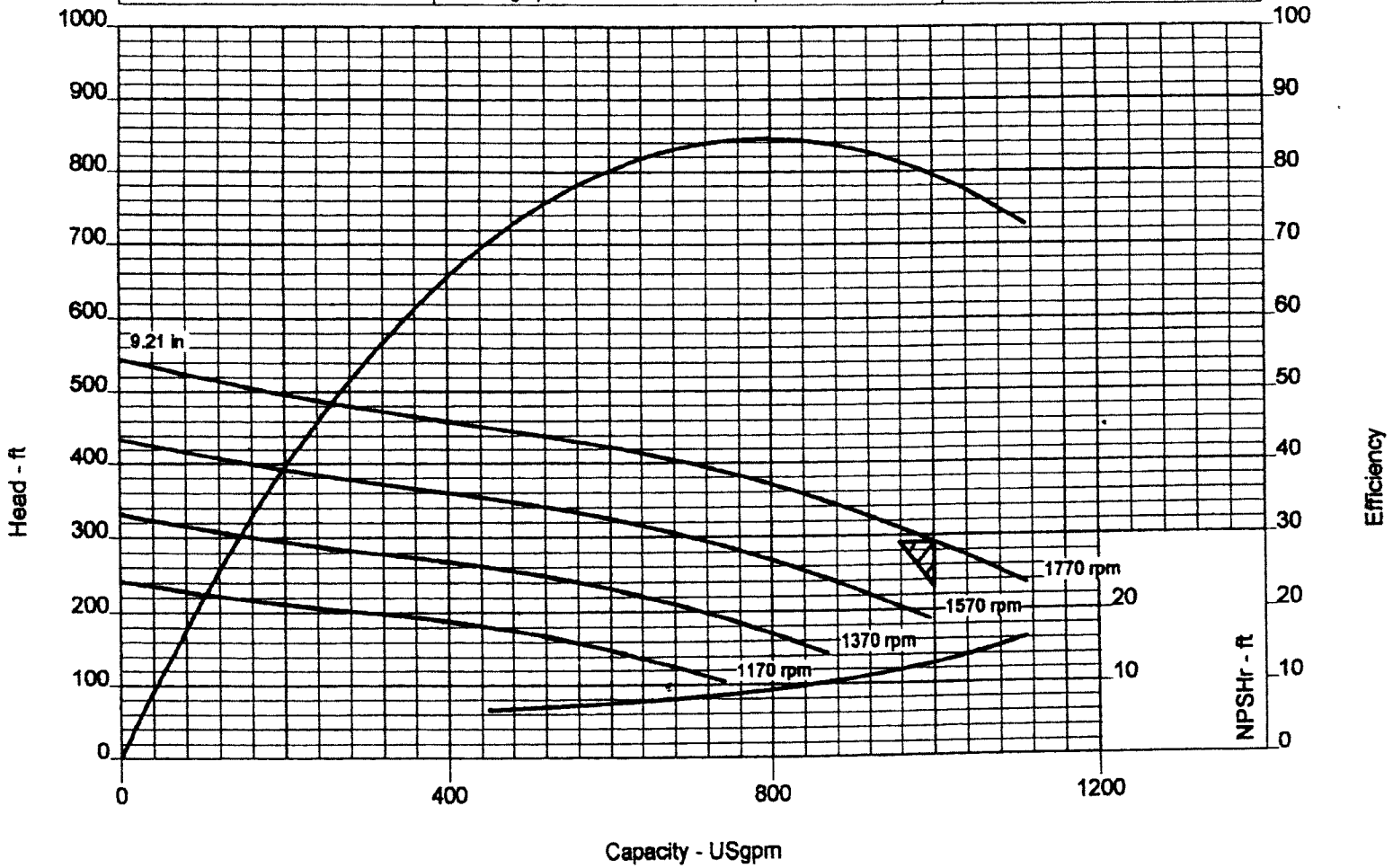


MEC
Murfee Engineering Company

FIGURE 2
NORTH AUSTIN M.U.D. NO. 1
PROPOSED LOCATION OF C.O.A. WATER SERVICE/BOOSTER STATIONS

JOB NO. 94002.163	SCALE: 1" = 2000'	SHEET: 1 OF 1
DESIGNED BY: DAM		
DRAWN BY: JMC		
FILE: \\94\002\163\wtr-boost-fig2		DATE: 08/05

Pump size & type	Flowserve Pump Division	Curve number
12EML		EC-2631
Capacity : 1000.0 USgpm	Specific gravity : 1.000	Stage(s) : 6
Head : 290.0 ft	Running speed : 1770 rpm	Date : Oct 13, 2005



P-NA01484

940

Murfee Engineering Company

94002.168

10/27/05
Mr. James Weddell
Texas Commission on Environmental Quality
Utility Technical Review Team
Water Supply Division MC-155
P.O. Box 13087
Austin, TX 78711-3087

RE: *North Austin MUD No. 1 Booster Stations*

Dear Mr. Weddell,

Following our telephone conversation on October 10, 2005 with respect to the referenced project, it was my understanding that you agreed to provide a letter of clarification to the TCEQ letter of August 8, 2005. In August 2005, the North Austin MUD No. 1 district manager, Mr. Gary Spoonts and I met with you and Mr. David Laughlin, P.E. to discuss this project. Based on conversations at that meeting, Mr. Spoonts and I understood that the TCEQ would accept the installation of a low suction pressure cutoff in lieu of an air gap on the suction side of the variable speed booster station. However the TCEQ remained concerned with the potential for a pressure surge with subsequent water hammer in the absence of surge protection facilities. We were informed that the District would be required to monitor water pressure and install surge protection equipment if necessary after no more than one year of operation.

Alternatively your letter dated August 8, 2005 indicates that the acceptance of a low pressure cutoff is only temporary and an air gap with a ground storage tank would be required within one year. Such a requirement is technically and economically prohibitive for the District as a solution as was explained in my attached letter response to Mr. Laughlin, P.E. and Mr. Ron Humphrey, P.E. of the City of Austin which was sent on September 13, 2005. In addition, your should know that the City of Austin currently operates three variable speed booster stations designed and constructed without a suction air gap or discharge surge protection. Two of these stations were designed and constructed specifically at the request of the City of Austin and were approved by the TCEQ. To my knowledge no problems have been observed in their 8-10 operating history.

As the Districts customers continue to receive low domestic water pressure during frequent periods, it is requested that you issue the proposed letter of clarification as quickly as possible in an effort to allow the District to proceed with some course of action. Although the City of Austin must also approve the proposed design, the City staff cannot approve a solution unless it is also approved by the State.

If you have any questions please call. I look forward to your response.
Sincerely,

David Malish P.E.
Murfee Engineering Company

CC: Gary Spoonts – North Austin MUD No. 1
Sharlene Collins – Armbrust and Brown, LLP

1101 Capital of Texas Highway South • Building D, Suite 110 • Austin, Texas 78746 • 512/327-9204

(H) Hoses used for the transfer of drinking water to and from the tank shall be used only for that purpose and labeled for drinking water only. The hoses shall conform to ANSI/NSF Standard 61 and must be certified by an entity recognized by the commission. Hoses and related appurtenances must be cleaned and disinfected on a regular basis during prolonged use or before start-up during intermittent use. Hoses must be properly stored between uses and must be provided with caps and keeper chains or have the ends connected together.

(I) The tank shall be disinfected monthly and at any time that contamination is suspected.

(J) At least one sample per month from each tank shall be collected and submitted for microbiological analysis to one of the commission's approved laboratories for each month of operation.

(K) A minimum free chlorine residual of 0.5 mg/L or, if chloramines are used as the primary disinfectant, a chloramine residual of 1.0 mg/L (measured as total chlorine) shall be maintained in the water being hauled. Chlorine or chlorine containing compounds may be added on a "batch" basis to maintain the required residual.

(L) Operational records detailing the amount of water hauled, purchases, microbiological sampling results, chlorine residual readings, dates of disinfection, and source of water shall be maintained.

Adopted January 28, 2004 Effective February 19, 2004

§290.45. Minimum Water System Capacity Requirements.

(a) General provisions.

(1) The requirements contained in this section are to be used in evaluating both the total capacities for public water systems and the capacities at individual pump stations and pressure planes which serve portions of the system that are hydraulically separated from, or incapable of being served by, other pump stations or pressure planes. The capacities specified in this section are minimum requirements only.

(2) The executive director will require additional supply, storage, service pumping, and pressure maintenance facilities if a normal operating pressure of 35 pounds per square inch (psi) cannot be maintained throughout the system, or if the system's maximum daily demand exceeds its total production and treatment capacity. The executive director will also require additional capacities if the system is unable to maintain a minimum pressure of 20 psi during fire fighting, line flushing, and other unusual conditions.

(3) The executive director may establish additional capacity requirements for a public water system using the method of calculation described in subsection (g)(2) of this section if there are

According to TCEQ - Capacity refers to both flow & pressure. The COA agreed to provided sufficient capacity to all lots which does not just mean flow.

Murfee Engineering Company

March 20, 1997

Mike Erdmann
Wholesale Service Manager
City of Austin
625 East 10th Street, Suite 500
Austin, Texas 78721

RE: North Austin Water Pressure

Dear Mr. Erdmann:

Referencing your letter to Ms. Sue Littlefield dated March 18, 1997 concerning water pressure in Willow Run, you mentioned that the City of Austin was examining the possibility of raising the lower operating level in the Martin Hill Resevoir to 996 feet msl. It is requested that you provide me with an estimated schedule identifying when you intend to raise the level. In addition, it would be appreciated if you would let us know precisely when the operating change occurs. This information will be used by the District manager to reinitiate the District's internal pressure monitoring program.

Please call if you have any questions. I appreciate your help.

Sincerely,

David Malish, P. E.

Malish/letters/erdmann2.doc
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FEB 14 '9? ...

ECO RESOURCES, INC.
9511 Ranch Road 620 North
Austin, TX 78726-2908

FAX: (512) 335-0251

FAX TRANSMISSION

TO: D. Mallett FAX NO.: 327-2747

Total pages, including cover: 4 DATE: 12/14/92

FROM: S. Smith PHONE: 512-335-7580

CONFIDENTIALITY NOTE

Sender's Comments:

Sheets are marked for locations of pressure gauges

Professional services in water supply and wastewater treatment.
A subsidiary of Southwest Water Company.

P-NA01488
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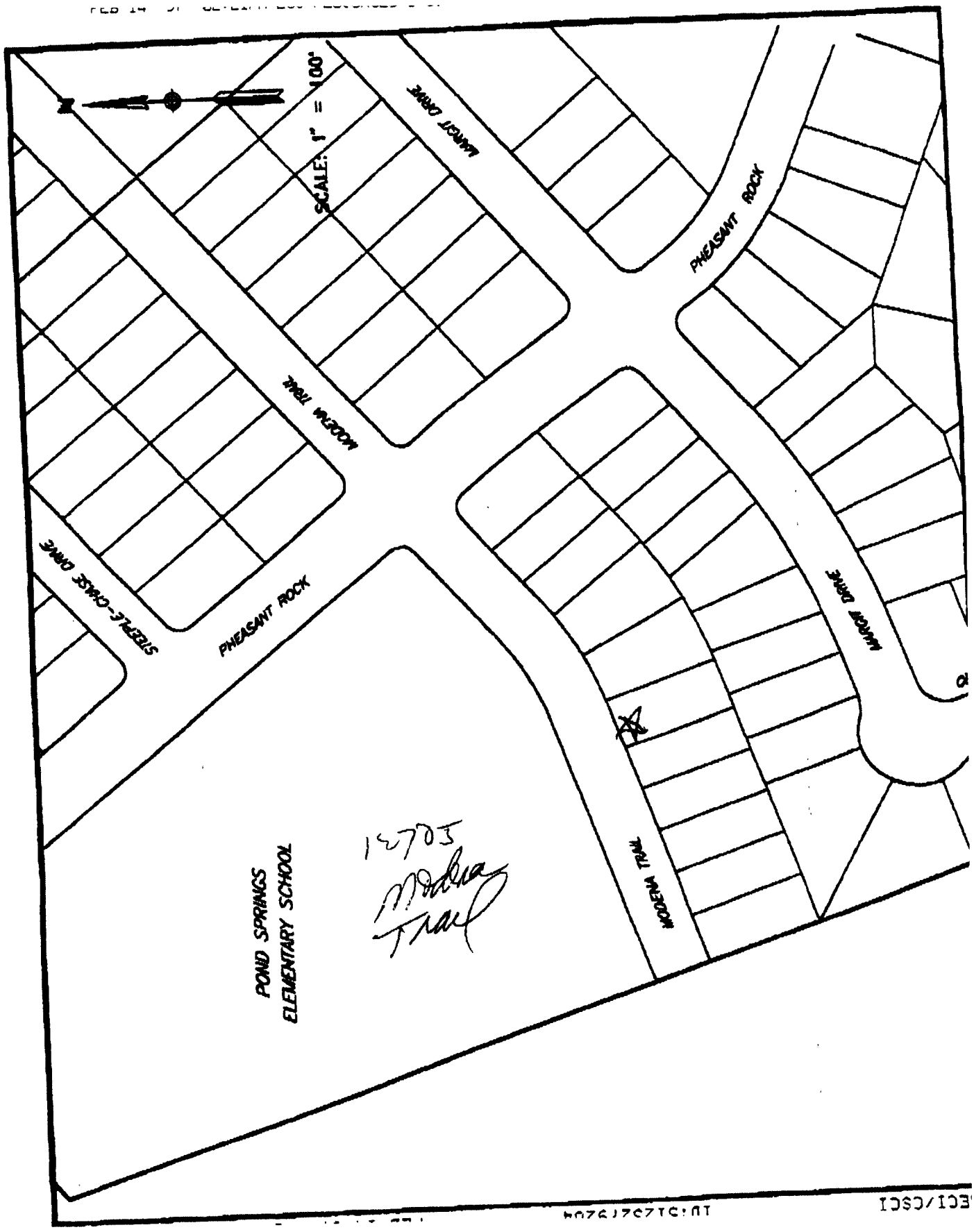
SCALE: 1" = 100'
LANCET DRIVE
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MOCHA TRAIL
SIERRA-CHASE DRIVE
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MANOR DRIVE
MODENA TRAIL
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ELEMENTARY SCHOOL
15705
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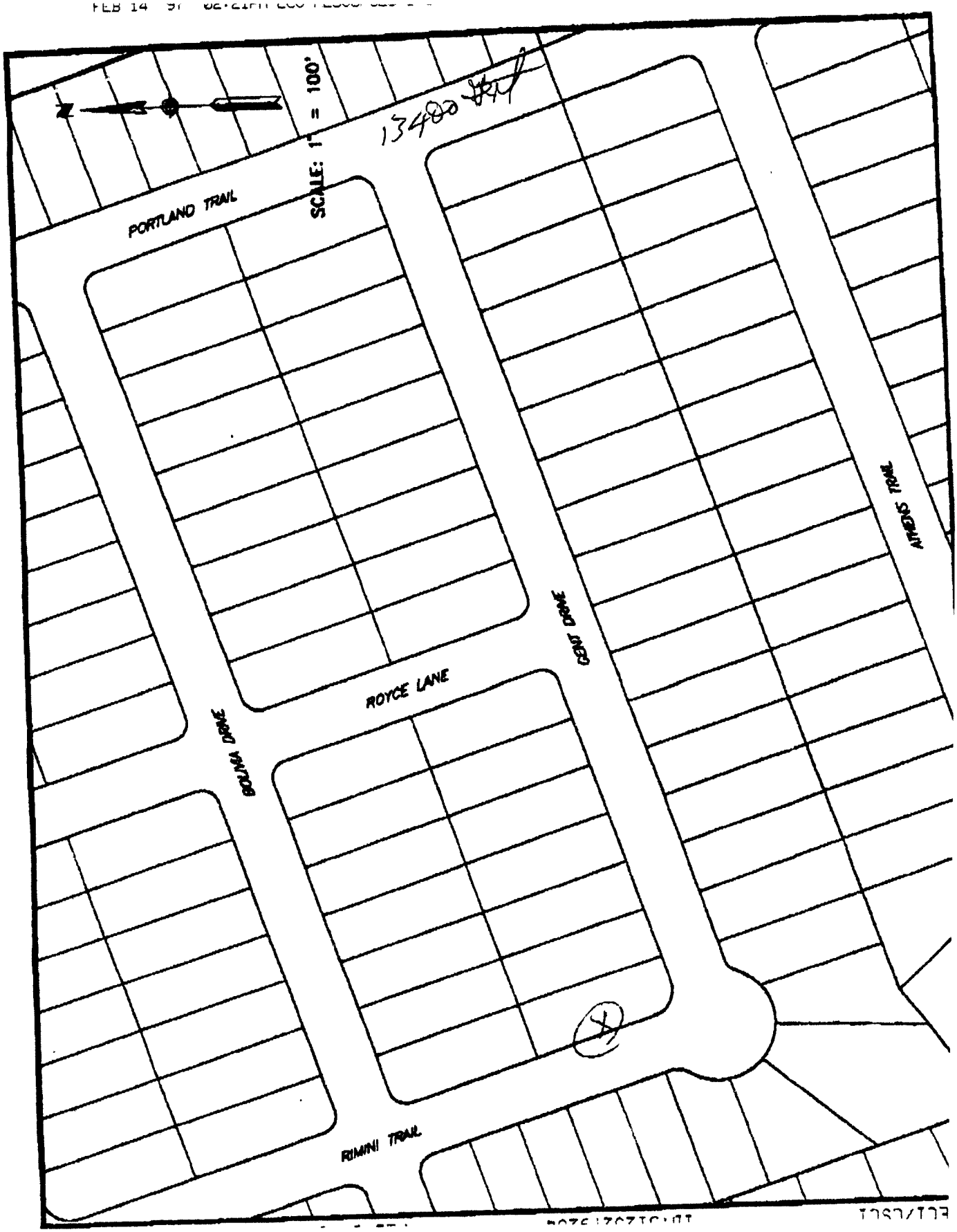
Trail



P-NA01491
947

Murfee Engineering Company

Memorandum

DATE: June 3, 1996

TO: Gary Spoonts, Eco Resources

FROM: David Malish DM

RE: Static Pressure Tests at North Austin MUD

It is requested that the District manager measure and record the static pressure at the designated fire hydrant twice per week beginning immediately. Measurements should be taken at 10:00 AM on Tuesdays and at 3:00 PM on Thursdays. Actual readings should be reported to Holly MacMorran at the office of Murfee Engineering Company by the Friday of each week and can be called in at 327-9204. If you have any questions or need additional information, please call.

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