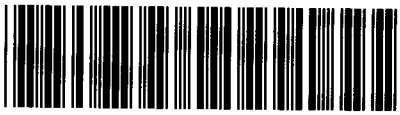


Control Number: 42867

Item Number: 87

Addendum StartPage: 0

SOAH DOCKET NO. 473-14-5138.WS
PUC DOCKET NO. 42857

PETITION OF NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1, NORTHTOWN MUNICIPAL UTILITY DISTRICT, TRAVIS COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT NO. 10 AND WELLS BRANCH MUNICIPAL UTILITY DISTRICT FROM THE RATEMAKING ACTIONS OF THE CITY OF AUSTIN AND REQUEST FOR INTERIM RATES IN WILLIAMSON AND TRAVIS COUNTIES	§	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

SOAH DOCKET NO. 473-14-5138.WS
PUC DOCKET NO. 42867

PETITION OF NORTH AUSTIN MUNICIPAL UTILITY DISTRICT NO. 1, NORTHTOWN MUNICIPAL UTILITY DISTRICT, AND WELLS BRANCH MUNICIPAL UTILITY DISTRICT FROM THE RATEMAKING ACTIONS OF THE CITY OF AUSTIN AND REQUEST FOR INTERIM RATES IN WILLIAMSON AND TRAVIS COUNTIES	§	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

NORTH AUSTIN UTILITY DISTRICT NO. 1'S RESPONSE TO CITY OF AUSTIN'S SECOND REQUEST FOR PRODUCTION OF DOCUMENTS

TO: City of Austin, by and through its attorney of record, Stephen P. Webb and Gwendolyn Hill Webb, Webb & Webb, 712 Southwest Tower, 211 East 7th Street, Austin, Texas 78701.

COMES NOW, North Austin Utility District No. 1 ("North Austin" or "Petitioner"), in the above-styled and numbered cause, and serves this, its Response to the City of Austin's Second Request for Production of Documents.

87

Respectfully submitted,

Randall B. Wilburn, Attorney at Law
State Bar No. 24033342
3000 South IH 35, Suite 150
Austin, Texas 78704
Telephone: (512) 535-1661
Fax: (512) 535-1678

John Carlton
State Bar No. 03817600
The Carlton Law Firm, P.L.L.C.
2705 Bee Cave Road, Suite 200
Austin, Texas 78746
Telephone: (512) 614-0901
Fax: (512) 900-2855

By:_____
JOHN J. CARLTON

COUNSEL FOR PETITIONER

CERTIFICATE OF SERVICE

I certify that I served a true and correct copy of the foregoing document on all parties of record in tis proceeding on this 19th day of November, 2014 via hand delivery, facsimile, electronic mail, overnight mail, U.S. mail and/or certified mail.

_____
JOHN J. CARLTON

PRODUCTION REQUESTS

The following requests pertain to the written prefiled testimony of David Malish and Thomas Arndt for North Austin Municipal Utility District No. 1.

11. Please provide any and all documents that support the justification for NAMD1's construction of two in-line variable speed water pressure booster stations.

Response: Responsive documents will be produced.

12. Please provide any and all documents pertaining to open meeting summaries notes, presentations, requests, and recorded deliberations pertaining to NAMD1's construction of two in-line variable speed water pressure low booster stations.

Objection: North Austin objects to this request because the request is overbroad in its time frame.

Response: Notwithstanding and without waiving the objections noted above, responsive documents will be produced.

13. Please provide any and all documents regarding the dispute with the City of Austin regarding the chlorine and chloramines residuals in the Martin Hill Reservoir, around 1996. Please include all communications pertaining to this issue with the City's Randy Gross, P.E., when he was Water and Wastewater Director; then City Manager Mr. Jesus Garza, and any representative of Espey, Huston & Associates.

Objection: North Austin objects to this request because the request is unduly burdensome, as any and all documents regarding communication with the City of Austin and the City's consultants are equally available to the City.

Response: Responsive documents will be produced.

14. Please provide any and all documents regarding the Utility Construction Contract.

Objection: North Austin objects to this request because the request is unduly burdensome, as any and all documents regarding communication with the City of Austin and the City's consultants are equally available to the City.

Response: Responsive documents will be produced.

15. Please provide any studies by Espey, Huston & Associates regarding the causes of low water pressure in NAMD1 and low chlorine and chloramines residuals in the Martin Hill Reservoir.

Objection: North Austin objects to this request because the request is unduly burdensome, as any and all documents regarding communication with the City of Austin and the City's consultants are equally available to the City.

Response: Responsive documents will be produced.

16. Please provide any and all documents regarding the need or reasons for NAMD1's issuance of bonds to construct water and wastewater in the early 1980's to the present.

Response: Responsive documents will be produced.

17. Please provide any and all documents regarding the need or reasons for NAMD1 issuing contract bonds to construct the 48-inch Spicewood Springs transmission main.

Objection: North Austin objects to this request because the request is unduly burdensome, as it includes communication with the City of Austin and the City's consultants that are equally available to the City.

Response: Responsive documents will be produced.

18. Please provide any and all documents regarding the need or reasons for NAMD1 issuing the $37,000,000 in general obligation bonds to purchase water or wastewater internal facilities.

Response: Responsive documents will be produced.

19. Please provide any and all documents regarding NAMD1's applications for waivers or exemptions with the Texas Commission on Environmental Quality ("TCEQ"), to be exempt from TCEQ's water pressure requirements for NAMD1.

Objection: North Austin objects to this request because the request is unduly burdensome, as it includes communication with the City of Austin and the City's consultants that are equally available to the City.

Response: Responsive documents will be produced.

20. Please provide any and all documents pertaining to the need for NAMD1 to construct a 2.7 million gallon elevated storage tank.

Response: Responsive documents will be produced.

21. Please provide any and all documents regarding the Master Meter Pressure dispute with the City of Austin. Specifically, the documents requested pertain to NAMD1's dispute with the City of Austin about whether Austin's obligation to maintain 35 psi ends at its Master Meter with NAMD1.

Objection: North Austin objects to this request because the request is unduly burdensome, as it includes communication with the City of Austin and the City's consultants that are equally available to the City.

Response: Responsive documents will be produced.

22. Please provide any and all documents regarding the Master Meter Pressure dispute with the TCEQ. Specifically, the documents requested pertaining to NAMD1's dispute with the City of Austin about whether Austin's obligation to maintain 35 psi ends at its Master Meter with NAMD1.

Objection: North Austin objects to this request because the request is unduly burdensome, as it includes communication with the City of Austin and the City's consultants that are equally available to the City.

Response: Responsive documents will be produced.

23. Please provide any and all documents regarding NAMD1's bond issue representations to future bond holders for sufficient water and wastewater services available to all developments in NAMD1's tax base.

Response: Responsive documents will be produced.

24. Please provide all statements, letters, briefs, reports made by NAMD1 representatives or individuals or companies representing or working on behalf of the interests or positions of NAMD1 about the need for or feasibility of Water Treatment Plant 4.

Objection: North Austin objects to this request because the request could include documents protected by attorney work product or attorney-client privileges;

Response: Notwithstanding and without waiving the objections noted above, responsive documents will be produced.

RESPONSE TO REQUEST NO. 11, 12

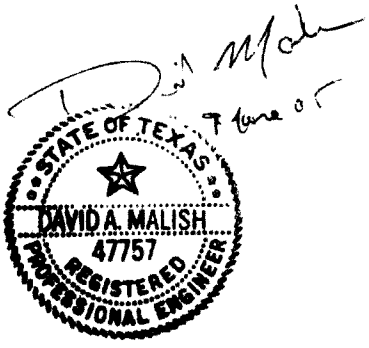
Engineering Report
in support of
Design of Temporary Variable Speed
Water Pressure Booster Station
to serve
North Austin M.U.D. No. 1

Prepared for:

North Austin M.U.D. No. 1
c/o Armbrust & Brown, LLP
100 Congress Avenue, Suite 1350
Austin, Texas 78703
512-435-2300

Prepared by:

Murfee Engineering Company, Inc.
1101 Capital of Texas Hwy S.
Building D, Suite 110
Austin, Texas 78746
512-327-9204



May 2005

P-NA00561

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INTRODUCTION

North Austin Municipal Utility District No. 1 (District) is situated basically north of the City of Austin and derives both water and wastewater wholesale service from the City of Austin under certain contractual agreements which basically includes the Agreement Concerning Creation and Operation of North Austin Municipal Utility District No. 1 dated November 15, 1983 and all subsequent amendments to that agreement. Retail service within the District is provided by the District using District owned and maintained wastewater collection and water distribution facilities. ECO Resources, Inc. is employed by the District as its contractor to manage, operate and maintain these facilities.

The District relies exclusively on the City of Austin to provide sufficient water capacity for both domestic and fire flows demands. The District does not currently operate, own or maintain any facilities to increase water capacity. Subdivisions currently constructed within the District have been approved by the City of Austin based partially on the availability of sufficient water service.

Portions of the District have been observed to experience low domestic water pressure below the State standard of 35 psi on occasions which have been identified through customer complaints and verified through field measurements and water modeling efforts. Follow up investigations revealed that the City of Austin no longer provides sufficient water pressure at the master meters to provide adequate domestic pressure at all times within the District. More specifically, the City of Austin staff have determined that the water supply facilities, primarily the Martin Hill Reservoir, is too large for the current demand base and the City operations staff cannot maintain a sufficient chlorine residual on distributed water. Apparently the potable water stagnates due to excessive detention and loses its chlorine residual. Therefore, the City staff has selected to lower the water level and subsequent hydraulic gradeline in the reservoir to reduce volume and affect more rapid water "turn over" to maintain chlorine residual. The subsequent result of their operational modification is lower pressures within the City of Austin's entire Martin Hill Reservoir service area which is occasionally below State standards.

The District engineer has met with City water and wastewater staff on several occasions and discussed possible operational resolutions to restore pressure. Alternatives included but were not limited to decreasing the volume of the Martin Hill Reservoir using internal dams or fillers and rechlorination on-site. The City of Austin's staff's response is attached. At this time it is understood that the City of Austin staff have no intention or plan to correct this problem.

Therefore, in response and to ensure public health and safety of the Districts customers, the District has selected to design and install two strategically located variable speed booster stations to ensure a constant domestic water pressure ranging from approximately 50 to 80 psi to all customers within the District. Water modeling efforts indicate that sufficient fire flows remains even at the lower water pressure received.

This report is prepared in support of design and construction of these facilities. As the District currently has no control of the delivered water pressure which occasionally falls below State standards, this request for review and approval is considered an emergency.

DESCRIPTION OF THE DISTRICT SERVICE AREA

North Austin MUD No. 1 was created as a District in 1983 with consent from the City of Austin in an agreement dated November 15, 1983. This District consists of approximately 996 acres and is situated north of the City of Austin and is bordered by Parmer Lane on the east, McNeil Drive on the south and FM 620 (SH 45) to the north. US 183 is situated to the west at various distances ranging from approximately ½ mile to perhaps two miles. The District is essentially bisected west to east by Anderson Mill Road. A location map of the District with respect to the City of Austin is provided on Figure 1.

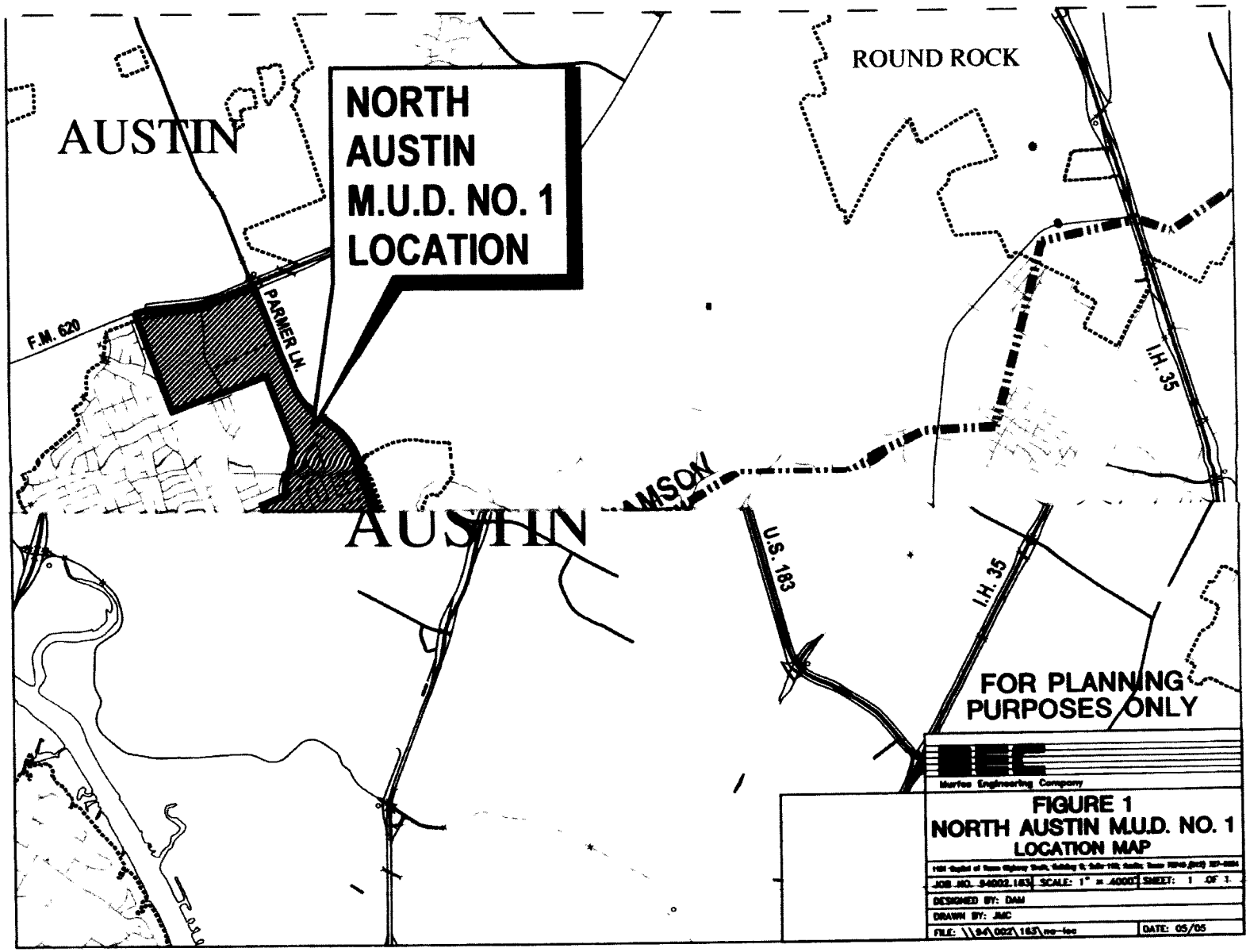
The District is drained by both Rattan Creek and Lake Creek which discharge to Brushy Creek, a tributary of the Brazos River Basin. The topography is characterized as gently rolling with elevations ranging from approximately 840 feet mean sea level (MSL) to 910 feet MSL as shown in Figure 2.

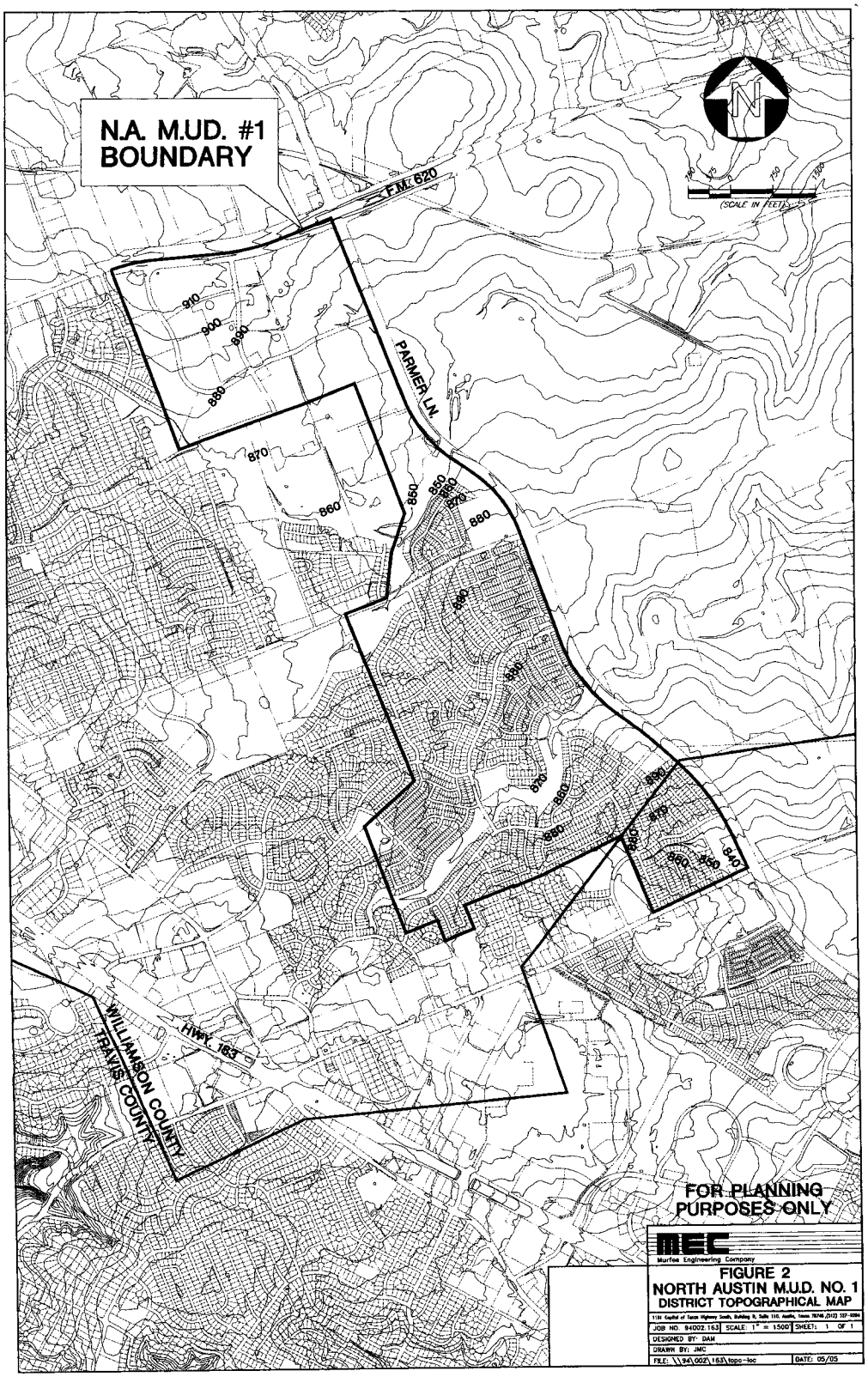
Development in the southern portions of the District consists primarily of approximately 2600 single family homes with limited multifamily and commercial retail uses. Development in the northern portion of the District, i.e., the portion north of Lake Creek, consists primarily of office/retail and multifamily development. Townhome/Condo units are also being planned in this area of the District. A general land use map is shown in Figure 3.

The District owns and operates its own internal water and wastewater facilities but receives wholesale service from the City of Austin for both utilities. Wastewater is collected within the District as it drains to either the City of Austin owned and operated Rattan Creek lift station or Lake Creek lift station for transfer to the City of Austin system. Domestic water service is provided to the District from both the City of Austin's Northwest B (NWB) pressure zone facilities and the Northwest A (NWA) pressure zone facilities. The City of Austin NWB facilities operate at a design overflow hydralic grade line of 1140 feet MSL and are basically scheduled to provide service to geographical areas at nominal ground elevations above approximately 900 feet MSL. More specifically, NWB pressure zone facilities are extended to serve all of the District north of Lake Creek which includes geographical areas below 900 feet MSL. Domestic pressures in this service area are consistently field measured above 50 psi at all times unless water service is temporarily interrupted.

The southern portion of the District, i.e., the portion south of Lake Creek, are served by the City of Austin NWA pressure zone. This pressure zone has a design overflow hydraulic grade line of 1015 feet MSL and is scheduled to serve geographical areas at nominal ground elevations of generally 750 feet MSL to 900 feet MSL. Nominal ground elevations in this portion of the district range from approximately 840 feet MSL to approximately 890 feet MSL.

Wholesale water is purchased from the City of Austin through essentially five City owned master meters. As previously mentioned, retail service is provided within the District with conventional retail meters via a distribution system operated and maintained by the District through its contractor ECO Resources, Inc. NWB pressure water is derived from the City of Austin through a single master meter located in the northwest corner of the Districts along FM 620 (SH 45). NWA pressure water is essentially derived from four additional master meters located 1) near the intersection of Amarillo at McNeil Drive, 2) Dallas Drive at Parmer Lane, 3) Tamayo Drive and Parmer Lane and 4) Anderson Mill Road and Parmer Lane. Figure 4 shows the location of the five master meters.


NORTH
AUSTIN
M.U.D. NO. 1
LOCATION
AUSTIN
ROUND ROCK
AUSTIN
F.M. 620
PARMER LN.
I.H. 35
U.S. 183
I.H. 35
FOR PLANNING
PURPOSES ONLY
Murfee Engineering Company
FIGURE 1
NORTH AUSTIN M.U.D. NO. 1
LOCATION MAP
JOB NO. 94002.163
SCALE: 1" = 4000'
SHEET: 1 OF 1
DESIGNED BY: DAM
DRAWN BY: JMC
DATE: 05/05


N.A. M.U.D. #1
BOUNDARY
F.M. 620
PARMER LN
WILLIAMSON COUNTY
TRAVIS COUNTY
HWY. 183
910
900
890
880
870
860
850
840
(SCALE IN FEET)
FOR PLANNING
PURPOSES ONLY
MEC
Murfee Engineering Company
FIGURE 2
NORTH AUSTIN M.U.D. NO. 1
DISTRICT TOPOGRAPHICAL MAP
JOB NO. 94002.163 SCALE: 1" = 1500' SHEET: 1 OF 1
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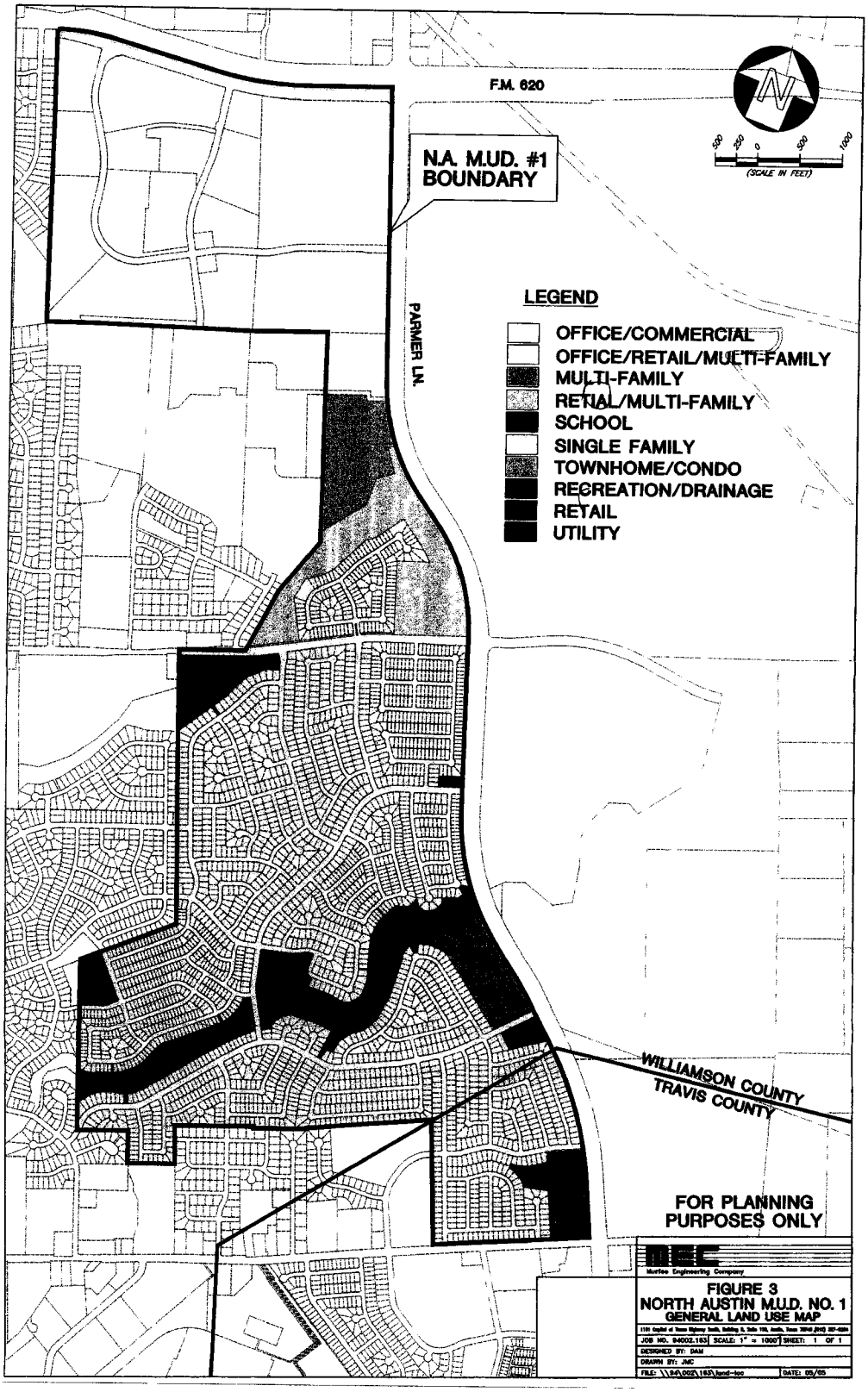
DRAWN BY: JMC
FILE: \\94\002\163\topo-loc DATE: 05/05

P-NA00566


F.M. 620
N.A. M.U.D. #1
BOUNDARY
PARMER LN.
500 250 0 500 1000
(SCALE IN FEET)
LEGEND
OFFICE/COMMERCIAL
OFFICE/RETAIL/MULTI-FAMILY
MULTI-FAMILY
RETAIL/MULTI-FAMILY
SCHOOL
SINGLE FAMILY
TOWNHOME/CONDO
RECREATION/DRAINAGE
RETAIL
UTILITY
WILLIAMSON COUNTY
TRAVIS COUNTY
FOR PLANNING
PURPOSES ONLY
Murfee Engineering Company
FIGURE 3
NORTH AUSTIN M.U.D. NO. 1
GENERAL LAND USE MAP
JOB NO. 94002.163 SCALE: 1" = 1000' SHEET: 1 OF 1
DESIGNED BY: DAM
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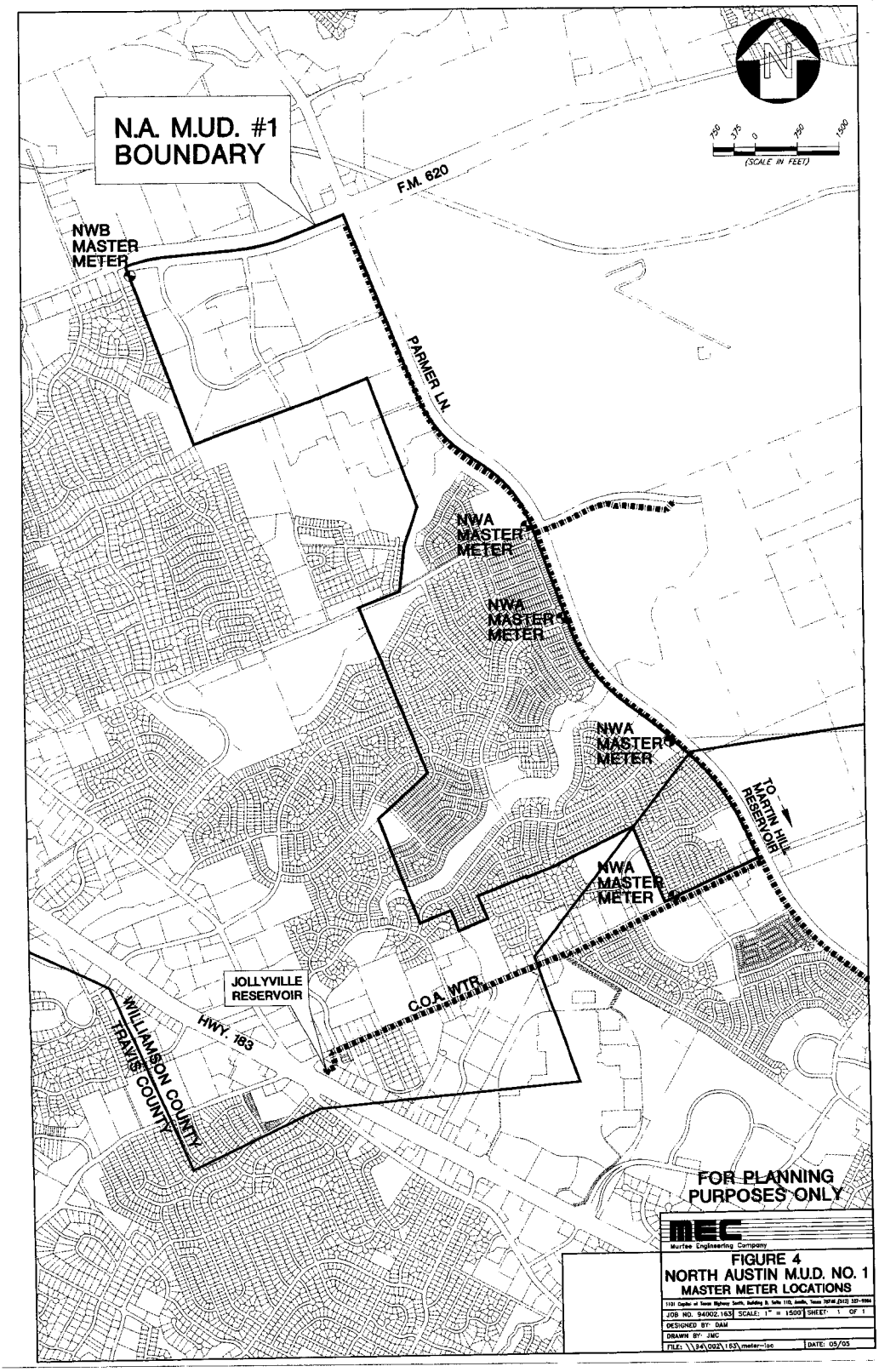
P-NA00567


N.A. M.U.D. #1
BOUNDARY
F.M. 620
NWB
MASTER
METER
PARMER LN.
NWA
MASTER
METER
NWA
MASTER
METER
NWA
MASTER
METER
NWA
MASTER
METER
TO
MARTIN HILL
RESERVOIR
JOLLYVILLE
RESERVOIR
C.O.A. WTR
HWY. 183
WILLIAMSON COUNTY
TRAVIS COUNTY
750 375 0 750 1500
(SCALE IN FEET)
FOR PLANNING
PURPOSES ONLY
MEC
Murfee Engineering Company
FIGURE 4
NORTH AUSTIN M.U.D. NO. 1
MASTER METER LOCATIONS
JOB NO. 94002.163 SCALE: 1" = 1500' SHEET 1 OF 1
DESIGNED BY: DAM
DRAWN BY: JMC
FILE: \\94\002\163\meter-loc DATE: 05/05

P-NA00568

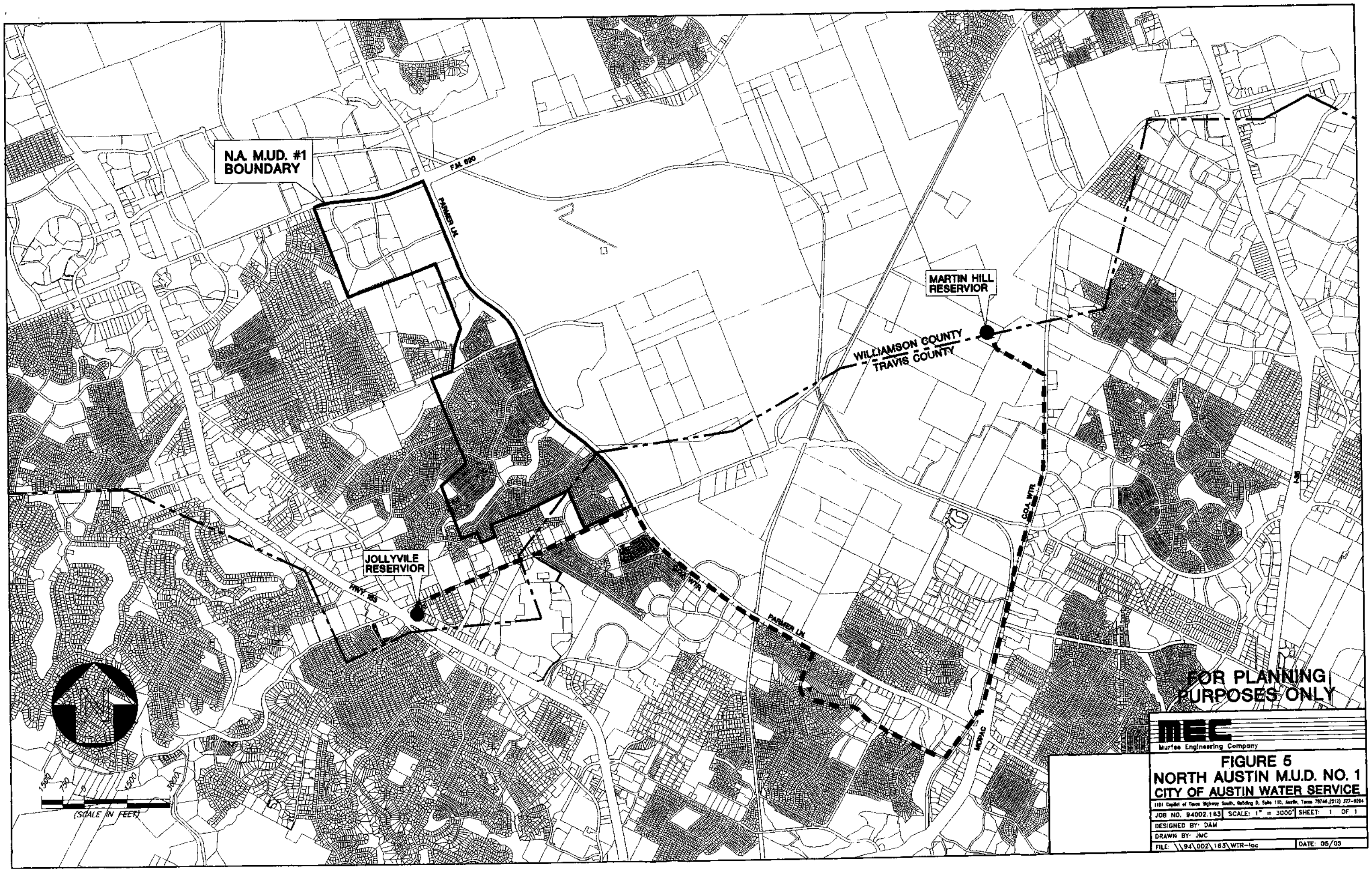
DESCRIPTION OF THE PRESSURE PROBLEM

As previously stated, the southern portion of the District is served by the City of Austin's NWA pressure zone facilities. These pressure facilities basically include the Martin Hill Reservoir and the Jollyville Reservoir which are designed with an overflow hydraulic grade line of 1015 feet MSL. The location of these facilities with respect to the District is shown in Figure 5. Assuming a normal operating range of perhaps 10 feet and a modeled water pressure loss of only a few psi, these facilities were designed to provide domestic pressure in excess of the State standard of 35 psi to the District. Subsequent subdivisions within the District designed by various engineers were approved for construction by the City of Austin under this assumption of adequate domestic pressure and fire flow. It is important to note that the City of Austin will no longer approve construction of subdivisions unless at least 50 psi of domestic pressure is available. One such subdivision within the District is currently denied approval as a domestic pressure of 50 psi is not currently available.

The Martin Hill Reservoir was designed and constructed by the City of Austin to have a total storage volume of 42 million gallons, perhaps the worlds largest. Once put into operation, this storage tank was determined to have excess volume for its service area and it became necessary, according to City staff, to reduce the effective operational storage volume in the reservoir to maintain adequate disinfection. This volume reduction was accomplished by lowering the operating level in the storage tank to a low of 980 feet MSL or 35 feet below its overflow elevation. Based on field measurements, it is suspected, but not confirmed, that levels below 980 feet MSL have occurred on occasion.

Recognizing the problem, the District instructed its consultant to engage the City staff to develop a resolution. Alternatives include establishing an intermediate pressure zone using the Jollyville Reservoir to operate at full capacity to serve the District whereby separating its service from the Martin Hill Reservoir. Two alternatives were explored. The first considered using an abandoned water line in McNeil Road and the second considered constructing a new dedicated main to the District. Both the District and the City agreed that neither of these two alternatives were either technically or economically feasible.

Other alternatives considered structural operational modifications to the Martin Hill Reservoir. Reduction in volume of the Martin Hill Reservoir with the construction of an internal dam or the placement of filler material was suggested but the City staff rejected these considerations perhaps because of economical concerns. Rechlorination to "freshen" the delivered water was rejected based on terrorism and other concerns as ammonia would need to be supplied for chloramination disinfection. In any event, the City staff is not willing to explore any operational modifications. A copy of their actual response is attached in Appendix A. The District now recognizes its obligation to resolve this problem internally.


N.A. M.UD. #1
BOUNDARY
F.M. 620
PARMER LN.
MARTIN HILL
RESERVIOR
WILLIAMSON COUNTY
TRAVIS COUNTY
JOLLYVILE
RESERVIOR
HWY 183
PARMER LN.
COA WTR.
MOPAC
(SCALE IN FEET)
FOR PLANNING
PURPOSES ONLY
MEC
Murfee Engineering Company
FIGURE 5
NORTH AUSTIN M.U.D. NO. 1
CITY OF AUSTIN WATER SERVICE
JOB NO. 94002.163 SCALE: 1" = 3000' SHEET: 1 OF 1
DESIGNED BY: DAM
DRAWN BY: JMC
FILE: \\94\002\163\WTR-loc DATE: 05/03

P-NA00570

RECOMMENDED RESOLUTION

Recognizing that the City of Austin has no immediate plans or intension to correct the immediate pressure problem, the District instructed its District engineer to develop a strategy and design to temporarily remedy the internal pressure problem until external water demand dictates full employment of the City of Austin's facilities and pressure is restored under normal operations. The District was also advised by its consultant that it currently holds approximately $700,000 to $800,000 in surplus funds that may be available for this effort. Under this directive the District engineer initiated an analysis with water modeling support and determined that two strategically located variable speed booster stations could be designed and constructed to resolve the pressure problems with the potentially available financial resources.

The District is fortunate to have available two vacant sites for construction of pressure boosting facilities which are strategically located. These sites include an approximate 1.9 area tract near the intersection of Dallas Drive and Parmer Lane and an approximately 0.8 acre tract near the intersection of Tamayo Drive and Parmer Lane.

The two proposed booster stations are designed to provide the total anticipated peak domestic water demand based on the City of Austin criteria and historical field data. The results of water model simulations on the existing District water distribution system indicates that sufficient fire flow is available from the City of Austin. Therefore, the booster stations are design to collectively provide sufficient peak domestic flow only under extreme pressure differentials as delivered by the City of Austin. If flow demands exceed the booster stations operating capacity such as in the event of a major fire flow event, the booster stations will be automatically bypassed through a check valve and the District's system will operate as if the booster stations did not exist - a satisfactory operating condition for fire flows. Once the large flow demands cease, the booster stations will return to its normal operating mode.

The Northwest A pressure zone services approximately 2600 connections within the District. Based on the City of Austin's criteria of 2.2 gpm per connections for peak level flows and 0.4 gpm per connection for low flow, the District's domestic water demand will range from approximately 1040 gpm to 5720 gpm. The variable speed booster stations are configured to maintain a specific downstream water pressure by maintaining the demand flows.

Increased water demands will tend to lower system pressure which will simultaneously be restored with increased flow as the pump/motor speed increases. A constant downstream pressure in the range of 66 psi is selected.

The District engineer recommends the use of variable speed technology over the hydropnematic technology for several reasons. Due to topographical conditions and water distribution pressure head loss considerations, the District experiences a 30 psi water pressure differential across the southern portion of the District. Efforts to improve water pressure considered providing a constant minimum domestic pressure of 50 psi to all customers which implies a water pressure of 80 psi to the customers in the lowest topographic elevations. Variable speed technology provides a constant pressure while hydropnematic pressure provides a variable pressure ranging over approximately 20 psi. To maintain a pressure of no more than approximately 60 to 80 psi to some customers could imply a low pressure of 30 to 50 psi to customers at higher elevations which will not meet State standards.

A lesser but acceptable operating range of 15 psi with the hydropnematic system would work and maintain a minimum pressure of 35 psi but results in little margin of safety for operational problems commonly associated with hydropnematic systems as they occasionally drift from design set points. In addition, the District engineer has had exceptionally good experience with the variable speed technology employed for a similar situation in the Wells Branch Municipal Water District also located north of Austin west of the District. Finally, this technology is recommended as the cost of such facilities is within the range of the available financial resources of the District as determined by the District's engineer with preliminary quotes from local suppliers/contractors.

The proposed design incorporates the use of two variable speed pressure booster stations located near the intersection of Dallas Drive and Parmer Lane and at the intersection of Tamayo Drive and Parmer Lane as shown in Figure 6. The two remaining master meters near the intersection of Amarillo and McNeil Drive and Anderson Mill Road and Parmer Lane will not be totally decommissioned but will rather be retrofitted with downstream check valves to isolate under normal operations. In the event of a pump failure to either or both booster systems or the event of a excessive fire flow demand, additional water supply through these existing connections would be available as pressure decreases – a condition no worse than the present and within State standard for fire flow.

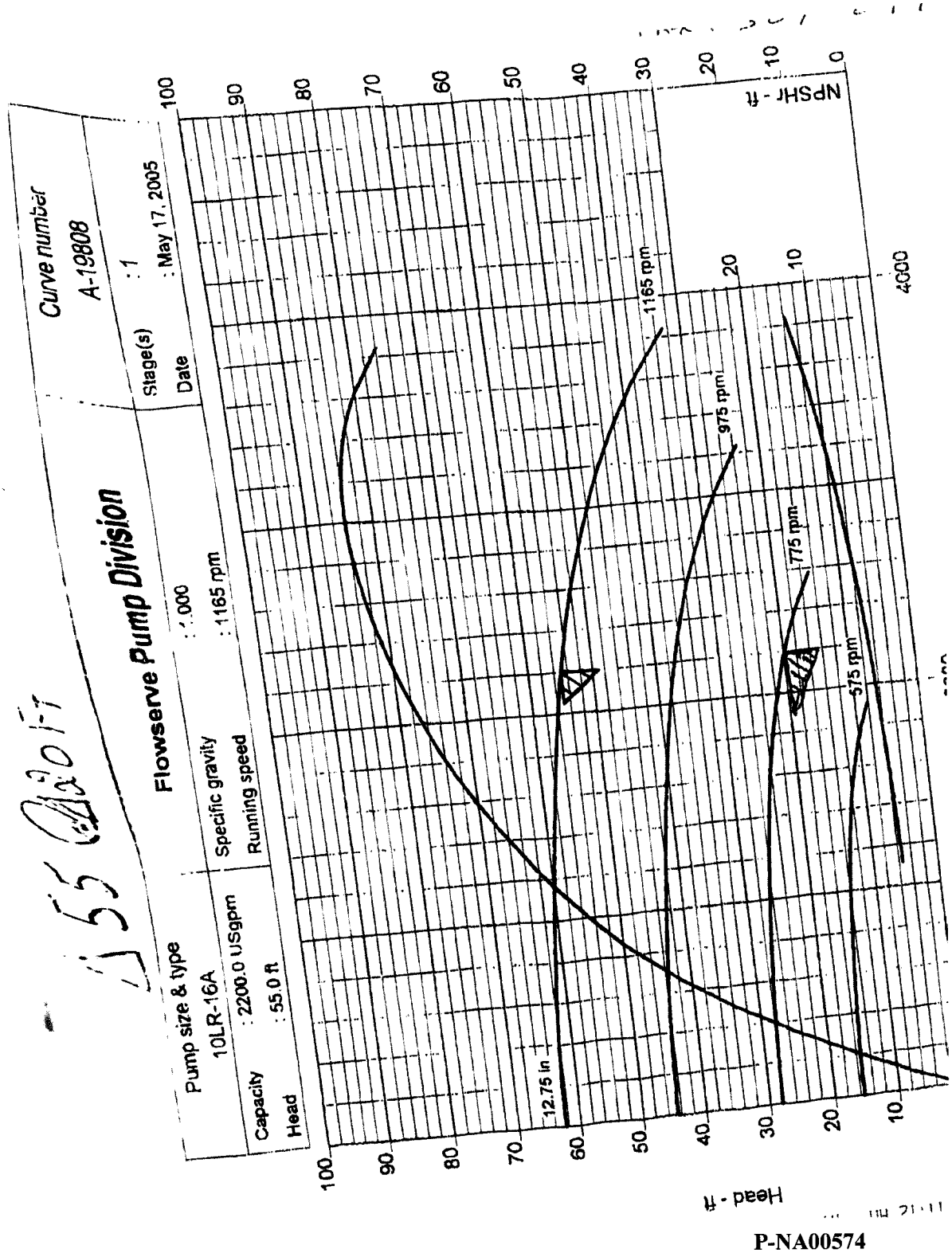
It should be recognized that the water main servicing the District at Tamayo Drive and Parmer Lane is a 12 inch diameter main and that the main at Dallas Drive and Parmer is a 16 inch diameter main. Therefore, the pump stations cannot be equally sized in an effort to maintain minimum main velocity at extreme high flow demands. Based on modeling efforts and results presented in Appendix B, it is recommended that the north booster station at Tamayo and Parmer be designed to deliver a maximum of 2200 gpm of firm capacity at a hydraulic grade line of 1036 feet MSL and the south booster station at Dallas Drive and Parmer Lane be designed to deliver 3600 gpm and a firm capacity at a hydraulic gradeline of 1044 feet MSL. Water model results show that District domestic pressure will range from approximately 50 psi to 82 psi constantly under a peak hour demand condition. These design pressures can be adjusted slightly downward to minimize pressures to 48 psi and 80 psi respectively if necessary.

Selected variable speed pumps must be capable of operating over the full range of anticipated conditions. Domestic water demands with the District are anticipated to range from a low of 500 gpm to a high of approximately 5800 gpm during peak hour conditions. Delivery pressures from the City of Austin will range from a low of approximately 36 psi to a high of approximately 56 psi as the Martin Hill Reservoir operational elevation fluctuates over 35 feet. Based on the results of the water modeling effort and the available water main size for receiving the pressure boosted water at the two selected sites, a design firm capacity of 2200 gpm at the north station and a design firm capacity of 3600 gpm at the south station is recommended. Initial review of pump performance curves suggests that the north station be equipped with two 2200gpm providing a firm capacity of 2200 gpm pumps and the south station will be equipped with three 1800 gpm pumps providing a firm capacity of 3600 gpm. The table below provides a summary of extreme conditions under which each pump must operate.

Summary of Pump Operating Ranges North Station – Elevation 880' MSL			
		Delivered Pressure (Feet)	***Delivered Pressure (PSI)***
City of Austin Available Pressure		95-130	41-56
	Design Flow (gpm)	***Discharge Head (Feet)***	***Discharge Head (PSI)***
Pump Operating Range	2200	20-55	9-24
	200	20-55	9-24
South Station – Elevation 890' MSL			
		Delivered Pressure (Feet)	***Delivered Pressure (PSI)***
City of Austin Available Pressure		85-120	36-52
	Design Flow (gpm)	***Discharge Head (Feet)***	***Discharge Head (PSI)***
Pump Operating Range	1800	25-60	11-26
	300	25-60	11-26

It is recommended that two Flowserve, 50 h.p. centrifugal pumps (10LR-16A) be used for the north station and three Flowserve, 50 h.p. centrifugal pumps (8CR-14A) be used for the south station. The pump curves are provided in Figure 7 and Figure 8 respectively. A schematic of each pump station is provided in Figure 9 and 10. It is recommended that the booster stations be purchased as a skid mounted packaged system. Specifications for these facilities are provided in Appendix C.

FIGURE 7



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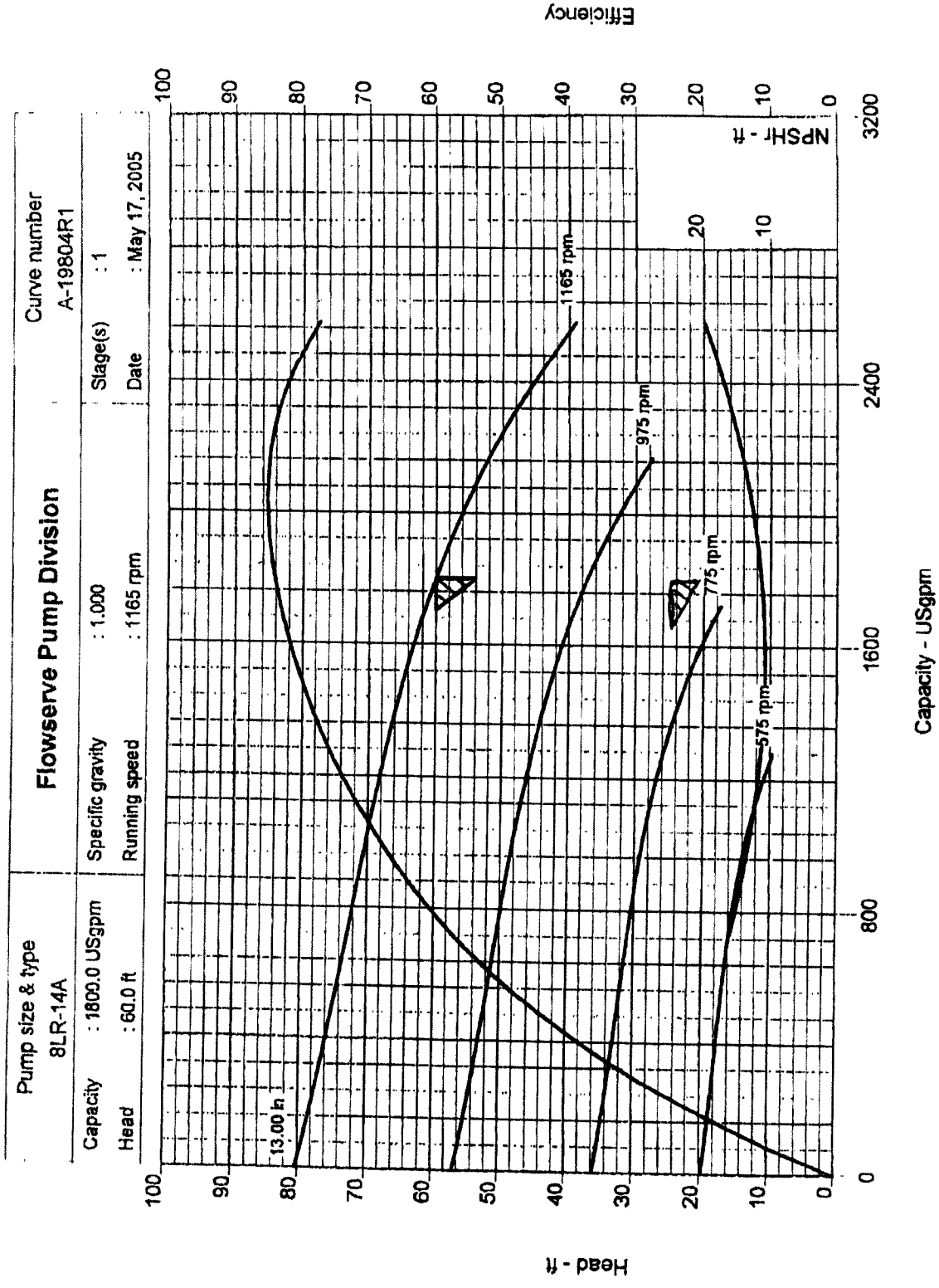
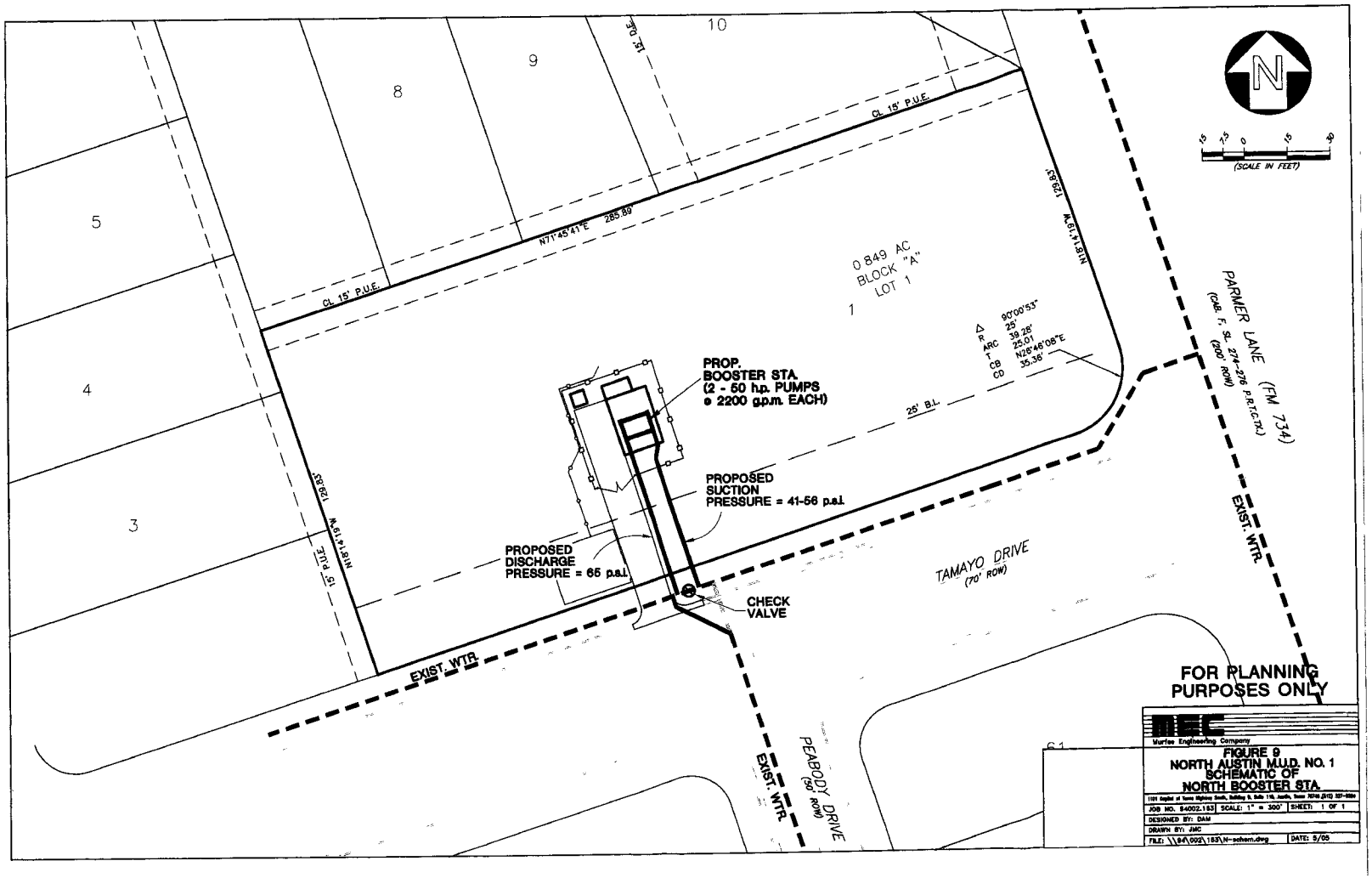
Daniel, 327-2947

FIGURE 8



P-NA00575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9
8
5
4
3
15' D.E.
CL 15' P.U.E.
N71°45'41"E 285.89'
CL 15' P.U.E.
0.849 AC.
BLOCK "A"
LOT 1
1
N18°14'19"W 129.85'
Δ = 90°00'53"
R = 25'
ARC = 39.28'
CB = 25.01'
CD = N26°46'08"E 35.36'
25' B.L.
PROP.
BOOSTER STA.
(2 - 50 h.p. PUMPS
@ 2200 g.p.m. EACH)
PROPOSED
SUCTION
PRESSURE = 41-56 p.s.i.
PROPOSED
DISCHARGE
PRESSURE = 65 p.s.i.
CHECK
VALVE
N18°14'19"W 129.85'
15' P.U.E.
EXIST. WTR.
EXIST. WTR.
EXIST. WTR.
TAMAYO DRIVE
(70' ROW)
PEABODY DRIVE
(50' ROW)
PARMER LANE (FM 734)
(CAB. F, SL. 274-276 P.R.T.C.TX.)
(200' ROW)
N
(SCALE IN FEET)
FOR PLANNING
PURPOSES ONLY
Murfee Engineering Company
FIGURE 9
NORTH AUSTIN M.U.D. NO. 1
SCHEMATIC OF
NORTH BOOSTER STA.
JOB NO. 84002.153 | SCALE: 1" = 300' | SHEET: 1 OF 1
DESIGNED BY: DAM
DRAWN BY: JMC
FILE: \\84\002\153\N-schem.dwg | DATE: 5/05

P-NA00576

APPENDIX A

EMAIL FROM CITY OF AUSTIN

Lutes, Teresa

COPY

From: Jennings, Bart
Sent: Monday, May 10, 2004 2:32 PM
To: Sharlene Collins (E-mail); David Mallsh (E-mail)
Cc: Lutes, Teresa; Cantu, Reynaldo; Burazer, Jane; Greene, George; Gardner, Gene; Brooks-Newton, Georgi; Vivona, John
Subject: North Austin MUD Issues

Sharlene/David,

I met with Teresa and Gene on Friday to discuss any previous work initiated on your suggested option of providing higher pressure water to the North Austin MUD for its internal pressure problems though additional multiple connections of the City's water system to the MUD's distribution system. It seems that past work was mostly conceptual and modeling of such an option has not been thoroughly explored. Gene requested the following information in order for him to properly analyze such an option:

1. A map showing the boundaries of the areas that you wish to address with the proposed solution. The boundaries of the low pressure areas should follow property lines.
2. The number of connections within the identified areas (I am assuming they are all 5/8" connections. If not, please let us know.)
3. Indicate the peak hour flow and fire flow figures for the MUD in these low pressure areas.
4. Indicate where you propose additional master meters be located.

As soon as we receive the information, Gene will work on this model and provide you the results of his findings.

In terms of your suggestion regarding the re-chlorination of the Martin Hill Reservoir, the suggestion has been reviewed by various divisions of the Austin Water Utility. The Austin Water Utility is not interested in pursuing this option to address pressure issues for several reasons:

1. Public Perception: Because of the size of the facilities needed to store chemicals on site and the general public's concern of the storage of chemical (which has been expressed in the past of the Utility's existing water treatment plants), we believe that the public and the media would become alarmed at such a proposal and would create public relation issues for an area that the City wishes to promote economic development.

2. Change in Safety Procedures: By storing these chemicals on-site, the Utility's safety procedures, anti-terrorism procedures, vulnerability assessments, and security measures at the site would be required to be changed. As you know, such issues are regulated by State and Federal agencies and have been scrutinized since 9/11. The change in security measures would require additional funding for improvements and increased operating expenses. Such a change would also increase the Utility's overall risk and liability related to mechanical failures or accidents that could possibly occur at the site.

3. Sizing of Facilities: Re-chlorination in a other distribution systems has not encompassed a reservoir of the type of magnitude that the City operates. Most utilities shy away from feeding gas chemicals in their distribution systems due to safety and public perception of using gas chemicals and use liquid chemicals instead. This means using aqueous ammonia and sodium hypochlorite and would require large storage volumes. The sizing of the facilities only exacerbates the concerns listed.

4. Potential Water Quality Problems: Because our water source is surface water, the introduction of additional chemicals at the reservoir will increase the possibility of disinfectant byproducts. Most of our industrial customers manufacturing systems are highly sensitive to such byproducts and several industrial customers obtain their water through the Martin Hill Reservoir.

5. Operating Flexibility: The Austin Water Utility wishes to retain the greatest operational flexibility in operating the Martin Hill Reservoir and does not wish to limit the range of the reservoir level. The turnover in the reservoir is an important issue in order to ensure that bacteria re-growth due to nitrification does not occur. By operating the reservoir within the range that it is currently being operated at, the nitrification potential is addressed. Operating the reservoir at a higher level in order to increase psi within the distribution system would increase the possibility of nitrification and subsequent bacteria re-growth.

1

2

APPENDIX B

WATER DISTRIBUTION MODEL
PEAK HOUR DEMAND CONDITIONS

APPENDIX B

WATER DISTRIBUTION MODEL
PEAK HOUR DEMAND CONDITIONS

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

Label	Elevation (ft)	Discharge (gpm)	Pump Head (ft)	Discharge Enhanced Pressure (psi)	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge Enhanced HGL (ft)
PMP-1 Dallas	890.00	3,582.40	68.25	66.86	976.30	1,044.54	1,044.54
PMP-2 Tamayo	880.00	2,232.20	60.35	67.74	976.22	1,036.57	1,036.57

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Zone
J-1	910.00	0.00	0.00	1,025 70	50.06	1
J-435	907.00	30.80	14.00	1,025.75	51.38	1
J-280	910.00	26.40	12 00	1,033.93	53.62	1
J-405	901.00	30.80	14.00	1,025 74	53 97	1
J-930	899.00	57.20	26.00	1,025 62	54.78	1
J-340	906.00	11.00	5.00	1,033.70	55.25	1
J-375	896.00	55.00	25.00	1,025.70	56.11	1
J-855	894.00	13.20	6.00	1,025 61	56.94	1
J-355	902.00	22.00	10 00	1,033.69	56.98	1
J-335	902.00	26.40	12.00	1,033.70	56.98	1
J-365	902.00	17.60	8.00	1,033.75	57.00	1
J-525	894.00	33.00	15 00	1,026.24	57.21	1
J-1030	895.00	33.00	15.00	1,027.42	57.29	1
J-385	893.00	33.00	15.00	1,025.62	57 38	1
J-380	893.00	55.00	25.00	1,025.67	57.40	1
J-945	896.00	24.20	11.00	1,028.68	57.40	1
J-975	896.00	26 40	12.00	1,028.74	57.43	1
J-1000	896.00	30 80	14.00	1,028.89	57.49	1
J-275	901.00	52.80	24 00	1,034 17	57.62	1
J-330	900.00	22.00	10.00	1,033.70	57 85	1
J-440	892.00	72.60	33.00	1,025.88	57.92	1
J-410	892 00	70.40	32.00	1,025 94	57.95	1
J-985	895.00	30.80	14.00	1,029.00	57.97	1
J-530	892 00	39 60	18.00	1,026.24	58 08	1
J-520	892 00	13 20	6 00	1,026.29	58.10	1
J-550	891.00	22 00	10.00	1,026.21	58.50	1
J-990	894.00	30.80	14.00	1,029.26	58.52	1
J-940	892.00	24.20	11.00	1,027.54	58.64	1
J-350	898.00	33.00	15.00	1,033.70	58.71	1
J-1025	891.00	33.00	15.00	1,027.46	59.04	1
J-390	889.00	41.80	19.00	1,025.68	59.13	1
J-985	890.00	24.20	11.00	1,027.12	59.32	1
J-1035	890.00	33.00	15.00	1,027.42	59.46	1
J-1045	890.00	33.00	15.00	1,027.44	59.46	1
J-1050	890.00	33.00	15.00	1,027.44	59.47	1
J-430	888.00	37.40	17.00	1,025.96	59.69	1
J-555	888.00	19.80	9.00	1,026.21	59.80	1
J-910	888.00	13.20	6.00	1,026.29	59.83	1
J-535	888.00	30.80	14.00	1,026.34	59.85	1
J-1055	889.00	33.00	15.00	1,027.49	59.92	1
J-905	888.00	15.40	7.00	1,026.61	59.97	1
J-935	888.00	24.20	11.00	1,027.20	60.22	1
J-560	887.00	19.80	9.00	1,026.23	60.24	1
J-570	887.00	26.40	12.00	1,026.29	60.27	1
J-970	890.00	0.00	0.00	1,029.36	60.29	1
J-1060	888.00	33.00	15.00	1,027.45	60.33	1
J-515	887.00	35.20	16.00	1,026.53	60.37	1
J-655	888.00	22.00	10.00	1,027.59	60.39	1
J-540	887.00	15 40	7.00	1,026.63	60.41	1
J-590	887.00	33.00	15.00	1,026.63	60.41	1
J-505	887.00	33.00	15 00	1,026.82	60.49	1
J-600	886.00	26.40	12.00	1,026.80	60.92	1

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Zone
J-605	886.00	17.60	8.00	1,027.16	61.07	1
J-500	886.00	19.80	9.00	1,027.58	61.26	1
J-1020	886.00	33.00	15.00	1,027.69	61.30	1
J-850	892.00	11.00	5.00	1,033.74	61.33	1
J-360	892.00	17.60	8.00	1,033.75	61.33	1
J-325	892.00	17.60	8.00	1,033.75	61 33	1
J-395	884.00	85.80	39.00	1,025.98	61 43	1
J-415	884.00	41.80	19.00	1,026.15	61.50	1
J-425	884.00	46.20	21.00	1,026.60	61.70	1
J-545	884.00	28.60	13.00	1,026.80	61.78	1
J-1070	885.00	26.40	12.00	1,028.24	61.97	1
J-1040	884.00	33.00	15.00	1,027.42	62.05	1
J-345	890.00	30.80	14.00	1,033.75	62.19	1
J-510	883.00	44 00	20.00	1,026.77	62.20	1
J-460	883.00	6.60	3.00	1,027.06	62.33	1
J-995	886.00	30.80	14.00	1,030.06	62.33	1
J-565	882.00	19.80	9.00	1,026.28	62.42	1
J-595	882.00	19.80	9.00	1,026.49	62.51	1
J-1005	884.00	30.80	14.00	1,028 60	62 56	1
J-950	882 00	24.20	11.00	1,026.89	62.69	1
J-885	881.00	19.80	9.00	1,026.13	62.79	1
J-830	892.00	0.00	0 00	1,037.28	62.86	1
J-650	882.00	66.00	30.00	1,027.40	62.91	1
J-615	881 00	19.80	9.00	1,026.58	62.99	1
J-610	882.00	46.20	21.00	1,027.70	63.04	1
J-320	888.00	11.00	5.00	1,033.79	63 08	1
J-285	888.00	48.40	22.00	1,033.83	63.10	1
J-585	880.00	19.80	9.00	1,026.15	63 23	1
J-420	880.00	19.80	9.00	1,026.66	63.45	1
J-635	881.00	46.20	21.00	1,027.90	63.56	1
J-890	880.00	26.40	12.00	1,027.17	63.67	1
J-215	890.00	48.40	22.00	1,037.28	63.72	1
J-495	880.00	26.40	12.00	1,027.69	63.90	1
J-310	886.00	66.00	30.00	1,033.78	63.94	1
J-455	880.00	17.60	8.00	1,027 93	64.00	1
J-955	879.00	24.20	11.00	1,026.96	64.01	1
J-400	878.00	72.60	33.00	1,026.15	64.10	1
J-210	890.00	48.40	22.00	1,038.16	64.10	1
J-1010	881.00	30.80	14.00	1,029.24	64.14	1
J-680	882.00	35.20	16.00	1,030.89	64.42	1
J-445	878.00	19.80	9.00	1,027.07	64.50	1
J-875	877.00	19.80	9.00	1,026.56	64.71	1
J-490	878.00	13.20	6.00	1,027.65	64.74	1
J-190	892.00	46.20	21.00	1,041.73	64.78	1
J-880	876.00	22.00	10.00	1,026.08	64.93	1
J-185	893.00	26.40	12.00	1,043.46	65.10	1
J-920	877.00	6.60	3.00	1,027.53	65.13	1
J-640	877.00	15.40	7.00	1,027.54	65.13	1
J-620	876.00	19.80	9.00	1,026.58	65.15	1
J-1090	877.00	30.80	14.00	1,027.59	65.15	1
J-915	877.00	8.80	4.00	1,027.60	65.16	1
J-580	875.00	66.00	30.00	1,026.10	65.37	1

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Zone
J-160	889.00	46.20	21.00	1,040.23	65.43	1
J-1015	880.00	0.00	0.00	1,031.29	65.46	1
J-485	876.00	24.20	11.00	1,027.61	65.59	1
J-465	876.00	13.20	6.00	1,027.73	65.65	1
J-305	882.00	17.60	8.00	1,033.80	65.68	1
J-205	887.00	50.60	23.00	1,039.20	65.85	1
J-200	888.00	46.20	21.00	1,040.28	65.88	1
J-645	875.00	17.60	8.00	1,027.33	65.90	1
J-1075	875.00	26.40	12.00	1,027.99	66.19	1
J-660	874.00	68.20	31.00	1,027.22	66.29	1
J-155	888.00	46.20	21.00	1,041.30	66.33	1
J-235	888.00	55.00	25.00	1,041.31	66.33	1
J-450	876.00	0.00	0.00	1,029.50	66.41	1
J-470	874.00	24.20	11.00	1,027.61	66.46	1
J-300	880.00	13.20	6.00	1,033.81	66.55	1
J-575	872.00	44.00	20.00	1,026.12	66.66	1
J-290	880.00	44.00	20.00	1,034.40	66.80	1
J-665	877.00	33.00	15.00	1,031.44	66.82	1
J-220	882.00	50.60	23.00	1,036.63	66.90	1
J-245	885.00	48.40	22.00	1,039.69	66.93	1
J-15	884.00	24.20	11.00	1,038.72	66.94	1
J-670	872.00	55.00	25.00	1,027.23	67.16	1
J-315	878.00	22.00	10.00	1,034.38	67.66	1
J-1085	871.00	33.00	15.00	1,027.78	67.83	1
J-230	882.00	33.00	15.00	1,039.07	67.96	1
J-675	870.00	24.20	11.00	1,027.24	68.03	1
J-625	869.00	44.00	20.00	1,026.25	68.04	1
J-1095	870.00	26.40	12.00	1,027.47	68.13	1
J-475	870.00	48.40	22.00	1,027.56	68.17	1
J-480	870.00	55.00	25.00	1,027.57	68.17	1
J-690	874.00	28.60	13.00	1,031.59	68.18	1
J-1080	870.00	0.00	0.00	1,027.89	68.31	1
J-225	878.00	50.60	23.00	1,036.37	68.52	1
J-265	878.00	50.60	23.00	1,036.94	68.76	1
J-270	876.00	37.40	17.00	1,035.22	68.89	1
J-20	878.00	24.20	11.00	1,037.73	69.11	1
J-720	875.00	0.00	0.00	1,034.75	69.12	1
J-145	880.00	46.20	21.00	1,039.81	69.14	1
J-715	873.00	33.00	15.00	1,032.84	69.15	1
J-630	866.00	44.00	20.00	1,026.16	69.29	1
J-1100	867.00	15.40	7.00	1,027.46	69.42	1
J-710	871.00	28.60	13.00	1,032.09	69.69	1
J-150	879.00	46.20	21.00	1,040.33	69.80	1
J-115	878.00	24.20	11.00	1,039.48	69.86	1
J-665	865.00	55.00	25.00	1,027.22	70.18	1
J-1105	865.00	13.20	6.00	1,027.62	70.38	1
J-30	876.00	24.20	11.00	1,039.07	70.55	1
J-1135	864.00	15.40	7.00	1,027.61	70.79	1
J-255	874.00	39.60	18.00	1,038.31	71.09	1
J-25	872.00	24.20	11.00	1,036.78	71.29	1
J-295	870.00	24.20	11.00	1,035.19	71.47	1
J-1120	862.00	46.20	21.00	1,027.45	71.58	1

P-NA00584

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Zone
J-1110	861.00	26.40	12.00	1,027.53	72.05	1
J-700	865.00	46.20	21.00	1,031.64	72.10	1
J-250	872.00	33.00	15.00	1,038.74	72.14	1
J-705	865.00	26.40	12.00	1,031.82	72.18	1
J-1140	860.00	15.40	7.00	1,027.40	72.42	1
J-1115	860.00	39.60	18.00	1,027.46	72.45	1
J-925	864.00	8.80	4.00	1,031.63	72.53	1
J-35	869.00	24.20	11.00	1,037.76	73.01	1
J-45	864.00	24.20	11.00	1,035.84	74.35	1
J-140	868.00	24.20	11.00	1,040.00	74.42	1
J-240	867.00	55.00	25.00	1,039.30	74.55	1
J-1130	855.00	22.00	10.00	1,027.40	74.59	1
J-1125	855.00	44.00	20.00	1,027.42	74.60	1
J-195	863.00	24.20	11.00	1,039.92	76.55	1
J-50	856.00	24.20	11.00	1,034.45	77.21	1
J-40	858.00	24.20	11.00	1,036.88	77.39	1
J-110	854.00	46.20	21.00	1,039.58	80.29	1
J-105	854.00	46.20	21.00	1,039.58	80.29	1
J-1065	845.00	330.00	150.00	1,031.18	80.55	1
J-55	848.00	24.20	11.00	1,034.42	80.65	1
J-125	852.00	24.20	11.00	1,039.58	81.16	1
J-130	850.00	24.20	11.00	1,039.58	82.02	1

Scenario: 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-4	100.00	12	2,232.20	6.33	1.82	18.23	PMP-2 Tar	J-720	100.0
P-205	77 00	16	3,582.40	5 72	0.83	10.78	J-165	J-170	100.0
P-1	100.00	16	3,582.40	5 72	1.08	10.78	J-170	PMP-1 D	100.0
P-2	100.00	16	3,582.40	5.72	1.08	10.78	PMP-1 Dal	J-185	100 0
P-970	288 00	12	1,782.52	5 06	3.46	12.02	J-720	J-1015	100.0
P-245	282.00	16	2,640 29	4 21	1 73	6.13	J-185	J-190	100.0
P-250	263.00	16	2,498 28	3 99	1.45	5.53	J-190	J-200	100.0
P-585	574.00	12	1,382.40	3.92	4.31	7.51	J-300	J-450	100.0
P-580	219.00	8	-588.08	3.75	2.43	11.11	J-445	J-450	100.0
P-3	50.00	16	2,232.20	3.56	0.22	4.49	J-725	PMP-2 T	100.0
P-255	277 00	16	2,067.05	3.30	1 08	3.89	J-200	J-205	100.0
P-350	326 00	16	1,954.40	3.12	1.14	3.51	J-225	J-270	100.0
P-225	300.00	8	-465.16	2 97	2.16	7.20	J-155	J-185	100.0
P-340	180.00	16	-1,850.36	2.95	0.57	3.17	J-225	J-265	100 0
P-295	317 00	8	450.55	2.88	2.15	6.78	J-185	J-235	100.0
P-965	283.00	8	-449.69	2.87	1.91	6.76	J-715	J-720	100.0
P-1255	381.00	12	986.79	2.80	1.53	4.02	J-680	J-970	100.0
P-1315	310.00	12	-979.21	2.78	1.23	3.96	J-995	J-1015	100.0
P-375	295.00	16	1,725.21	2.75	0.82	2.79	J-270	J-290	100.0
P-285	870 00	16	1,663.19	2 65	2.27	2.60	J-205	J-285	100.0
P-385	242.00	16	1,603.87	2.56	0.59	2.43	J-290	J-300	100.0
P-65	282.00	8	378.40	2.42	1.38	4.91	J-45	J-50	100.0
P-1395	294 00	24	3,223.51	2.29	0.36	1.23	SR-2	J-90	100.0
P-1310	145.00	12	-803.30	2.28	0.40	2.75	J-680	J-1015	100.0
P-590	584.00	12	794.32	2.25	1 57	2.69	J-450	J-455	100 0
P-310	294.00	6	189.15	2.15	1.62	5.52	J-235	J-245	100.0
P-1430	858.00	8	330.00	2.11	3.27	3.81	J-50	J-1065	100.0
P-1220	303.00	8	-327.27	2.09	1.14	3.75	J-940	J-945	100.0
P-600	236.00	8	-324.81	2.07	0.87	3.70	J-460	J-455	100.0
P-20	271.00	8	322.66	2.06	0.99	3.65	J-15	J-20	100.0
P-910	640.00	12	-725.73	2 06	1.46	2.28	J-635	J-970	100.0
P-200	275 00	8	-316.86	2.02	0.97	3.53	J-150	J-155	100.0
P-60	269.00	8	315.42	2.01	0.94	3.50	J-25	J-45	100.0
P-45	270.00	6	176.74	2 01	1.31	4.87	J-30	J-35	100.0
P-25	276.00	8	312.49	1.99	0.95	3.44	J-20	J-25	100.0
P-1285	392.00	12	-684.15	1.94	0.80	2.04	J-990	J-995	100.0
P-260	321.00	8	302.04	1.93	1.04	3.23	J-205	J-210	100.0
P-1320	293.00	8	297.00	1.90	0.92	3.13	J-1005	J-1020	100.0
P-1280	141.00	12	-653.35	1.85	0.26	1.87	J-985	J-990	100.0
P-570	309.00	8	-289.12	1.85	0.92	2.98	J-400	J-445	100.0
P-195	1,637 00	36	5,814.60	1.83	0.83	0.51	J-100	J-165	100.0
P-115	669.00	36	5,814.60	1.83	0.34	0.51	J-95	J-100	100.0
P-110	512.00	36	5,814.60	1.83	0.26	0.51	J-90	J-95	100.0
P-575	146.00	8	279.16	1.78	0.41	2.80	J-445	J-420	100.0
P-955	275.00	8	-276.00	1.76	0.75	2.74	J-710	J-715	100.0
P-660	295.00	8	268.51	1.71	0.77	2.60	J-500	J-505	100.0
P-1305	326.00	8	-264.27	1.69	0.82	2.53	J-1010	J-995	100.0
P-1260	276.00	8	-261.06	1.67	0.68	2.47	J-945	J-970	100 0
P-800	152.00	8	-252.81	1.61	0.35	2.33	J-600	J-605	100.0
P-960	438.00	6	140.69	1.60	1.40	3.19	J-715	J-685	100.0
P-1160	83.00	24	2,232.20	1 58	0.05	0.62	J-165	J-180	100.0

P-NA00586

Scenario: 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-975	2,737.00	24	2,232 20	1.58	1.71	0.62	J-180	J-725	100.0
P-50	284.00	6	138.51	1.57	0.88	3.10	J-35	J-40	100.0
P-130	301.00	12	-547 80	1.55	0 41	1.35	J-30	J-115	100 0
P-345	662.00	8	237.77	1.52	1.37	2.08	J-255	J-265	100.0
P-1300	316.00	8	-233.47	1.49	0.63	2.01	J-1005	J-1010	100.0
P-535	266.00	8	-229.29	1.46	0.52	1.94	J-415	J-420	100.0
P-805	285 00	8	-227.14	1.45	0 54	1.91	J-605	J-610	100.0
P-1275	230.00	12	-497.41	1.41	0.26	1.13	J-975	J-985	100.0
P-915	309.00	8	-218.69	1.40	0.55	1.78	J-680	J-685	100.0
P-845	189.00	12	-483.87	1.37	0.20	1 07	J-610	J-635	100.0
P-675	160.00	8	207.75	1 33	0.26	1.62	J-460	J-545	100.0
P-300	1,258.00	8	206.40	1.32	2.01	1.60	J-235	J-240	100.0
P-315	368.00	8	202.16	1.29	0.57	1.54	J-240	J-250	100.0
P-595	223.00	6	-110.46	1.25	0.45	2.04	J-425	J-460	100.0
P-850	250.00	8	195.66	1.25	0.36	1.45	J-635	J-640	100.0
P-330	385.00	6	-108.21	1.23	0.76	1.96	J-255	J-230	100.0
P-180	249.00	8	-187.19	1.19	0.33	1.33	J-140	J-150	100.0
P-705	145.00	8	-185.86	1.19	0.19	1 32	J-540	J-505	100.0
P-185	607.00	6	102.11	1.16	1.07	1.76	J-155	J-160	100 0
P-230	274.00	8	-180.19	1.15	0.34	1.24	J-125	J-195	100.0
P-1215	286.00	8	-176.64	1 13	0.34	1.20	J-935	J-940	100 0
P-855	186.00	8	173.66	1.11	0.22	1 16	J-640	J-645	100 0
P-700	251.00	8	-171.62	1.10	0.28	1 14	J-535	J-540	100.0
P-240	1,138.00	12	-385.03	1.09	0.80	0.70	J-115	J-200	100.0
P-235	1,158.00	6	95.81	1.09	1.81	1.57	J-190	J-195	100.0
P-265	793.00	8	169.50	1.08	0.88	1.11	J-210	J-215	100.0
P-320	385.00	8	169.16	1.08	0.43	1.11	J-250	J-255	100.0
P-1435	723.00	12	380.60	1.08	0.50	0.69	J-975	J-1070	100.0
P-545	425.00	6	94.33	1.07	0.65	1.52	J-425	J-430	100.0
P-355	965.00	8	167.59	1.07	1.05	1.09	J-270	J-275	100.0
P-1385	299.00	8	-163.00	1.04	0.31	1.03	J-620	J-950	100.0
P-945	256.00	8	-162.73	1.04	0.26	1.03	J-705	J-710	100.0
P-335	447 00	6	-89.99	1.02	0.62	1.39	J-230	J-245	100.0
P-1440	407.00	12	354.20	1.00	0 25	0.60	J-1070	J-1075	100.0
P-1200	791.00	8	-87 18	0.99	1.04	1.31	J-45	J-40	100.0
P-280	287 00	8	154.64	0.99	0.27	0.94	J-220	J-225	100 0
P-30	605.00	12	-348.86	0.98	0.35	0.58	J-15	J-30	100.0
P-950	402.00	6	84.68	0.96	0.50	1.25	J-710	J-690	100.0
P-720	334.00	6	-84.67	0.96	0.42	1.25	J-440	J-520	100.0
P-680	274.00	8	149.59	0.95	0.24	0.88	J-515	J-520	100.0
P-275	1,242.00	6	-84.14	0.95	1.53	1.23	J-220	J-210	100.0
P-175	434.00	6	-83.47	0.95	0.53	1.21	J-145	J-150	100.0
P-710	312 00	8	-147.08	0.94	0.27	0.85	J-515	J-545	100.0
P-1450	192.00	12	327.80	0.93	0.10	0.52	J-1075	J-1080	100.0
P-1455	227.00	12	327.80	0.93	0.12	0.52	J-1080	J-1085	100 0
P-1365	237.00	8	144.36	0.92	0.20	0.82	J-1020	J-1055	100.0
P-650	492.00	12	-320.49	0.91	0.25	0.50	J-495	J-455	100.0
P-790	275.00	8	-140.31	0.90	0.21	0.78	J-565	J-595	100.0
P-870	249.00	8	-138.74	0.89	0.19	0.77	J-650	J-655	100.0
P-605	293.00	8	131.43	0.84	0.20	0.69	J-455	J-465	100.0
P-1390	1,739.00	36	2,591.09	0.82	0.20	0.11	J-5	J-90	100.0

Scenario: 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-5	1,436.00	36	2,591.09	0 82	0.16	0.11	SR-1	J-5	100 0
P-1250	656.00	8	-126.43	0 81	0.42	0.64	J-965	J-940	100.0
P-525	322.00	8	-125.75	0.80	0.21	0.64	J-410	J-415	100.0
P-1290	171.00	8	125 13	0 80	0.11	0.63	J-985	J-1000	100.0
P-795	294.00	8	-122 08	0.78	0 18	0.60	J-590	J-600	100.0
P-270	1,091.00	8	121.10	0 77	0.65	0 60	J-215	J-220	100.0
P-830	558.00	8	120 35	0.77	0 33	0.59	J-620	J-625	100.0
P-1460	318.00	8	119.74	0 76	0.19	0.58	J-1085	J-1090	100.0
P-1325	379.00	8	119.64	0.76	0.22	0.58	J-1020	J-1025	100.0
P-1475	276.00	8	117.12	0.75	0.15	0.56	J-1085	J-1105	100.0
P-360	459.00	8	114.79	0 73	0.25	0.54	J-275	J-280	100.0
P-920	284.00	8	-111.00	0.71	0.14	0.51	J-685	J-690	100.0
P-505	945.00	8	-110.25	0.70	0.47	0.50	J-390	J-400	100.0
P-530	245.00	6	-81.74	0.70	0.17	0.69	J-395	J-415	100.0
P-1225	627.00	8	109 17	0.70	0.31	0.49	J-935	J-950	100.0
P-165	162.00	8	108.58	0.69	0.08	0.49	J-140	J-195	100.0
P-510	370.00	8	-106.27	0.68	0.17	0.47	J-395	J-400	100.0
P-655	350.00	12	238.51	0.68	0.10	0.29	J-495	J-500	100.0
P-815	489.00	8	104.33	0.67	0.22	0.45	J-600	J-615	100.0
P-1495	527.00	6	57.93	0.66	0 33	0.62	J-1085	J-1120	100.0
P-1245	373.00	8	-102.23	0.65	0.16	0.43	J-955	J-965	100.0
P-190	1,127.00	6	55.91	0.63	0.65	0.58	J-160	J-105	100.0
P-775	298.00	8	-99.19	0.63	0.12	0.41	J-585	J-565	100.0
P-370	998.00	6	-55.34	0.63	0.57	0.57	J-285	J-290	100.0
P-1400	759.00	6	-54.40	0 62	0.42	0.55	J-130	J-140	100.0
P-940	373.00	6	53.29	0.60	0.20	0.53	J-705	J-695	100.0
P-1295	762.00	8	94.33	0.60	0.29	0.37	J-1000	J-1005	100.0
P-890	269.00	8	-94.08	0.60	0.10	0.37	J-670	J-645	100.0
P-810	496.00	12	210.53	0.60	0.11	0.23	J-610	J-655	100.0
P-875	363.00	6	51 33	0.58	0.18	0.49	J-650	J-660	100.0
P-290	275.00	6	51.22	0.58	0.14	0.49	J-205	J-230	100.0
P-1265	170.00	8	-90.41	0.58	0.06	0.35	J-945	J-975	100.0
P-305	802.00	6	-50.76	0.58	0.39	0.48	J-240	J-245	100.0
P-1465	367.00	8	88.94	0.57	0.12	0.34	J-1090	J-1095	100.0
P-1480	276.00	8	88.52	0.57	0.09	0.33	J-1105	J-1110	100.0
P-365	276.00	8	88 39	0.56	0.09	0.33	J-280	J-285	100.0
P-820	281.00	8	87.58	0.56	0.09	0.33	J-615	J-595	100 0
P-905	285.00	8	-83.39	0.53	0.08	0.30	J-675	J-645	100.0
P-140	548.00	12	-186.97	0.53	0.10	0.18	J-115	J-125	100 0
P-935	628.00	8	-83.03	0.53	0.19	0.30	J-700	J-705	100.0
P-610	404.00	8	82.41	0.53	0.12	0.29	J-465	J-470	100.0
P-635	155.00	8	-78.19	0.50	0.04	0.26	J-485	J-490	100.0
P-1235	248.00	8	-78.03	0.50	0.07	0.26	J-950	J-955	100.0
P-840	362.00	8	-76.35	0.49	0.09	0 25	J-630	J-625	100 0
P-695	400.00	8	-75.61	0.48	0.10	0.25	J-530	J-535	100 0
P-495	881.00	6	-42.37	0.48	0.30	0.35	J-380	J-395	100.0
P-785	586.00	8	72.53	0.46	0.14	0.23	J-590	J-595	100.0
P-520	875 00	8	-72.08	0.46	0.20	0.23	J-405	J-410	100.0
P-565	258.00	6	-40.20	0.46	0.08	0.31	J-440	J-430	100.0
P-500	905.00	6	-39.83	0.45	0.28	0.31	J-375	J-395	100.0
P-430	423.00	6	-39.75	0.45	0.13	0.31	J-335	J-285	100.0

P-NA00588

Scenario: 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-670	854.00	6	37.71	0 43	0.24	0 28	J-510	J-515	100.0
P-170	815.00	6	-37.27	0.42	0.22	0.27	J-110	J-145	100.0
P-750	252 00	8	-65.21	0.42	0.05	0.19	J-570	J-535	100 0
P-640	325 00	6	-35.82	0.41	0.08	0.25	J-490	J-465	100.0
P-515	251.00	8	-62.75	0.40	0 04	0.18	J-375	J-405	100.0
P-1485	399.00	8	62 12	0.40	0.07	0.17	J-1110	J-1115	100.0
P-1370	245.00	8	60.71	0.39	0.04	0.17	J-1055	J-1060	100.0
P-770	324.00	8	-59.59	0.38	0.05	0.16	J-580	J-585	100.0
P-420	238.00	8	32.55	0 37	0.05	0.21	J-325	J-330	100 0
P-400	354.00	8	-55.58	0 35	0.05	0.14	J-310	J-285	100.0
P-645	276.00	8	-55.57	0.35	0.04	0.14	J-490	J-495	100 0
P-925	293 00	8	-54.93	0.35	0 04	0.14	J-690	J-695	100.0
P-540	315.00	6	30.07	0.34	0 06	0.18	J-420	J-425	100.0
P-485	441.00	8	-52.64	0.34	0 06	0.13	J-385	J-390	100.0
P-560	1,033.00	8	-52.26	0.33	0.13	0.13	J-435	J-440	100.0
P-390	251 00	16	208.27	0.33	0.01	0.06	J-300	J-305	100.0
P-685	456.00	8	51.73	0.33	0.06	0.12	J-520	J-525	100.0
P-480	447.00	8	50.76	0.32	0.05	0.12	J-380	J-930	100.0
P-1380	381.00	8	-50.65	0.32	0.05	0 12	J-1050	J-1055	100.0
P-665	396 00	8	49.64	0.32	0.05	0.11	J-505	J-510	100.0
P-40	644.00	6	-27.13	0.31	0.10	0.15	J-25	J-40	100.0
P-475	242.00	8	47.58	0.30	0.03	0.11	J-375	J-380	100.0
P-1505	461.00	8	-47.14	0.30	0 05	0.10	J-1125	J-1095	100.0
P-1145	419.00	6	26.40	0.30	0.06	0 14	J-670	J-890	100.0
P-740	434.00	8	-46.93	0.30	0.04	0.10	J-560	J-565	100.0
P-895	221.00	8	-45.90	0.29	0.02	0.10	J-665	J-675	100.0
P-630	384 00	8	-45.19	0.29	0.04	0.10	J-480	J-485	100.0
P-395	294 00	16	179.67	0.29	0.01	0.04	J-305	J-310	100.0
P-735	275.00	8	-44.42	0.28	0.03	0.09	J-555	J-560	100.0
P-1330	447.00	8	43.84	0.28	0.04	0.09	J-1025	J-1030	100.0
P-1210	478.00	8	-43.27	0.28	0.04	0.09	J-605	J-935	100.0
P-380	232.00	6	24.20	0.27	0.03	0.12	J-270	J-295	100 0
P-70	316 00	6	24.20	0.27	0.04	0.12	J-50	J-55	100 0
P-1355	229 00	8	-42.80	0.27	0.02	0.09	J-1050	J-1025	100.0
P-415	800.00	16	169.25	0.27	0.03	0.04	J-310	J-325	100.0
P-445	557.00	8	42.11	0.27	0.05	0.08	J-345	J-350	100.0
P-760	1,158.00	8	40.06	0.26	0.09	0.08	J-555	J-575	100.0
P-1135	212.00	6	22.00	0.25	0.02	0.10	J-580	J-880	100.0
P-405	198.00	6	22.00	0.25	0 02	0.10	J-290	J-315	100.0
P-625	416.00	6	-21.88	0.25	0.04	0.10	J-480	J-470	100.0
P-860	716.00	6	-21.41	0.24	0.07	0.10	J-645	J-650	100.0
P-725	399.00	8	37.44	0.24	0.03	0.07	J-525	J-550	100.0
P-1510	314.00	8	37.40	0.24	0.02	0 07	J-1125	J-1130	100.0
P-615	763.00	8	36.33	0.23	0.05	0.06	J-470	J-475	100.0
P-1130	253.00	6	19.80	0.22	0.02	0.08	J-620	J-875	100.0
P-1140	279.00	6	19.80	0.22	0.02	0.08	J-585	J-885	100 0
P-1500	547.00	8	34.26	0.22	0.03	0.06	J-1120	J-1125	100.0
P-835	891.00	8	-32.35	0.21	0.05	0.05	J-575	J-630	100.0
P-715	557 00	8	-32.07	0.20	0.03	0.05	J-510	J-545	100.0
P-1360	450.00	8	-31.53	0.20	0.02	0.05	J-1035	J-1050	100.0
P-440	296.00	16	119 11	0.19	0 01	0.02	J-325	J-345	100.0

Scenario: 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-550	283.00	6	16.73	0.19	0.02	0.06	J-430	J-410	100.0
P-1350	232 00	8	-28.92	0.18	0.01	0.04	J-1045	J-1050	100.0
P-765	379.00	8	28.41	0 18	0.02	0.04	J-575	J-580	100.0
P-930	286.00	8	-28.03	0.18	0.01	0.04	J-695	J-700	100 0
P-1375	368.00	8	27.71	0 18	0.01	0 04	J-1060	J-1045	100.0
P-1515	139.00	6	15.40	0.17	0 01	0 05	J-1105	J-1135	100.0
P-1170	208.00	6	15.40	0.17	0 01	0.05	J-590	J-905	100.0
P-1470	127.00	6	15.40	0.17	0.01	0.05	J-1095	J-1100	100.0
P-1185	122.00	4	6.60	0.17	0.01	0 08	J-640	J-920	100.0
P-745	517 00	8	-25.61	0 16	0.02	0.03	J-565	J-570	100 0
P-35	604.00	6	-14.03	0.16	0.03	0.04	J-20	J-35	100.0
P-1345	474.00	8	-23.63	0.15	0.01	0.03	J-1040	J-1045	100.0
P-900	598.00	6	13.28	0.15	0.02	0.04	J-675	J-660	100.0
P-1110	120.00	6	13.20	0.15	0.00	0.04	J-385	J-855	100.0
P-1175	193 00	6	13.20	0.15	0.01	0.04	J-570	J-910	100.0
P-455	278.00	6	-12.89	0 15	0.01	0.04	J-355	J-330	100.0
P-1490	369.00	8	22.52	0.14	0.01	0.03	J-1115	J-1120	100.0
P-865	181.00	12	-49.79	0.14	0.00	0.02	J-500	J-655	100.0
P-555	256.00	8	-21.46	0.14	0 01	0 02	J-405	J-435	100.0
P-435	131.00	6	11.00	0.12	0.00	0.03	J-335	J-340	100.0
P-1105	128.00	6	11.00	0.12	0.00	0.03	J-360	J-850	100.0
P-410	151.00	6	11.00	0.12	0.00	0.03	J-305	J-320	100.0
P-690	275.00	8	-18.72	0.12	0.01	0.02	J-525	J-530	100.0
P-755	623.00	8	17.29	0 11	0.01	0.02	J-530	J-560	100.0
P-450	418.00	6	9.11	0.10	0.01	0.02	J-350	J-355	100.0
P-490	343.00	8	15.80	0.10	0.00	0.01	J-390	J-380	100.0
P-1190	151.00	8	8.80	0.10	0.00	0.02	J-700	J-925	100.0
P-1180	129.00	8	8.80	0.10	0.00	0.02	J-485	J-915	100.0
P-730	264.00	8	15.44	0.10	0.00	0 01	J-550	J-555	100.0
P-1520	182.00	8	15.40	0.10	0.00	0.01	J-1130	J-1140	100.0
P-145	379 00	12	-30.98	0.09	0.00	0.01	J-125	J-130	100.0
P-885	713.00	8	-12.68	0.08	0.01	0.01	J-665	J-670	100.0
P-620	787 00	8	-12.07	0.08	0.01	0 01	J-475	J-480	100 0
P-460	307 00	16	46.20	0.07	0.00	0.00	J-345	J-360	100.0
P-1335	221.00	8	10.84	0.07	0 00	0 01	J-1030	J-1035	100 0
P-1340	240.00	8	9.37	0.06	0.00	0.01	J-1035	J-1040	100.0
P-1195	670.00	8	6.44	0.04	0.00	0.00	J-385	J-930	100.0
P-880	643.00	6	-3.58	0.04	0.00	0.00	J-660	J-665	100.0
P-465	470.00	16	17.60	0.03	0.00	0.00	J-360	J-365	100.0
P-125	265.00	12	9.71	0.03	0.00	0.00	J-105	J-110	100.0
P-425	402.00	6	-2.35	0 03	0.00	0.00	J-330	J-335	100.0
P-825	304.00	8	-3.05	0.02	0.00	0.00	J-615	J-620	100.0
P-780	360.00	8	-1.16	0.01	0.00	0.00	J-540	J-590	100.0
P-150	316.00	12	-0.78	0.00	0.00	0 00	J-130	J-110	100.0
P-210	62.00	8	0.00	0 00	0.00	0.00	J-170	J-175	100.0
P-470	489.00	8	-0.00	0.00	0.00	0 00	J-1	J-375	100.0
P-1085	151.00	8	0.00	0.00	0.00	0 00	J-215	J-830	100.0
P-1425	679.00	8	0.00	0.00	0.00	0.00	J-175	J-900	100.0
P-980	1,755.00	24	0.00	0.00	0.00	0.00	J-725	J-1145	100.0
P-220	634.00	16	0.00	0.00	0.00	0.00	J-170	J-185	100.0
P-1530	1,322.00	12	0.00	0.00	0.00	0 00	J-1145	J-1080	100.0

Scenario: 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-120	180 00	12	0.00	0.00	0.00	0.00	J-100	J-105	100.0
P-1445	226 00	8	0.00	0.00	0.00	0.00	J-1035	J-1070	100.0
P-1150	187 00	12	0 00	0.00	0 00	0.00	J-725	J-720	100 0
P-15	205.00	12	0.00	0.00	0.00	0.00	J-5	J-15	100.0

APPENDIX C

NORTH AUSTIN MUD/ PACKAGED BOOSTER STATIONS SPECIFICATIONS

North Austin MUD / Packaged Booster Stations
Specifications

General Description

Provide one (1) Variable Speed Triplex Packaged Booster Station to have three (3) Horizontal Split Case pumps and one (1) duplex packaged station to have two (2) Horizontal Split Case pumps. Pump Station # 1 (south station) to have each pump rated at 1800 GPM @ 60' TDH and Pump Station # 2 to have each pump rated at 2200 GPM @ 55' TDH. Variable Frequency Drives are to be provided for each pump and common control panel will perform alternation, On/Off control, low and high pressure alarms and shutdowns. The above equipment, pump isolation valves, check valves, suction and discharge piping to be mounted on a fabricated steel skid. Skid to include all electric wiring and instrumentation to provide a complete stand alone system.

Pre-Submittal Information Required

Pre-submittal to be provided ten (10) Days prior to bid date, an addendum will be issued with the approved suppliers.

A. Full description and performance data on all substitute items proposed with references for verification of performance for such equipment already in service. Pump multi speed curves to be computer generated, hand drawn curves will not be accepted. Minimum of five (5) references with name and telephone number for both the controls and pumping equipment specified shall be furnished.

B. Detailed description of how the proposed substitute differs from that specified including but not limited to materials of construction, fabrication, operation, warranty, service, corrosion protection, power consumption and maintenance requirements.

C. Detailed discussion of why the proposed substitute is equal or superior to that specified in material of construction, fabrication, operation, warranty, service, corrosion protection, power consumption and maintenance requirements.

D. Tracings and four copies of revised prints reflecting in detail any and all changes in arrangements for materials, equipment, piping, fabrication, erection, maintenance, power supply, etc.

E. Provide a Programming and Operations Manual for the Microcomputer-based Software system. The manual shall include the following information as a minimum:

1. How to view and change between the various displays
2. A list of alarms handled
3. Alarm handling (ISA sequence used, etc.)
4. A list of status' handled
5. A list of analog signals handled
6. A list of all graphic displays proposed
7. What standard operating system is used

F. The intent of the specification is that a standard system be provided, with standard documentation. A custom written Description of Operation is not acceptable.

G. Name and telephone number of person(s) to contact to answer questions or supply additional information. No alternate manufacturers are exempt from presubmittal requirements.

H. The right is reserved to reject any and all proposals, to waive any informality, irregularity, mistake, error or omission in any proposals received and to accept the proposal, as determined by the Engineer or Owner, deemed most favorable to the Owner.

Horizontal Split Case Pumps

Pumps at Station # 1 are to be Flowserve Model 8LR-14A Horizontal Split Case pumps or pre-approved equal. Pumps to be rated 1800 GPM @ 60' TDH and operating at 1165 RPM and 1800 GPM @ 25 TDH and operating at a reduced speed.

Pumps at Station # 2 are to be Flowserve Model 10LR-16A Horizontal Split Case pumps or pre-approved equal. Pumps to be rated 2200 GPM @ 55' TDH and operating at 1165 RPM and 1800 GPM @ 20 TDH and operating at a reduced speed.

A. The pump casings shall be of the horizontally split type with casing faces accurately machined and doweled for bolting together. It shall be made of alloy cast iron to improve the density of the metal and increase its tensile strength. Suction and discharge openings shall be cast integrally with the lower half casing. Removal of the upper half casing and bearing caps shall permit the removal of the complete rotating element without disturbing pipe connections. Top half of casing shall be tapped for 1" priming piping connection at highest elevation on casing. The impellers shall be bronze of the enclosed, double-suction type. They shall be of radial flow design and shall be balanced both mechanically and hydraulically.
B. The impellers shall be pressed upon the shaft over a key extending beyond the impellers to lock the shaft sleeves in place. Axial adjustment shall be provided by means of shaft sleeve locking nuts. Removable wearing rings shall be provided on the pump casing. Casing wearing rings shall be made of bronze and shall have streamlined water guiding surfaces.
C. Shafts shall be made of carbon steel and accurately ground to size. They must be of ample size to insure low working stresses under all normal conditions imposed by the driver. They shall be protected against corrosion and abrasive action of the liquid by means of centrifugally cast bronze shaft sleeves held in place by lock nuts on the
D. Ball bearings shall be of the single row, deep groove type and shall be of ample size to withstand all axial and radial load imposed upon the pump shaft. Bearing housings shall be of the cartridge type, designed so that the entire rotating element may be removed from the pump without disturbing the alignment or exposing the bearings to dirt, water, grit, etc. Housings shall be positioned by means of dowel pins in the lower half of the pump casing and shall be securely clamped in place by covers fit on the horizontal plane. Means shall be provided for proper lubrication of all necessary working parts of pump unit.
E. As standard the stuffing boxes to be provide with John Crane model T1XF50X71 mechanical seals. Provide mechanical seal flush gland with internal piping.

Motors

Motors for pumps shall be new, high efficiency, inverter duty (VFD), horizontal, totally enclosed and fan cooled, and not to exceed previously listed speeds, Motor bearings shall be of the single row, deep groove type, grease lubed. End shaft shall be suitable for flexible coupling with pump. Motor horsepower shall be sufficient to operate the pump within the range of total head shown without exceeding the rated horsepower of the motor. Motor to be equipped with 120 volt rated silicone space heaters.

Variable Frequency Drives

Variable Frequency Drives are to be Cutler Hammer Model SVX9000, horsepower shall be sufficient to operate the pump within the specified range. Construction is to include Hand/Off/Auto selector switch, digital operator key pad with status and diagnostic messages. Each Variable Frequency Drives will perform PID control based on discharge pressure and will be programmed to maintain operator adjustable set point. Unit shall have HMCP as a disconnect means. Enclosure shall be Nema 3R weatherproof.

Control Panel

Control Panel to manufactured by US Filter Control Systems, unit shall utilize a LC2000 PLC controller with IO3000 Display / Operator Interface. Control Panel shall have all required relays, power supplies, I/O too interface with Variable Frequency Drives and instrumentation. Controller to provide on/off of pumps, high and low suction and discharge pressure alarms, low suction shutdown, pump alternation (either time of day or pump off step). All controls to be mounted in a Nema 3R weatherproof enclosure with inner door.

Pressure Transducers

Transducer shall be Barksdale series 425 and sized for systems requirements. The transducer shall be of Welded Stainless Steel Construction, Nema 4 Enclosure, reverse polarity protected, internal snubber and 0.25 % accuracy.

Check Valves

Check Valves shall be Crispin GC series Globe Style Silent, construction to include cast iron body, bronze disc and seat ring, stainless steel spring and hardware.

Pump Isolation Valves

Valves shall be American Flow series 2500 resilient wedge type rated for 250 p.s.i.g. cold water working pressure. All ferrous components shall be ductile iron, ASTM A536. Valves 3"-36" shall be in full compliance with AWWA C515. The words "D.I." or "Ductile Iron" shall be cast on the valve. The wedge shall be ductile iron encapsulated with EPDM rubber. The wedge shall be symmetrical and seal equally well with flow in either direction. The gate valve stem and wedge nut shall be copper alloy in accordance with Section 4.4.5.1 of the AWWA C515 Standard. Stainless Steel stems are not acceptable. The NRS stem must have an integral thrust collar in accordance with Section 4.4.5.3 of AWWA C515 Standard. Two-piece stem collars are

not acceptable. The wedge nut shall be independent of the wedge and held in place on three sides by the wedge to prevent possible misalignment. Valves shall be NSF Standard 61 certified.

Bolting materials shall develop the physical strength requirements of ASTM A307 and may have either Regular Square or hexagonal heads with dimensions conforming to ANSI B18.2.1. Metric size socket head cap screws are not allowed. The operating nut shall be constructed of ductile iron and shall have four flats at the stem connection to ensure even input torque to the stem. All gaskets shall be pressure energized O-Ring type seals. Stem shall be sealed by three O-Rings. The top two O-Rings shall be replaceable with the valve fully open and while subject to full rated working pressure. O-Rings set in a cartridge shall not be allowed. The valve shall have thrust washers located with (1) above and (1) below the thrust collar to ensure trouble-free operation of the valve. All internal and external surfaces of the valve body and bonnet shall have a fusion-bonded-epoxy coating, complying with ANSI/AWWA C550, applied electrostatically prior to assembly.

Piping

Reducers, spaces etc to be cast iron, fabricated steel header to be hot dipped galvanized.

Fabricated Steel Skid

All above equipment to be mounted on a common fabricated steel base, base to be hot dipped galvanized.

RESPONSE TO REQUEST NO. 11, 12, 21

City of Austin

Austin Water Utility, P.O. Box 1088, Austin, TX 78767 512-972-0118

May 11, 2006

Don Conklin
North Austin Municipal Utility District
7800 N. Mopac Expy, Ste No. 315
Austin, TX 78759

Dear Mr. Conklin:

The purpose of this letter is to document our understanding concerning the method to address the North Austin Municipal Utility District's ("MUD") internal pressure problems. While the MUD and the Austin Water Utility ("Utility") worked hard and found the most beneficial engineering method to address the MUD's pressure problems, the cost of the solution was beyond the financial means of the MUD, even with the inclusion of a financial contribution by the Utility. Therefore, the next best method as an interim solution, until the Utility constructs in approximately 2011 the 84" water main that will allow a permanent solution providing a water supply at a higher hydraulic grade level, is the MUD's construction and installation of in-line booster stations. As we discussed, the Utility's approval of construction plans for in-line booster stations is conditioned on the following:

1. David Malish and Ron Humphrey will verify our understanding that the construction plans will only require two waivers from the Texas Commission on Environmental Quality ("TCEQ"). One waiver is for the requirement of a maximum of a one-year time period for the use of in-line booster stations. The second waiver is for the requirement of an air gap between the Utility and the MUD's water systems. The MUD agrees that, other than the waivers, the in-line booster stations will meet TCEQ and Utility requirements.
2. The MUD will request the waivers from TCEQ. The Utility will not oppose these two waivers, but the TCEQ, and not the Utility, must waive State requirements. The MUD must receive the waivers from TCEQ in writing.
3. Upon the Utility's receipt of the TCEQ waivers, the Utility will approve the MUD's construction plans for the in-line booster stations.
4. The MUD will entirely fund the in-line booster stations project and pay all applicable City of Austin fees.

I understand the importance of this project to the MUD and its affected residents. As such, I will be glad to serve as your single point of contact for this project in order to expedite the City of Austin approval process. Please feel free to use this letter to indicate the Utility's agreement to in-line booster stations to TCEQ staff. If you have any questions or concerns, please call me at 972-0118. Thank you.

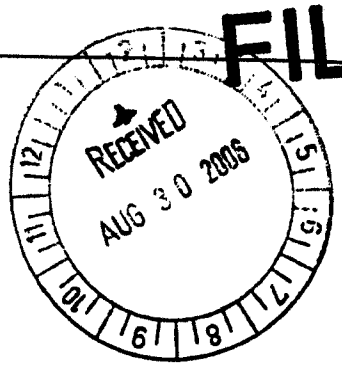
Sincerely,

Bart Jennings
Austin Water Utility

cc: Chris Lippe, P.E., Director, Austin Water Utility
Jose E. Canales, Deputy City Manager
Toby Hammett-Futrell, City Manager

City of Austin

Austin Water Utility, P.O. Box 1088, Austin, TX 78767



FILE

August 28, 2006

Alan McNeil
President
North Austin Municipal Utility District No. 1
9511 Ranch Road 620 North
Austin, TX 78726

Re: North Austin Municipal Utility District No. 1 ("MUD")-Proposed Booster Station

Dear Mr. McNeil:

Thank you for your letter dated August 24, 2006, regarding the MUD's proposed booster station. We congratulate you for working so hard and long in order to find a solution to improve water pressure within the MUD for a portion of its residents.

As noted in your letter, the Austin Water Utility ("Utility") plans to construct a large transmission main that upon its connection to water mains adjacent to the MUD will relieve the need for the MUD to continue to use the proposed temporary booster station. The Utility has proposed, in its FY 2007-2016 Capital Improvement Project plan, the project to be completed by the end of FY 2011-2012. The proposed Capital Improvement Plan is currently being reviewed by the Austin City Council. The Austin City Council will finalize and approve the City of Austin's ("City") budget in mid-September 2006.

In your letter, you requested the waiver of City fees regarding the MUD's booster station project. The Austin City Council's approval is required for any waiver of City fees. The Utility does not believe it can recommend or support a waiver of City fees for the following reasons:

1. The City does not obtain any economic or financial benefit from the MUD constructing the MUD's booster station project;
2. The Utility has already waived the application of the City's design criteria for this project and allowed the MUD to exclusively use the Texas Commission on Environmental Quality ("TCEQ") minimum criteria, which saves the MUD a significant amount of money;
3. In discussions with the MUD in February 2006, the Utility proposed that the MUD would be solely responsible for the expenses related to an interim solution for internal MUD pressure issues and the Utility would assume the $24 million cost for a permanent solution of constructing the large diameter water transmission main and converting the existing 36" water main of the Northwest A pressure zone, located in Parmer Lane, to the Northwest B pressure zone. The Utility is not requiring the MUD to cost participate in the City's project, even though the MUD will benefit from the project; and

4. On May 4, 2006, I spoke to Don Conklin, Vice-President of the MUD, and we finalized the terms of a proposal. This conversation was documented in a letter from me to Mr. Conklin dated May 11, 2006, which states that the MUD will pay all applicable City fees.

We do understand the MUD's desire to minimize the cost of the project and the Utility has already made significant financial concessions to the MUD's benefit.

Since the TCEQ has placed certain conditions on the MUD's construction and use of the in-line booster stations, I believe that it would be to our mutual benefit for your engineer, David Malish, to contact Ron Humphrey, Austin Water Utility, to clarify issues and coordinate the development of the MUD's construction plans. For example, we agree with the TCEQ that the requirements for the installation of automatic cut-off devices and continuous pressure recording devices to deactivate the pumps are essential. The minimum suction pressure setting will need to be tied to the minimum pressure associated with current levels of service at those suction-side device/recording locations. However, the minimum suction pressure setting will need to be in excess of 20 psi to ensure that Utility customers are not harmed by the installation of the MUD's booster pumping facilities.

If you have any further questions or concerns, please call me at 972-0118. Thank you.

Sincerely,

Bart Jennings
Austin Water Utility

cc: Toby Hammett-Futrell, City Manager
Rudy Garza, Assistant City Manager
Chris Lippe, P.E., Director, Austin Water Utility
Teresa Lutes, Austin Water Utility
Ron Humphrey, Austin Water Utility
Sharon Smith, Assistant City Attorney
David Malish, Murfee Engineering Company, Inc.
Gary Spoonts, ECO Resources, Inc.
Sharlene Collins, Armbrust and Brown, LLP

RESPONSE TO REQUEST NO. 13

STRASBURGER & PRICE, L.L.P.

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MEXICO CITY
EDIFICIO HEWLETT-PACKARD
MONTE PELVOUX NO. 111, PISO 6
LOMAS DE CHAPULTEPEC
11000 MEXICO D.F., MEXICO
011-525-202-8736

TELECOPY COVER PAGE

Date: May 6, 1996

PLEASE DELIVER THE FOLLOWING TELECOPY TO:

Name: Steve Pena & David Malish

Company: _____

Telecopy No.: 255-2466 & 327-2947

Sender: Sharlene Collins

Client/Matter No: 60115.0100

Verification No: _____

Total Number of Pages: 3 (including cover)

Telephone No.: (512) 499-3604

Client/Matter Name: _____

Please call us immediately if the telecopy you receive is incomplete or illegible. Our telephone number is (512) 499-3600.

MESSAGE: