VILLAGE OF LOS RANCHOS
SPECIAL USER FEE AGREEMENT

THIS AGREEMENT is made by and between the **Village of Los Ranchos ("Village"),** located at 6718 Rio Grande Blvd., N.W., and **Palindrome Properties Group, LLC**, a Nevada limited liability company **("Developer") (together, Developer and the Village are referred to as "Parties").**

WITNESSETH:

WHEREAS, on October 16, 2020, Palindrome Communities, LLC and Village entered into a Purchase, Sale and Development Agreement ("**PSA**") establishing a project (the "**Village Center Project**") to develop certain real property comprising fourteen (14) lots, containing approximately 12.14 acres more or less, situated in the Village, generally depicted and legally described on Exhibit A attached hereto (the "**Project Area**"); and

WHEREAS, the PSA was assigned to Developer; and

WHEREAS, the Village currently owns eleven (11) of the fourteen (14) lots in the Project Area, and

WHEREAS, portions of the Project Area were recognized in the *Village of Los Ranchos de Albuquerque 4th Street Corridor Project Phase I Street Improvements Drainage Report* prepared by Larkin Group NM, Inc. dated October 24, 2005 ("**Drainage Report**"), attached hereto as Exhibit B, and accordingly may connect to the Village's 4th Street Phase I Street Improvements (the "**4th Street Phase I Storm System**"); and

WHEREAS, the Village Center Project was approved and authorized pursuant to the Village's "Village Center Redevelopment Plan" and the New Mexico Metropolitan Redevelopment Code, NMSA 1978, §§ 3-60A-1 thru -48 (the "**MRC**"); and

WHEREAS, the 4th Street Phase I Storm System was designed with capacity reserved for the Project Area; and

WHEREAS, the PSA contemplates a replat of the existing lots and tracts that comprise the Project Area into six (6) new tracts (collectively, the "**Project Tracts**" and individually, each a "**Tract**"); and

WHEREAS, pursuant to the PSA and subject to the terms and conditions thereof, the Project Tracts will be transferred by the Village to Developer; Developer may elect to subsequently transfer its interest in a tract to an affiliate of Developer ; and

WHEREAS, the Village code authorizes the Village to participate with the private sector in order to accomplish the goals of the Village's stormwater ordinance to address the safety, convenience and economics for both private and public facilities. See e.g., Vill. Ord. §§ 4.3.5 (C) and (I); and

WHEREAS, Village Ordinance § 4.3.5(B) states the goal of the Village stormwater ordinance is to prevent construction, grading, or paving from increasing the potential for damage from flooding, erosion, and sedimentation to adjacent properties or public facilities; and

WHEREAS, in accordance with PSA Article 15, Developer agreed to comply with all federal, state, county, municipal and other governmental statutes, ordinances, laws, standards, provisions, rules and regulations, now or hereafter enacted or amended, affecting the Project Area; and

WHEREAS, the Village recognizes the unique nature of the Village Center Project, and that the net change in volume of stormwater discharge from Tracts 1, 2, 3, and 6 of the Project Area to the 4th Street Phase I Storm System from current levels would be zero or negative should the Village Center Project be able to discharge stormwater to the 4th Street Phase I Storm System as proposed in attached Exhibit C; and

WHEREAS, the Parties recognize that continued connection to the 4th Street Phase I Storm System represents a significant service provided to the Village Center Project, and a reasonable Special User Fee is justified to compensate the Village for said service.

NOW, THEREFORE, in consideration of the premises and mutual obligations herein, the Parties do mutually agree as follows:

1. **Connection to 4th Street Phase I Storm System.**

   A. This Agreement expressly authorizes the continued connection of Tracts 1, 2,3, and 6 of the Project Area to the 4th Street Phase I Storm System after a Tract is transferred to Developer in accordance with the PSA. After a Tract is transferred to Developer , certain portions of the Village Center Project shall continue to discharge stormwater to the 4th Street Phase I Storm System at inlets on 4th Street and Osuna Road as depicted in attached Exhibit C. Village recognizes that Developer shall establish new

connections in compliance with Village Ordinance § 4.3.4 as may be necessary to accommodate improvements to the Project Area. The Village Center Project's connection(s) authorized by this section shall remain in effect so long as the connection is in compliance with this Agreement and all federal, state and local laws.

B. The Village Center Project's connection to the 4th Street Phase I Storm System shall follow any and all specifications for portions of sub-basin 50, sub-basin 60, and portions of sub-basin 80 as identified in the Drainage Report. The Drainage Report, among other things, accounts for the 24-hour, 100-year storm, identifies the proposed inlets for the sub-basins to connect to, and identifies the amount of runoff that will enter storm drain infrastructure on 4th Street and Osuna Road. In accordance with the Drainage Report, and because the Village Center Project is a redevelopment, the 100-year peak rates of flow will be no more than for existing conditions. The quantities each sub-basin may contribute to the 4th Street Phase I Storm System are identified in Table 2 *Sub-basins That Contribute Directly to the Proposed Storm Drain System*, of the Drainage Report. An excerpt of Table 2 is included here for reference:

Basin ID (See Figure 3)	Area (Acres)	Existing 100 yr. Q (cfs)	Existing 100 yr. Vol. (ac-ft)
50*	4.1	12.9	0.671
60	7.1	11.9	0.177
80*	3.0	13.1	0.579

*Sub-basins 50 and 80 shall be allocated to the Village Center Project as determined by the Village engineer.

C. A portion of the Project Area is not included in the sub-basins identified in Section 1.B above. Thus, stormwater from that portion of the Project Area shall be retained on-site.

D. Developer will work with the Village, or its designee, to ensure that only stormwater enters the system. Developer shall utilize the landscape and grading design plans to minimize runoff and to increase on-site stormwater retention through the use of low impact development/green infrastructure ("LID/GI") practices. No discharge from directly connected impervious areas resulting from the stormwater quality design storm or lesser storms will be allowed without on-site treatment prior to release to the 4th Street Phase I Storm System, or provision of means to minimize such discharges to the maximum extent practicable.

E. The maintenance of storm water collection and connection facilities and structures for the Village Center Project to which the general public is denied access shall be the sole and exclusive responsibility of Developer, as applicable, and such maintenance shall be performed to Village or other applicable governing standards. Further, the maintenance of storm water collection and connection facilities and structures and related major facilities that only serve Developer's private property or its development shall also be the sole and exclusive responsibility of Developer, as applicable.

F. The Village may allow Developer's private maintenance within public rights-of-way or easements, provided that adequate guarantees and indemnifications to the Village are supplied and appropriate permit requirements have been met.

G. To the extent the same may be required, this Agreement may be considered a limited permit to satisfy the requirements of Village Ordinance § 4.3.4 and will not constitute or be considered a Reversion Event as defined by the PSA. Nothing in this Agreement abrogates the duty and obligation of Developer to comply with all local, County, State or Federal design criteria and review.

H. The Village provides no warranty or guarantee of the functionality of the 4th Street Phase I Storm System.

I. Developer shall indemnify the Village from any damages that may result from Developer's connections to the 4th Street Phase I Storm System.

J. Developer shall be responsible for complying with any requirements of the National Flood Insurance Program ("NFIP") or any other public or private insurance requirements.

K. This Agreement will have no impact on any other fee, tax, impact fee or serve as a variance for or from any other Village Ordinance or other applicable statute or code requirement. Developer agrees that it will pay all fees, taxes, impact fees, connection fees and all charges incurred by Developer, from the date of delivery of the Village-owned Tracts at closing, for usage of water, gas, electricity or other public utilities relating to such Tracts. Developer agrees to defend, indemnify, save and hold the Village harmless from any such utility charges or expense or liability for all of the aforesaid fees, taxes, impact fees, connection fees and other charges with respect to the Tract owned by it. The terms and conditions of this paragraph shall survive expiration or earlier termination of this Agreement.

L. This Agreement shall not be construed in any way to approve a grading and drainage plan as required by Village Ordinance.

2. **Compensation.**

A. In consideration of the continued services provided by the Village to the properties, via the 4th Street Phase I Storm System, Developer will pay in the aggregate a Special User Fee of Five Thousand Dollars ($5,000) per year, for a period of 30 years with payments due on March 31 of each year, beginning in the year 2023. This Agreement shall be recorded with the Bernalillo County Clerk and such assessment and Special User Fee shall run with the land until paid in full. Developer shall be solely responsible for payment of such Special User Fee to the Village unless otherwise agreed to by the Village.

B. The Special User Fee shall be deposited into the Village's Permanent Fund. Because the 4th Street Phase I Storm System is designed as a system, funds collected pursuant to this Special User Fee may be used for maintaining and improving the Village's entire system, and not just those facilities directly connected to the Village Center Project.

C. Developer and the Village agree that this Special User Fee is reasonable and fair. The rate is comparable to the costs of installing the Village system related to the Village-owned properties and the contributing volume, and the anticipated maintenance costs associated with the connection.

D. By agreeing to this Special User Fee, Developer agrees to the reasonability of this special impact fee and waives any right to appeal this Agreement.

E. Developer intends to record a Declaration of Easements and Covenants (the "**Declaration**") at the time of the replat of the Project Tracts.,

3. Term. This Agreement is effective on the date signed by the Mayor or Village Administrator and shall continue in effect until March 31, 2053, unless earlier terminated pursuant to Section 4 of this Agreement. Notwithstanding the expiration of the term, the connection authorized in Section 1.A. shall remain authorized, subject to the requirements of Section 1.A.

4. Default and Termination.

A. Any of the following shall constitute an event of default of Developer upon its occurrence and no cure period shall apply, unless otherwise stated:
   1. Developer dissolves or liquidates; provided, however, that division of Developer into multiple entities shall not constitute dissolution or liquidation;
   2. Developer makes a general assignment for the benefit of its creditors;
   3. Whether voluntarily or as a result of a petition filed against Developer, Developer is the subject of a bankruptcy, moratorium, reorganization,

arrangement, or adjustment of debt proceeding under the law of any jurisdiction, whether now or hereafter in effect; or Developer voluntarily takes advantage of any such law by answer or otherwise; or

4. Developer breaches, or fails to perform or comply with, any material term of this Agreement if Developer has not cured the breach within thirty (30) days after receipt of written notice from the Village. It is expressly agreed that the entirety of Sections 1 and 2 of this Agreement are material terms.

B. If the Village receives a written notice of violation from the United States Environmental Protection Agency (EPA) indicating that Village is in violation of its Municipal Separate Storm Sewer System (MS4) permit, and the Village demonstrates that such violation is in whole or in part a direct result of Developer's management of Village Center Project onsite stormwater facilities and connection(s) to the 4th Street Phase I Storm System, Village shall notify Developer in writing. Upon such notification, Developer shall cooperate with the Village in curing the violation within a reasonable amount of time. Developer agrees that it shall reimburse the Village for any monetary fines assessed by the EPA against the Village as a result of the violation, in a pro rata amount based upon the ratio of Developer's and the Village' responsibility for the violation. Failure of Developer to comply with this Section shall constitute an event of default.

C. If an event of default shall have occurred and be continuing beyond the cure periods set out in this Section 4, the Village may suspend performance under this Agreement and terminate this Agreement on written notice to Developer. Developer understands and agrees that the Village may suffer irreparable injury in the event of an uncured default by Developer under this Agreement, and that the Village may be entitled to injunctive relief against Developer. Additionally, all existing connections to the 4th Street Phase I Storm System shall be severed and Developer must immediately comply with any Village Stormwater ordinance at the time of termination due to uncured default by Developer under this Agreement.

D. This Agreement may not be terminated by Developer so long as the term of this Agreement is still valid and the Village Center Project's connections to the 4th Street Phase I Storm System remain. In the event of Developer's termination of this Agreement, any remaining amount due to the Village for the term of the Agreement shall become immediately due and payable. Additionally, all existing connections to the 4th Street Phase I Storm System shall be severed and Developer must immediately comply with any Village Stormwater ordinance at the time of termination.

5. Status of the Developer. The Developer is not an employee of the Village. The Village shall not be considered the employer of any employees of the Developer. This relationship between the Village and the Developer shall not constitute a joint venture, partnership, or agency.

6. Assignment. The Developer shall not assign or transfer any interest in this Agreement without the prior written approval of the Village. Any approved assignment or transfer shall include a provision that binds the assignee or transferee to all terms, obligations, and conditions of this Agreement but in no event will the Village consent to a novation of this Agreement.

7. Records and As-builts. The Developer shall maintain and supply the Village with detailed construction and "as-built" drawings of its facilities related to the Village Center Project. The drawings shall be submitted to the Village in standard format and may be delivered in either paper or electronic form at the discretion of the Village. Such drawings remain the property of the Village and are to be held for the internal use of the Village. Prior to construction, drawings must be submitted, reviewed, and approved by the Village and Village Engineer with appropriate fees, as follows:

- Developer shall submit two sets of plans, one for the Village and one for Developer. No Bernalillo County Public Works review is necessary. Any plans submitted to the Village shall be identical to plans previously submitted to the City of Albuquerque or Bernalillo County, if applicable. The Village and Village Engineer will compare the improvement plans to the site development plans, site master plan, and grading and drainage plans.
- Developer will obtain any required excavation/barricade permits for work in the right-of-way.
- The Village or the Village Engineer will review the plans to confirm compliance with City of Albuquerque design standards and issue an approval memo as may be called for. As appropriate, the Village will stamp approved plans. Applicant is responsible for costs incurred by the Village for the Village Engineer's review and approval.
- During and post construction, the Village and Village Engineer have the right to review the construction to confirm compliance with the applicable standards and may halt construction if construction is noncompliant.
- Developer will submit "as-builts" to the Village post-construction.

8. Release. Upon receipt of final payment of the amount due under this Agreement, the Village and the Developer shall evaluate the performance of the 4th Street Phase I Storm System and the state of the connections and will renegotiate any continued compensation under applicable laws and ordinances at that time.

9. Authority. The Developer agrees not to purport to bind the Village to any obligation not assumed in this Agreement by the Village, unless the Developer has express written authority to do so, and then only within the strict limits of that authority.

10. Compliance with Laws. In performing services pursuant to this Agreement, the Developer shall comply with the laws of the United States, State of New Mexico, and the Village of Los Ranchos.

11. Indemnification. To the fullest extent permitted by law, Developer agrees to defend, indemnify, and save harmless the Village, its Mayor, its Board of Trustees, officers, agents, representatives, consultants, and employees from and against all suits, actions, liabilities, demands, penalties, expenses, attorneys' fees, costs, and claims of any character, including claims for death, injury, or damage to any person, or damage to property, arising out of or relating to this Agreement, or the connections of Village Center Project properties to the 4th Street Phase I Storm System, except to the extent caused by the negligence or willful misconduct of the Village.

This indemnification provision shall equally apply to injuries to employees of the Developer. In the case of any claim brought by any employee of Developer, the indemnification obligations under this Section shall not be affected in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or on behalf of any Developer under workers' compensation, disability benefit, or employee benefit provisions or acts.

This indemnification provision is subject to the limitations and provisions of NMSA 1978 § 56-7-1.

12. Product of Services; Copyright. Developer agrees that all work products, including, but not limited to, original reports and other written materials generated in the performance of this Agreement shall belong to and become the sole property of the Village of Los Ranchos; provided that Developer may retain file copies of said work products. Developer shall provide said work products to the Village upon request. The Village may only use work products for their intended purpose, but all copyrights and ownership of intellectual property associated with the work reports is retained by Developer.

13. Conflict of Interest. The Developer warrants that the Developer currently has no interest and shall not acquire any interest, direct or indirect, that does or would conflict in any manner or degree with the performance of the obligations required under this Agreement.

14. Amendment. This Agreement shall not be changed or supplemented except by a written instrument executed by the Parties.

15. Scope of Agreement. This Agreement together with the PSA incorporates all the agreements and understandings between the Parties concerning its subject matter, and all agreements and understandings have been merged into this Agreement and the PSA. No prior or contemporaneous agreement or understanding, verbal or otherwise, of the Parties or their agents concerning the subject matter of this Agreement and the PSA is valid or enforceable unless included in this Agreement and the PSA.

16. Applicable Law. This Agreement shall be governed by and interpreted in accordance with the laws of the State of New Mexico, exclusive of any conflict-of-laws provision that would select the law of another state.

17. Enforcement. Developer shall pay the Village all costs and expenses, including reasonable attorneys' fees, incurred in connection with any action taken to enforce or interpret this Agreement.

18. Severability. If any part of this Agreement is held to be invalid or unenforceable, such holding will not affect the validity or enforceability of any other part of this Agreement so long as the remainder of the Agreement is reasonably capable of completion.

[*No further text.*]

IN WITNESS WHEREOF, the Village and the Developer have executed this Agreement as of the date of signature by the Village of Los Ranchos written below.

Village of Los Ranchos de Albuquerque

By: _____
Name: Ann Simon
Title: Administrator

Date: June 29, 2022

Palindrome Properties Group, LLC,
a Nevada limited liability company

By: _____
Name: Chad I. Rennaker
Title: President

Date: _____

APPROVED AS TO FORM:

_____

Date: 6-29-22

Nann Winter
General Counsel for the Village of Los Ranchos

Exhibit A – Depiction and Legal Description of Project Area
Exhibit B – Drainage Report
Exhibit C – Proposed Discharge

EXHIBIT A

LAND

Lot 1: 336 Osuna Rd NW. Legal Description: LOT 11A PLAT OF LOT 11A OSUNA ADDN REPLAT OF LTS 9, 10 & 11 CONT .7396 AC

Lot 2: 330 Osuna Rd NW. Legal Description: 012 OSUNA ADDITION

Lot 3: 322 Osuna Rd NW. Legal Description: 013 OSUNA ADDITION. This lot is NOT owned by the Village.

Lot 4: 318 Osuna Rd NW. Legal Description: 014 OSUNA ADDITION. This lot is NOT owned by the Village.

Lot 5: 6562 4th St NW. Legal Description: MRGCD MAP #29 TRS 43A-1, 43-B, & 43-D & LOTS 15 & 16 OSUNA ADDITION CONT 2 .31 AC

Lot 6: 6558 4th St NW. Legal Description: MAP 29 TR 43C

Lot 7: No address. Legal Description: MAP 29 TRACT 43E

Lot 8: 6538 4th St NW. Legal Description: 1 DIV OF LOT 1 OF LAND OF ROBERT COOPER CONT 0.689 AC

Lot 9: No address. Legal Description: TRS 58B, 59B1B1, 59C1, 59D1 & 59E1 CONT 2.504 AC M/L

Lot 10: 6536 4th St NW. Legal Description: MAP 29 TRS 59A2 AND 59B2

Lot 11: No address. Legal Description: TRS 59B1B2, 59C2, 59D2 & 59E2 CONT 0.318 AC M/L

Lot 12: 6530 4th St NW. Legal Description: 1-B AMENDED PLAT OF LOT 1-B MERRITT ACRES A SUMMARY PLAT OF LTS 2-A & 3-A OF P AT OF N 1/2 OF LT 1 CONT 1.547 AC

Lot 13: 6528 4th St NW. Legal Description: 1-A PLAT OF N1/2 LOT 1 MERRITT ACRES. This lot is NOT owned by the Village.

Lot 14: 6518 4th St NW. Legal Description: THE S 100 FT OF LOT 1 MERRIT ACRES

Exhibit B

Village of Los Ranchos de Albuquerque

4th Street Corridor Project Phase I

Street Improvements

Drainage Report

October 24, 2005

Prepared By:
Larkin Group NM, Inc.
Consulting Engineers
8500 Menaul Blvd NE
Albuquerque, NM 87112

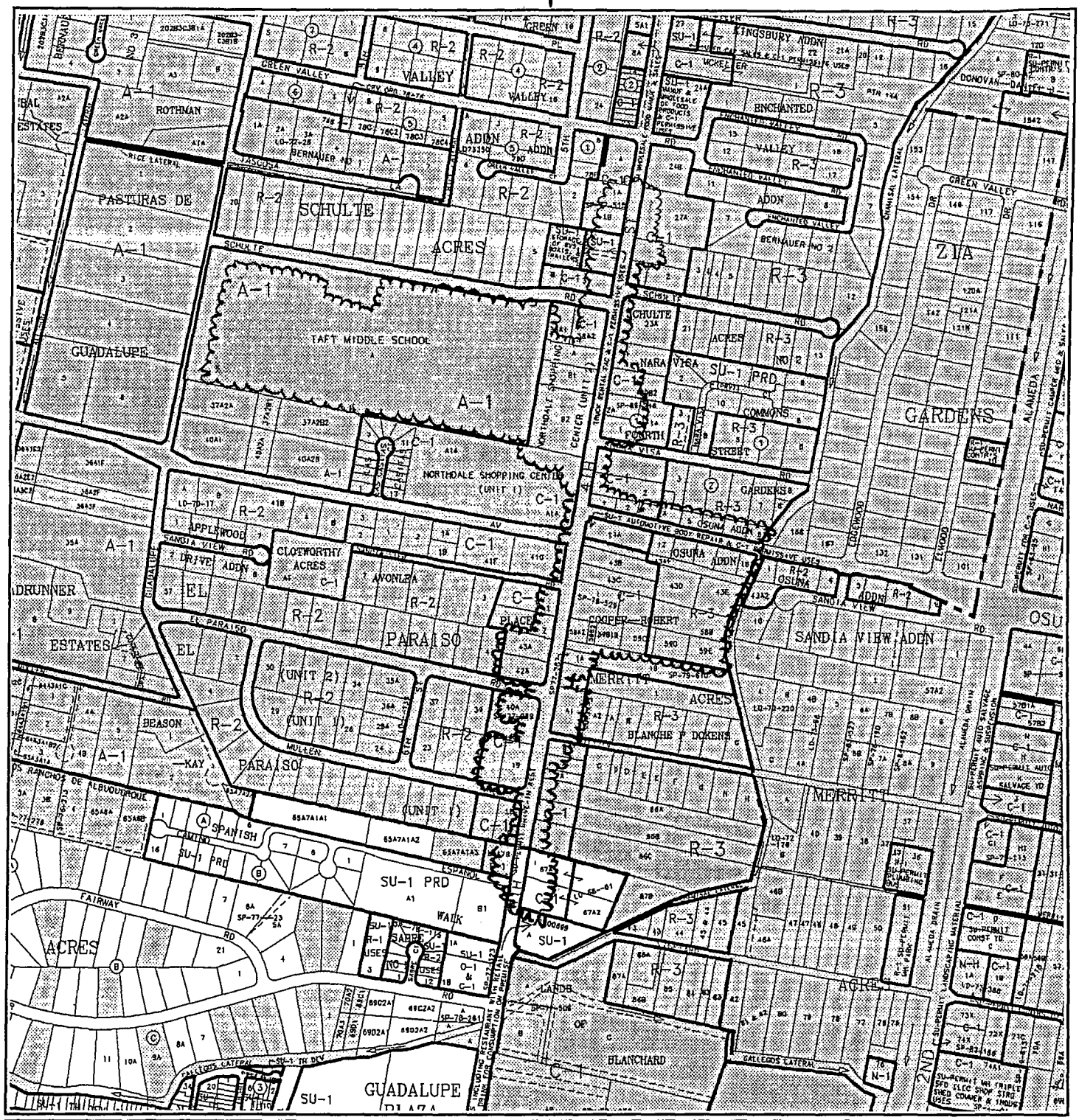
E-14
E-15
GRAPHIC SCALE IN FEET
250 0 750 1000
Zone Atlas Page
E-14-Z
Map Amended through April 02, 2004
Zone Atlas Page
E-15-Z
Map Amended through April 02, 2004
NOTE: GREY SHADING REPRESENTS AREA OUTSIDE OF THE CITY LIMITS
Albuquerque Geographic Information System
PLANNING DEPARTMENT
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FIGURE 1

1.0 Introduction

The purpose of this report is to address the drainage issues and storm drain improvements that are associated with the proposed Fourth Street Corridor Phase I Street Improvements project. These street improvements are based on recommendations as described in the "Fourth Street Corridor Study" (July, 1998) prepared by Wilson & Company for the Village of Los Ranchos de Albuquerque acting through and in cooperation with the New Mexico Department of Transportation (NMDOT).

The "Fourth Street Corridor Study" recommended roadway improvements to a 2.7mile long segment of Fourth Street located between Montaño Road and Alameda Boulevard. These improvements have been separated into two phases. Phase I will extend from Camino Español to Schulte Rd. and is scheduled for construction in 2005. No schedule has been established for construction of the future phase.

This drainage report only addresses improvements to Fourth Street and Osuna Road. for the proposed Phase I Fourth Street Corridor improvements that are located within the Village of Los Ranchos de Albuquerque limits, see Figure 1, (Location Map Zone Atlas Map E-15-Z). The study area includes 43 acres. This construction area is shown on FIRM Map Number 35001C0119 D Panel 119 of 825 and is determined to be outside the 100-year floodplain (see FIRM Map in Appendix D-4). The construction of this project is not intended to affect the 100-year floodplains as shown. Elevations used in this report are based on the 1929 Vertical Datum.

The common practice of raising the road surface elevation with every paving project or road improvement has created poor drainage conditions from lands surrounding Fourth Street and Osuna Road. This project will lower the street flowlines to improve drainage.

The stormwater detention facilities proposed for this project use the proposed collection system pipe for additional storage volume. Additionally this system pipe provides for drainage of the open and buried pipe detention reservoir. An orifice plate near the low end of the system limits releases to the Montaño Road storm drain to less than 5 cfs.

2.0 Hydrology Methods

The drainage analysis was based on Section 22.2 of the Development Process Manual (DPM), Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993.
The project is located within Precipitation Zone 2 as defined in Section 22.2 of the DPM. This study by Larkin Group, NM as well as the Fourth Street Corridor Drainage Report Chamisal Lateral to Gallegos Lateral (September 2003) prepared by Wilson & Company (see Sec. 3.0) used the 24 hour, 100-year return event storm to calculate peak runoff for developed conditions. The 24 hour, 100-year rainfall is 2.75 inches.

A pipe routing subroutine with slightly oversized pipes was used to route hydrographs down the main flow paths. The Route Reservoir subroutine using storage volumes measured for conveyance pipe, the buried pipe reservoir and the above ground ponding extending over the playing field was used to model the pond. The pond outflow rating curve was developed from the orifice equation.

2.01 Assumptions

This study anticipates the existing development and zoning will not change significantly. Ponding will be required to limit discharge to the Montaño storm drain to less than five cfs. An agreement between AMAFCA, the City of Albuquerque, Albuquerque Public Schools and the Village of Los Ranchos de Albuquerque will provide for ponding at the Taft Middle School.

2.02 Basin Model Parameters

The watershed was divided into 10 sub-basins ranging in size from approximately 1.5 acres to 17.4 acres. Basin and sub-basin boundaries were drawn along appropriate ridges and high ground including natural features, roads, berms, and other raised structures. These sub-basins contribute to the primary flow paths that constitute the drainages. Site visits along with topography and orthophotography from Bernalillo County, were used to identify these flow paths.

These sub-basins were identified on the 1999 digital mapping printed at a scale of 1 inch = 200 feet and a 1-foot contour interval. The area of each sub-basin was determined digitally using AutoCAD by drawing a polyline around the sub-basin boundary. Channel lengths were measured, and the slopes were determined from the detailed mapping. These parameters and resulting values for Time of Concentration are given in Table 1.

2.03 Time of Concentration

The DPM (1997) specifies using the SCS Upland Method to determine time of runoff concentration (t_c) for reach lengths up to 4000 feet. Due to the relatively low relief topography of the watershed, the SCS Upland Method was used for all reach lengths. The following formula from the DPM was

used in an AHYMO-97 subroutine for computing t_c.

$$t_c = (L_1 / V_1 + L_2 / V_2 + \ldots + L_X / V_X) / 3600 \text{ sec/hour}$$

where L is the sub-reach length (feet) and V is the velocity (feet / sec) in that sub-reach, as determined by the following equation:

$$V = K * \sqrt{(s * 100)} = 10 * K * \sqrt{(s)}$$

where s is the slope in feet per foot, and K depends upon the conveyance condition, as shown in the following table:

CONVEYANCE FACTORS**	
K	Conveyance Condition
0.7	Turf, landscaped areas and undisturbed natural areas (sheet flow* only).
1	Bare or disturbed soil areas and paved areas (sheet flow* only).
2	Shallow concentrated flow (paved or unpaved).
3	Curb and gutter, and paved street flow, storm sewers and natural channels, and that portion of sub-basins (without constructed channels) below the upper 2000 feet for sub-basins longer than 2000 feet.
4	Constructed channels (for example: riprap, soil cement or concrete lined channels).
* Sheet flow is flow over plane surfaces, with flow depths up to 0.1 feet. Sheet flow generally applies only to the upper 400 feet (maximum) of a sub-basin. **Table B.1 Chapter 22, Section 2, City of Albuquerque Design Process Manual.	

2.04 Land Treatment

AHYMO uses land treatment conditions to facilitate accounting of rainfall infiltration and other losses. The land treatment percentages were estimated from site visits, as-built drawings and using

the most current orthophotos, taken in 2003, which were made available by the USGS.

The majority of zoning along 4th Street is commercial C-1 with some special use for restaurant or automotive properties. Residential zoning R-2 or R-3 is located along Osuna road and behind some of the properties along 4th Street. R-3 is high density residential townhouses or apartments.

2.05 Sub-basin Characteristics

Characteristics of the 43 acres of sub-basins in the AHYMO Model are included in Tables 1 and 2 and are described below. Most of the properties with frontage on 4th Street are slightly higher than the properties back away from the street. The ground surface behind the commercial properties in general does not drain to 4th Street.

Sub-basin 10 at the north end of the study area north of Shulte Road includes the street pavement and parts of commercial properties with frontages on both sides of 4th Street. This 2.11 acre sub-basin extends to approximately 100 feet from the edge of the road. Land treatments for this sub-basin are 5% landscape, 5% bare ground and 90% type D with roofs or pavements. Sub-basin 10 is assumed will drain to two proposed drop inlets on 4th Street.

Sub-basin 20 on the east side of 4th Street includes the street pavement, a residence and 4 commercial properties with a total area of 2.43 acres. The sub-basin extends to approximately 100 feet from the edge of the road. Land treatments for this sub-basin are 10% landscape, 10% bare ground and 80% type D with roofs or pavements. Sub-basin 20 will drain to two proposed drop inlets on 4th Street.

Sub-basin 30, with a total area of 3.5 acres on the west side of 4th Street just north of Osuna Road includes 4 commercial properties of the Northdale Shopping Center. This site has recently been redeveloped with a new bank and drug store. A lined pond with surface rundowns collects runoff from the back side of the parking lot behind the businesses on the west side of the sub-basin. Drop inlets in the front of the drugs store and bank and a drop inlet behind the drugstore are piped to the pond also. This pond will drain through a pipe to the storm drain in 4th Street. The parking lot area at the front of JB's Restaurant will drain to a proposed drop inlet in the storm drain easement in the parking lot. Land treatments for this sub-basin are 3% landscape, 2% bare ground and 95% type D with roofs or pavements. The 60" pipe to the Taft Middle School Pond will cross this sub-basin from 4th Street.

Sub-basin 40, a short distance west of 4th Street on the south side of Shulte Road, is the 17.4 acre Taft Middle School. Parking lots on the north and west sides of the school drain to Shulte Road and to the west. Land treatments for this sub-basin are 10% grass and shrubs, 50% landscape, 5% bare ground and 35% type D with roofs or pavements. The east side of the site drains to the detention pond at the athletic fields. This east end of the property will be reconstructed with an athletic field and running track. This field will be surrounded with a berm that allows the entire field area to hold stormwater. A shallow pond will be located in the southeast corner of the site. The west side of the school grounds has an on-site drainage system that collects runoff to a lift station and discharges to the detention pond.

Sub-basin 50 along Osuna Road on the east side of 4th Street includes the street pavements, two commercial properties and seven residential properties. The 3.67 acre sub-basin extends from the Chamisal Lateral on the east to the curb on the west side of 4th Street. Land treatments for this sub-basin are 5% landscape, 10% bare ground and 85% type D with roofs or pavements. Sub-basin 50 will drain to four proposed drop inlets on Osuna Road and one proposed inlet on the west side of 4th Street.

Sub-basin 60 on the east side of 4th Street includes one commercial property and one residential property with a total area of 7.1 acres. The sub-basin is bounded by the Chamisal Lateral on the east side and the curb on the east side of 4th Street on the west. The front of the property is zoned commercial C-1. The existing property back from the road includes a large irrigated field or pasture that is zoned R-3 for high density residential. The large field behind Pudge Brothers Pizza is fallow ground. Land treatments for this sub-basin are 10% weeds and shrubs, 60% landscape or agricultural, 15% bare ground and 15% type D with roofs or pavements. This study assumes the majority or 75% of the existing condition runoff from this sub-basin will enter the storm drain pipe in 4th Street through a manhole connection. The location of this manhole has not been specified but is assumed would be near Station 24+50. The remaining 25% of the existing condition runoff will enter the smaller storm drain pipe in Osuna Road. Onsite detention is assumed for control of developed conditions.

Sub-basin 70 on the west side of 4th Street includes the street pavement and two commercial properties. Land treatments for this 1.03 acre sub-basin are 5% landscape, 25% bare ground and 70% type D with roofs or pavements. Sub-basin 70 will drain to two proposed drop inlets on 4th Street.

Sub-basin 80 on both sides of 4th Street includes 4 commercial properties on 2.95 acres. Land treatments for this sub-basin are 5% landscape, 5% bare ground and 90% type D with roofs or pavements. Sub-basin 80 runoff will be divided in the current design at El Paraiso Road and will drain to two proposed drop inlets on 4th Street to the north and two drop inlets on 4th Street to the south. An additional inlet will be installed in the El Paraiso Center parking lot.

Sub-basin 90 on both sides of 4th Street includes one commercial property and two residential properties. Land treatments for this 1.75 acre sub-basin are 5% weeds and shrubs, 60% landscape, 5% bare ground and 30% type D with roofs or pavements. Sub-basin 90 will drain to two proposed drop inlets on 4th Street at the north edge of the sub-basin.

Sub-basin 100 on both sides of 4th Street includes 2 commercial properties and two residential properties on a total of 1.52 acres. Land treatments for this sub-basin are 5% landscape, 5% bare ground and 90% impervious roofs or pavements. The majority of sub-basin 100 will drain to two proposed drop inlets on 4th Street with a small portion continuing on to two proposed drop inlets further downslope to the north.

3.0 History of Drainage Analysis For the 4th St. Corridor

Previous drainage studies for the area include the 4th Street Corridor Drainage Report Chamisal Lateral to Gallegos Lateral (September 2003) prepared by Wilson & Co. for The Village of Los Ranchos de Albuquerque. Earlier the Preliminary North Valley Drainage Management Plan (NVDMP) Phases 2 and 3, (March 2001) was prepared by Smith Engineering Co. for AMAFCA. The Wilson & Co. study is based on the NVDMP. The NVDMP is currently under review, by AMAFCA.

These previous studies included areas much larger than the current project. The Smith Engineering Company NVDMP study area included the current project area as part of the larger north valley area north of I-40 from Edith Blvd to the Riverside Drain. Nine ponds were proposed in the study from Alamosa Road to Paseo del Norte.

The Wilson & Co. study included the present project area from north of Alamosa to Shulte Road and additional areas north to Ranchitos Road. The Wilson & Company study also included a broader area extending east to the Chamisal Lateral and west to Rice Lateral in the north and 500 feet west of 4th Street in the south. Wilson & Company proposed six ponds in their study area with three in the present project area including the one at the Taft Middle School.

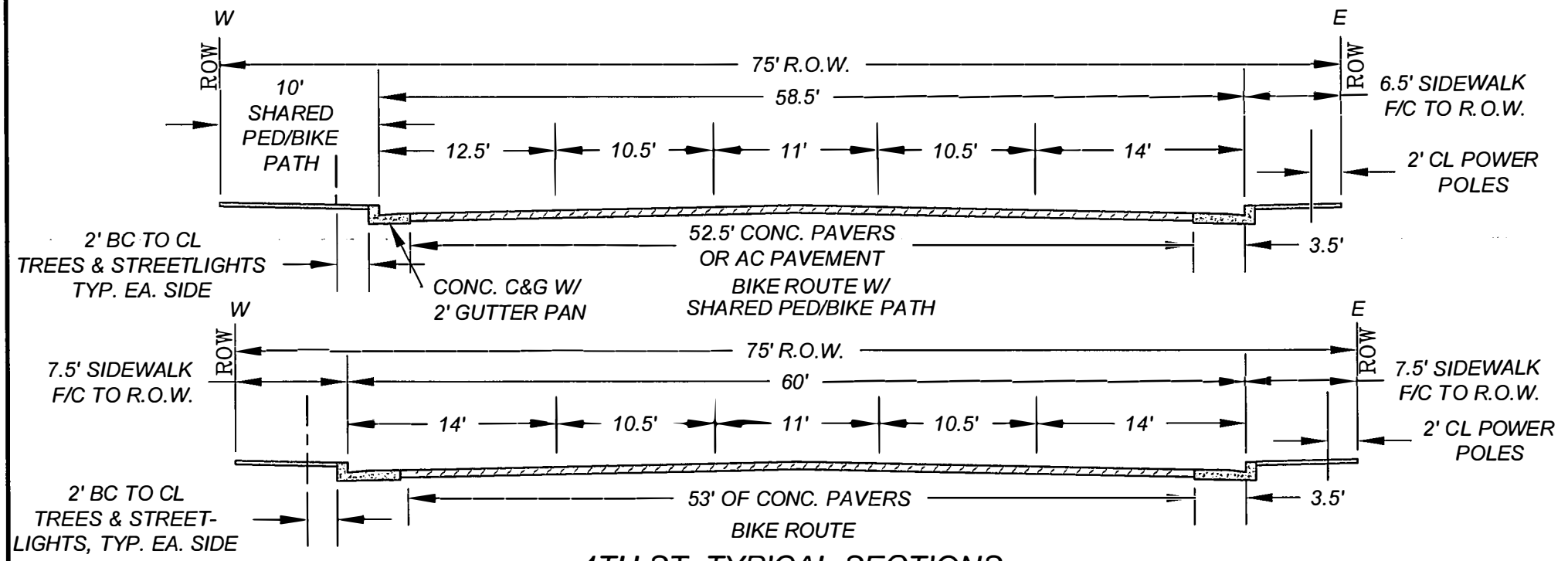
A Revised Drainage Report for the Northdale Shopping Center Redevelopment was prepared in November of 2003 by Tierra West, LLC. Northdale shopping center formerly discharged some runoff to the Taft Middle School property. The redevelopment of the shopping center included a pond at the northwest corner of the site adjacent to the Taft Middle School property line. According to the Drainage Management Plan for this site the pond would drain to the 60 inch pipe from the Taft Middle School Pond. As-built plans however show a drainage stub-out from the pond to 4th Street.

4.0 Project Street Improvements

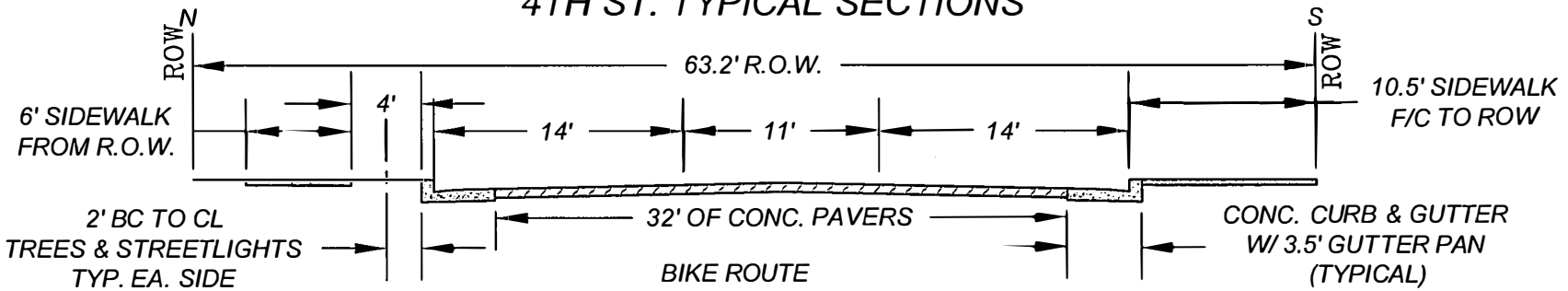
Design details (See Figure 2) are undergoing refinement and final details were presented in the Fourth Street Corridor Project Conceptual Design Report by Larkin Group NM. This construction is as follows:

4.1 Improved Street Section on 4th Street. 4th Street will have two lanes of traffic in each direction with a center left turn lane and concrete sidewalks on each side which vary in width from 6.5 ft. to 12 ft. The outside lanes in each direction will be 14 feet wide to accommodate a bike route, other through lanes will be 10.5 feet wide, and the center turn lane will be 11 feet wide. Concrete curb and gutter will be constructed on each side along the length of the road and handicap access ramps will be provided at all intersection corners. Nine Type A inlets will be installed on 4th Street.

4.2 Improved Street Section on Osuna Road. Osuna Road between 4th Street and the Chamisal Lateral will be improved with concrete curb and gutter on each side of the road. Also included in the design will be a 10.5-foot sidewalk on the south and a 6.5-foot sidewalk on the north. The road will have an 11-foot wide center left turn lane and single 14-foot wide lanes for east and westbound traffic including bicycles. Four Type A inlets will be installed on Osuna Road.



4TH ST. TYPICAL SECTIONS



OSUNA ROAD TYPICAL SECTION

DRAINAGE REPORT

FIGURE 2

PRELIMINARY TYPICAL STREET SECTIONS

LARKIN GROUP NM, INC

5.0 Design Drainage Analysis

This report addresses the 100-yr., 24-hour storm event. Inlets, storm drains, and the related detention basin are all sized to accommodate this storm. Results from the 10, 25, and 100-yr. storm events are provided for comparison in Appendix A. Table 1 summarizes land treatment characteristics for drainage basins adjacent to the Phase I project area for existing and developed conditions (see Figure 3).

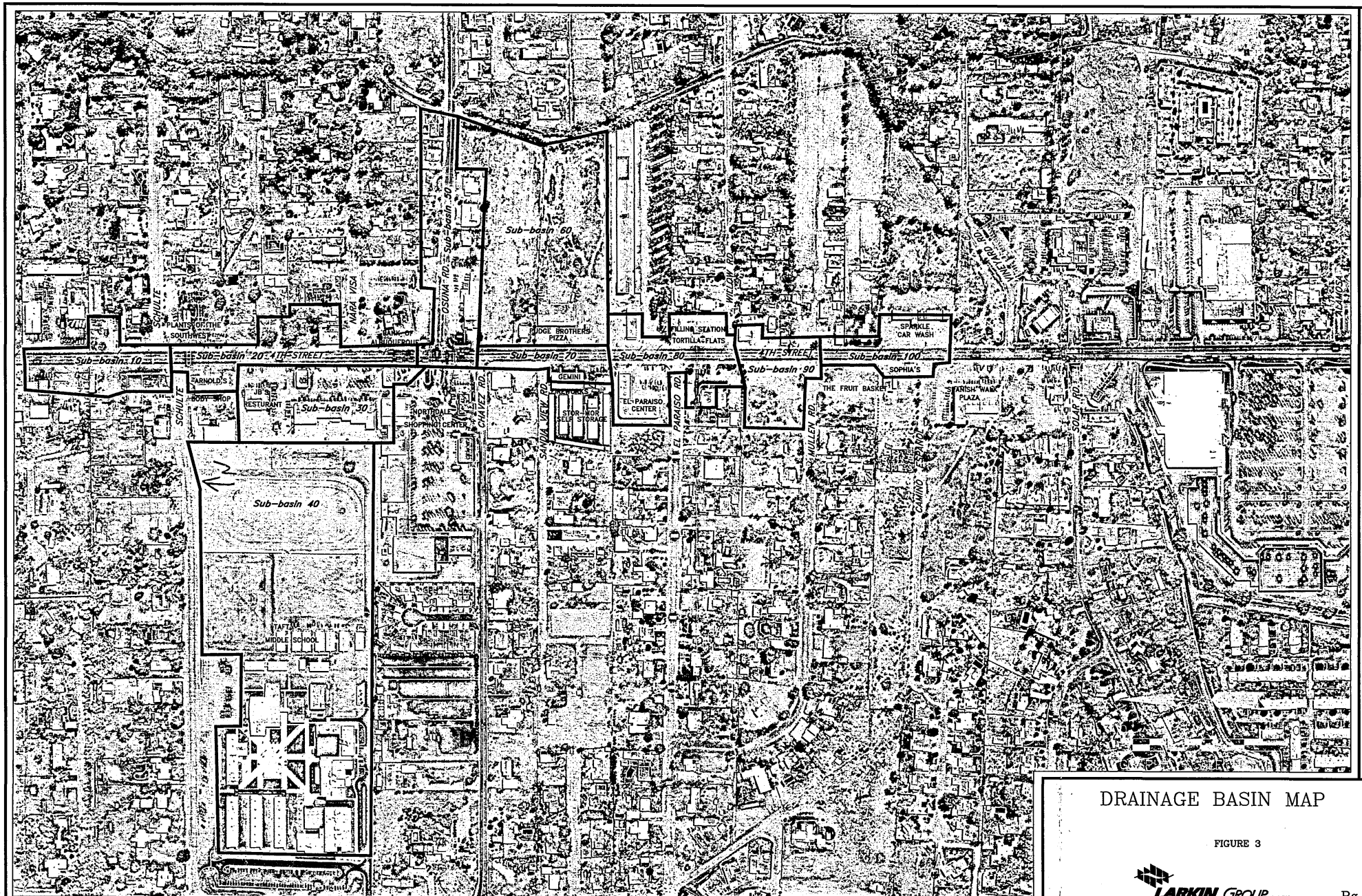
Table 1 Land Treatment Summary for Basins in Phase I

Basin ID (See Figure 3)		Existing Conditions Land Treatment Percentages			
	Acres	A	B	C	D
10	2.1	0	5	5	90
20	2.4	0	5	5	90
30	2.5	0	5	5	90
40	17.3	10	50	5	35
50	4.1	0	5	5	90
60	7.1	10	60	15	15
70	1.0	0	5	25	70
80	3.0	0	5	5	90
90	1.7	5	60	5	30
100	1.5	0	5	5	90

Table 2 Sub-basins That Contribute Directly to the Proposed Storm Drain System

Basin ID (See Figure 3)	Area (Acres)	Existing 100 yr. Q (cfs)	Existing 100 yr. Vol. (ac-ft)
10	2.1	9.3	0.415
20	2.4	10.3	0.478
30	2.5	6.5	0.289
40 (Taft MS)	17.3	40.2	1.975
50	4.1	12.9	0.671
60	7.1	11.9	0.624
70	1.0	4.2	0.177
80	3.0	13.1	0.579
90	1.7	5.2	0.187
100	1.5	6.8	0.302
Totals	42.7	120.4*	5.70

*not a routed total



4th STREET CORRIDOR IMPROVEMENTS — VILLAGE OF LOS RANCHOS DE ALBUQUERQUE

DRAINAGE BASIN MAP

FIGURE 3

LARKIN GROUP INC.

10-yr

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										PAGE = 2
ADD HYD	72.DI	7&82	72	.00390	6.91	.289	1.38734	1.500	2.768	
*S TOTAL AT STARLET MH										
ADD HYD	74.MH	85&72	74	.00890	12.68	.567	1.19444	1.500	2.226	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE-FROM STARLET TO SB60 MH S OF CHAVEZ										
ROUTE	71.PIP	74	71	.00890	12.33	.567	1.19452	1.550	2.164	
*S*** SUB-BASIN	60 *********PUDGE BROS PIZZA									
COMPUTE NM HYD	B-60	-	6	.01110	5.52	.288	.48616	1.650	.778	PER IMP= 15.00
ADD HYD	62.MH	6&71	62	.02000	16.95	.855	.80132	1.550	1.324	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM SB60 TO OSUNA										
ROUTE	51.PIP	62	51	.02000	16.66	.855	.80136	1.550	1.302	
*S*** SUB-BASIN	50 *********OSUNA ROAD									
COMPUTE NM HYD	B-50	-	5	.00550	8.27	.417	1.42239	1.550	2.351	PER IMP= 85.00
ADD HYD	52.MH	5&51	52	.02550	24.93	1.272	.93526	1.550	1.528	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM OSUNA TO NARA VISA										
ROUTE	31.PIP	52	31	.02550	24.67	1.272	.93529	1.600	1.512	
*S*** SUB-BASIN	30 *********NORTHDALE SHOPPING CENTER									
COMPUTE NM HYD	B-30	-	3	.00230	4.24	.181	1.47747	1.500	2.882	PER IMP= 90.00
ADD HYD	32.MH	3&31	32	.02780	27.85	1.453	.98011	1.550	1.565	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO BANK DI										
ROUTE	21.PIP	32	21	.02780	27.72	1.453	.98014	1.600	1.558	
*S*** SUB-BASIN	20 *********NARA VISA TO SHULTE									
COMPUTE NM HYD	B-20	-	2	.00380	6.71	.299	1.47747	1.500	2.760	PER IMP= 90.00
ADD HYD	22.MH	2&21	22	.03160	33.77	1.753	1.03991	1.550	1.670	
*S*** SUB-BASIN	10 *********NORTH OF SHULTE									
COMPUTE NM HYD	B-10	-	1	.00330	6.04	.260	1.47747	1.500	2.860	PER IMP= 90.00
ADD HYD	12.MH	1&22	12	.03490	39.12	2.013	1.08127	1.550	1.751	
*S ROUTE WEST IN 60" PIPE - FROM 4TH BANK DI TO TAFT MID SCHOOL										
ROUTE	41.PIP	12	41	.03490	37.44	2.013	1.08129	1.550	1.676	
COMPUTE NM HYD	B-40	-	4	.02700	21.39	1.053	.73141	1.600	1.238	PER IMP= 35.00
ADD HYD	POND	4&41	42	.06190	58.77	3.066 ←	.92866	1.600	1.484	
ADD HYD	TEST	17&42	19	.06430	62.58	3.255	.94914	1.550	1.521	
*S THESE FLOWS ARE ROUTED THROUGH THE TAFT SCHOOL DETENTION POND										
*S SITE AND CONTROLLED BY A 8.0 INCH DIA. ORIFICE LOCATED										
*S AT THE SOLAR ROAD MANHOLE WHICH WILL MAKE THE										
*S POND AND STORM DRAIN PERFORM AS A SURGE POND AND LIMIT THE PEAK										
*S OUTFLOW AT THE SOUTH END OF THE PROJECT TO LESS THAN 5 C.F.S.										
ROUTE RESERVOIR	40.OUT	42	43	.06190	4.44 ←	3.049	.92371	2.450	.112	AC-FT= 2.080
*S ROUTE EAST IN 60" PIPE - FROM TAFT MID SCHOOL TO 4TH BANK DI										
ROUTE	41.PIP	43	41	.06190	4.44	3.049	.92365	2.550	.112	
*S ROUTE SOUTH ALONG 4TH IN 60" PIPE - FROM BANK DI TO NARA VISA										
ROUTE	21.PIP	41	21	.06190	4.44	3.049	.92364	2.500	.112	
*S ROUTE SOUTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO OSUNA										
ROUTE	31.PIP	21	31	.06190	4.44	3.049	.92360	2.550	.112	
*S ROUTE SOUTH ALONG 4TH IN 36" PIPE - FROM OSUNA TO SB60										
ROUTE	51.PIP	31	51	.06190	4.44	3.049	.92358	2.450	.112	
*S ROUTE SOUTH ALONG 4TH IN 36" PIPE-FROM SB60 MH S OF CHAVEZ TO STARLET										
ROUTE	71.PIP	51	71	.06190	4.44	3.049	.92350	2.500	.112	
*S ROUTE SOUTH ALONG 4TH IN 36" PIPE - FROM STARLET TO WILLOW										
ROUTE	81.PIP	71	85	.06190	4.44	3.049	.92343	2.550	.112	
*S ROUTE SOUTH ALONG 4TH IN 24" PIPE - FROM WILLOW TO MULLEN										
ROUTE	91.PIP	85	91	.06190	4.44	3.048	.92335	2.550	.112	
FINISH										

10-yr

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*S THIS MODEL IS AN ADAPTATION OF THE AHYMO_97 HYDROLOGIC MODEL FOR:
*S ORIGINALLY THE NORTH VALLEY DRAINAGE MANAGEMENT PLAN
*S ORIGINALLY PREPARED FOR AMAFCA BY SMITH ENGINEERING (PLS, MDM, JNM)
*S MODEL DESCRIPTION -
*S 1. THIS MODEL ADDRESSES THE DRAINAGE FOR THE AREA IMMEDIATELY
*S ADJACENT TO THE PROPOSED 4TH STREET IMPROVEMENTS FROM
*s SCHULTE TO CAMINO ESPANOL.
*S 2. AS PER CURRENT VILLAGE OF LOS RANCHOS ORDINANCES THIS MODEL
*S WILL ADDRESS AND QUANTIFY THE "EXISTING" DEVELOPMENT CONDITIONS
*S FOR RUNOFF RATES AND VOLUMES.
*S 3. THE STORM DRAIN DIAMETERS USED FOR ROUTINGS IN THIS MODEL ARE
*S LARGER THAN NEEDED, DUE TO AHYMO_97 INABILITY TO MODEL
*S PRESSURE FLOW. FOR AN ACCURATE MODELING OF THE
*S STORM DRAINS SEE THE STORM CAD RESULTS. THE STORM DRAIN
*S ROUTINGS IN THIS MODEL ARE THEREFORE USED TO ROUTE THE
*S HYDROGRAPHS, NOT NECESSARILY TO SIZE THE STORM DRAINS
*S 4. NO SEDIMENT BULKING APPLIED DUE TO
*S A. MOST BASINS ARE DEVELOPED
*S B. MOST AREAS POND WATER, NOT MOVING WATER, THEREFORE
*S LITTLE CHANCE FOR EROSION AND SEDIMENT TRANSPORT
*S 5. USE PROCEDURES FROM COA DPM SECTION 22

START									TIME=	.00
LOCATION	BERNALILLO COUNTY									
*S 10 YEAR 24HR STORM										
RAINFALL TYPE= 2									RAIN24=	1.830
*S THIS FILE WAS USED TO SIZE THE PROPOSED PROJECT PIPES.										
*S PREPARED BY LARKIN,NM WITH PROPOSED IMPROVEMENTS KB,GTM										
*S*** SUB-BASIN 100 ********CAMINO ESPAÑOL										
COMPUTE NM HYD	B-100	-	10	.00240	4.43	.189	1.47747	1.500	2.882 PER IMP=	90.00
*S DIVIDE HYD										
*S FLOW IN EXCESS OF 8." ORIFICE CAPACITY FLOWS NORTH TO POND										
DIVIDE HYD	17.MSD	10	17	.00240	4.43	.189	1.47734	1.500	2.882	
	13.PIP	and	2	.00000	.00	.000	.00000	-.050	.000	
*S ROUTE NORTH ALONG 4TH IN 24" PIPE - FROM MULLEN TO WILLOW										
ROUTE	91.PIP	2	91	.00000	.00	.000	.00000	-.050	.000	
*S*** SUB-BASIN 90 ********* MULLEN TO WILLOW										
COMPUTE NM HYD	B-90	-	9	.00270	2.70	.097	.67479	1.500	1.562 PER IMP=	30.00
ADD HYD	92.00	9&91	92	.00270	2.70	.097	.67468	1.500	1.562	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET										
ROUTE	81.PIP	92	81	.00270	2.50	.097	.67502	1.550	1.447	
*S*** SUB-BASIN 80 *********EL PARAISO										
COMPUTE NM HYD	B-80	-	8	.00460	8.48	.362	1.47747	1.500	2.879 PER IMP=	90.00
DIVIDE HYD	80.STREET	8	82	.00230	4.24	.181	1.47740	1.500	2.879	
	80.PIPE	and	83	.00230	4.24	.181	1.47740	1.500	2.879	
ADD HYD	83.MH	83&81	84	.00500	6.53	.278	1.04395	1.500	2.040	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET										
ROUTE	81.PIP	84	85	.00500	6.28	.278	1.04410	1.550	1.961	
*S*** SUB-BASIN 70 *********SANDIA VIEW										
COMPUTE NM HYD	B-70	-	7	.00160	2.67	.107	1.25817	1.500	2.609 PER IMP=	70.00
*S FLOW INTO STARLET DI'S										

25-yr.

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										PAGE = 2
ADD HYD	72.DI	7&82	72	.00390	8.45	.360	1.72915	1.500	3.384	
*S TOTAL AT STARLET MH										
ADD HYD	74.MH	85&72	74	.00893	16.02	.719	1.50989	1.500	2.804	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE-FROM STARLET TO SB60 MH S OF CHAVEZ										
ROUTE	71.PIP	74	71	.00893	15.60	.719	1.50998	1.550	2.729	
*S*** SUB-BASIN 60	*********	PUDGE BROS PIZZA								
COMPUTE NM HYD	B-60	-	6	.01110	8.04	.415	.70042	1.650	1.131	PER IMP= 15.00
ADD HYD	62.MH	6&71	62	.02003	22.36	1.134	1.06128	1.550	1.745	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM SB60 TO OSUNA										
ROUTE	51.PIP	62	51	.02003	21.98	1.134	1.06132	1.550	1.714	
*S*** SUB-BASIN 50	*********	OSUNA ROAD								
COMPUTE NM HYD	B-50	-	5	.00550	10.12	.519	1.76844	1.550	2.874	PER IMP= 85.00
ADD HYD	52.MH	5&51	52	.02553	32.09	1.652	1.21361	1.550	1.964	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM OSUNA TO NARA VISA										
ROUTE	31.PIP	52	31	.02553	31.67	1.652	1.21364	1.600	1.938	
*S*** SUB-BASIN 30	*********	NORTHDALE SHOPPING CENTER								
COMPUTE NM HYD	B-30	-	3	.00230	5.15	.224	1.83000	1.500	3.496	PER IMP= 90.00
ADD HYD	32.MH	3&31	32	.02783	35.76	1.877	1.26454	1.550	2.008	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO BANK DI										
ROUTE	21.PIP	32	21	.02783	35.48	1.877	1.26457	1.550	1.992	
*S*** SUB-BASIN 20	*********	NARA VISA TO SHULTE								
COMPUTE NM HYD	B-20	-	2	.00380	8.15	.371	1.83000	1.500	3.350	PER IMP= 90.00
ADD HYD	22.MH	2&21	22	.03163	43.09	2.248	1.33247	1.550	2.128	
*S*** SUB-BASIN 10	*********	NORTH OF SHULTE								
COMPUTE NM HYD	B-10	-	1	.00330	7.33	.322	1.83000	1.500	3.469	PER IMP= 90.00
ADD HYD	12.MH	1&22	12	.03493	49.57	2.570	1.37946	1.550	2.218	
*S ROUTE WEST IN 60" PIPE - FROM 4TH BANK DI TO TAFT MID SCHOOL										
ROUTE	41.PIP	12	41	.03493	47.63	2.570	1.37948	1.550	2.131	
COMPUTE NM HYD	B-40	-	4	.02700	28.83	1.410	.97904	1.600	1.668	PER IMP= 35.00
ADD HYD	POND	4&41	42	.06193	76.26	3.980	1.20488	1.550	1.924	
ADD HYD	TEST	17&42	19	.06430	80.95	4.211	1.22792	1.550	1.967	
*S THESE FLOWS ARE ROUTED THROUGH THE TAFT SCHOOL DETENTION POND										
*S SITE AND CONTROLLED BY A 8.0 INCH DIA. ORIFICE LOCATED										
*S AT THE SOLAR ROAD MANHOLE WHICH WILL MAKE THE										
*S POND AND STORM DRAIN PERFORM AS A SURGE POND AND LIMIT THE PEAK										
*S OUTFLOW AT THE SOUTH END OF THE PROJECT TO LESS THAN 5 C.F.S.										
ROUTE RESERVOIR	40.OUT	42	43	.06193	4.68	3.963	1.19991	2.550	.118	AC-FT= 2.796
*S ROUTE EAST IN 60" PIPE - FROM TAFT MID SCHOOL TO 4TH BANK DI										
ROUTE	41.PIP	43	41	.06193	4.68	3.963	1.19984	2.650	.118	
*S ROUTE SOUTH ALONG 4TH IN 60" PIPE - FROM BANK DI TO NARA VISA										
ROUTE	21.PIP	41	21	.06193	4.68	3.963	1.19983	2.600	.118	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO OSUNA										
ROUTE	31.PIP	21	31	.06193	4.68	3.963	1.19980	2.650	.118	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM OSUNA TO SB60										
ROUTE	51.PIP	31	51	.06193	4.68	3.963	1.19977	2.750	.118	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE-FROM SB60 MH S OF CHAVEZ TO STARLET										
ROUTE	71.PIP	51	71	.06193	4.68	3.962	1.19969	2.650	.118	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM STARLET TO WILLOW										
ROUTE	81.PIP	71	85	.06193	4.68	3.962	1.19962	2.750	.118	
*S ROUTE NORTH ALONG 4TH IN 24" PIPE - FROM WILLOW TO MULLEN										
ROUTE	91.PIP	85	91	.06193	4.68	3.962	1.19955	2.750	.118	
FINISH										

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```
*S     THIS MODEL IS AN ADAPTATION OF THE AHYMO_97 HYDROLOGIC MODEL FOR:
*S ORIGINALLY THE NORTH VALLEY DRAINAGE MANAGEMENT PLAN
*S ORIGINALLY PREPARED FOR AMAFCABY SMITH ENGINEERING (PLS, MDM, JNM)
*S        MODEL DESCRIPTION -
*S   1.  THIS MODEL ADDRESSES THE DRAINAGE FOR THE AREA IMMEDIATELY
*S                   ADJACENT TO THE PROPOSED 4TH STREET IMPROVEMENTS FROM
*s                   SCHULTE TO CAMINO ESPANOL.
*S   2.  AS PER CURRENT VILLAGE OF LOS RANCHOS ORDINANCES THIS MODEL
*S        WILL ADDRESS AND QUANTIFY THE "EXISTING" DEVELOPMENT CONDITIONS
*S                   FOR RUNOFF RATES AND VOLUMES.
*S   3.  THE STORM DRAIN DIAMETERS USED FOR ROUTINGS IN THIS MODEL ARE
*S        LARGER THAN NEEDED, DUE TO AHYMO_97 INABILITY TO MODEL
*S        PRESSURE FLOW.   FOR AN ACCURATE MODELING OF THE
*S        STORM DRAINS SEE THE STORM CAD RESULTS. THE STORM DRAIN
*S        ROUTINGS IN THIS MODEL ARE THEREFORE USED TO ROUTE THE
*S        HYDROGRAPHS, NOT NECESSARILY TO SIZE THE STORM DRAINS
*S   4.  NO SEDIMENT BULKING APPLIED DUE TO
*S              A.  MOST BASINS ARE DEVELOPED
*S              B.  MOST AREAS POND WATER, NOT MOVING WATER, THEREFORE
*S                  LITTLE CHANCE FOR EROSION AND SEDIMENT TRANSPORT
*S   5.  USE PROCEDURES FROM COA DPM SECTION 22
START                                                                    TIME=      .00
LOCATION                    BERNALILLO COUNTY
*S 25 YEAR 24HR STORM
RAINFALL  TYPE= 2                                                        RAIN24=  2.200
*S THIS FILE WAS USED TO SIZE THE PROPOSED PROJECT PIPES.
*S PREPARED BY LARKIN,NM  WITH PROPOSED IMPROVEMENTS KB,GTM
*S*** SUB-BASIN    100 ********CAMINO ESPAÑOL
COMPUTE NM HYD        B-100   -    10      .00240       5.37      .234     1.83000   1.500    3.496 PER IMP=  90.00
*S DIVIDE HYD
*S FLOW IN EXCESS OF 8." ORIFICE CAPACITY FLOWS NORTH TO POND
DIVIDE HYD          17.MSD   10   17      .00237       4.70      .231     1.82986   1.450    3.098
                    13.PIP  and    2      .00003        .67      .003     1.82986   1.500   35.128
*S ROUTE NORTH ALONG 4TH IN 24" PIPE - FROM MULLEN TO WILLOW
ROUTE               91.PIP    2   91      .00003        .22      .003     2.09006   1.550   11.758
*S*** SUB-BASIN    90 ********* MULLEN TO WILLOW
COMPUTE NM HYD         B-90   -     9      .00270       3.68      .132      .91452   1.500    2.127 PER IMP=  30.00
ADD HYD              92.00  9&91   92      .00273       3.84      .135      .92698   1.500    2.198
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET
ROUTE               81.PIP   92   81      .00273       3.63      .135      .92724   1.550    2.076
*S*** SUB-BASIN    80 *********EL PARAISO
COMPUTE NM HYD         B-80   -     8      .00460      10.28      .449     1.83000   1.500    3.492 PER IMP=  90.00
DIVIDE HYD        80.STREET    8   82      .00230       5.14      .224     1.82993   1.500    3.492
                    80.PIPE  and   83      .00230       5.14      .224     1.82993   1.500    3.492
ADD HYD             83.MH 83&81   84      .00503       8.44      .359     1.33986   1.500    2.621
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET
ROUTE               81.PIP   84   85      .00503       8.19      .359     1.34001   1.550    2.544
*S*** SUB-BASIN    70 *********SANDIA VIEW
COMPUTE NM HYD         B-70   -     7      .00160       3.31      .135     1.58455   1.500    3.229 PER IMP=  70.00
*S FLOW INTO STARLET DI'S
```

100-yr.

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	31.PIP	21	31	.06205	4.77	5.399	1.63133	2.750	.120	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM OSUNA TO SB60										
ROUTE	51.PIP	31	51	.06205	4.77	5.399	1.63130	2.800	.120	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE-FROM SB60 MH S OF CHAVEZ TO STARLET										
ROUTE	71.PIP	51	71	.06205	4.77	5.399	1.63122	2.800	.120	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM STARLET TO WILLOW										
ROUTE	81.PIP	71	85	.06205	4.77	5.398	1.63115	2.850	.120	
*S ROUTE NORTH ALONG 4TH IN 24" PIPE - FROM WILLOW TO MULLEN										
ROUTE	91.PIP	85	91	.06205	4.77	5.398	1.63108	2.850	.120	
FINISH										

100-yr.

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
										PAGE = 2
ROUTE	81.PIP	92	81	.00285	6.40	.207	1.35955	1.550	3.503	
*S*** SUB-BASIN	80 *********EL PARAISO									
COMPUTE NM HYD	B-80	-	8	.00460	13.05	.579	2.35904	1.500	4.433	PER IMP= 90.00
DIVIDE HYD	80.STREET	8	82	.00230	6.53	.289	2.35898	1.500	4.433	
	80.PIPE	and	83	.00230	6.53	.289	2.35898	1.500	4.433	
ADD HYD	83.MH	83&81	84	.00515	12.10	.496	1.80536	1.550	3.669	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET										
ROUTE	81.PIP	84	85	.00515	12.04	.496	1.80550	1.550	3.649	
*S*** SUB-BASIN	70 *********SANDIA VIEW									
COMPUTE NM HYD	B-70	-	7	.00160	4.24	.177	2.07952	1.500	4.140	PER IMP= 70.00
*S FLOW INTO STARLET DI'S										
ADD HYD	72.DI	7&82	72	.00390	10.76	.467	2.24422	1.500	4.313	
*S TOTAL AT STARLET MH										
ADD HYD	74.MH	85&72	74	.00905	21.58	.963	1.99440	1.500	3.724	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE-FROM STARLET TO SB60 MH S OF CHAVEZ										
ROUTE	71.PIP	74	71	.00905	21.31	.963	1.99448	1.550	3.677	
*S*** SUB-BASIN	60 *********PUDGE BROS PIZZA									
COMPUTE NM HYD	B-60	-	6	.01110	11.92	.624	1.05358	1.650	1.679	PER IMP= 15.00
ADD HYD	62.MH	6&71	62	.02015	31.35	1.587	1.47623	1.550	2.430	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM SB60 TO OSUNA										
ROUTE	51.PIP	62	51	.02015	30.80	1.587	1.47626	1.550	2.388	
*S*** SUB-BASIN	50 *********OSUNA ROAD									
COMPUTE NM HYD	B-50	-	5	.00550	12.89	.671	2.28884	1.550	3.661	PER IMP= 85.00
ADD HYD	52.MH	5&51	52	.02565	43.68	2.258	1.65042	1.550	2.661	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM OSUNA TO NARA VISA										
ROUTE	31.PIP	52	31	.02565	43.18	2.258	1.65045	1.600	2.630	
*S*** SUB-BASIN	30 *********NORTHDALE SHOPPING CENTER									
COMPUTE NM HYD	B-30	-	3	.00230	6.53	.289	2.35904	1.500	4.439	PER IMP= 90.00
ADD HYD	32.MH	3&31	32	.02795	48.28	2.548	1.70872	1.550	2.699	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO BANK DI										
ROUTE	21.PIP	32	21	.02795	48.02	2.548	1.70875	1.550	2.684	
*S*** SUB-BASIN	20 *********NARA VISA TO SHULTE									
COMPUTE NM HYD	B-20	-	2	.00380	10.35	.478	2.35904	1.500	4.255	PER IMP= 90.00
ADD HYD	22.MH	2&21	22	.03175	57.67	3.026	1.78653	1.550	2.838	
*S*** SUB-BASIN	10 *********NORTH OF SHULTE									
COMPUTE NM HYD	B-10	-	1	.00330	9.30	.415	2.35904	1.500	4.405	PER IMP= 90.00
ADD HYD	12.MH	1&22	12	.03505	65.91	3.441	1.84042	1.550	2.938	
*S ROUTE WEST IN 60" PIPE - FROM 4TH BANK DI TO TAFT MID SCHOOL										
ROUTE	41.PIP	12	41	.03505	63.48	3.441	1.84044	1.550	2.829	
COMPUTE NM HYD	B-40	-	4	.02700	40.23	1.975	1.37170	1.600	2.328	PER IMP= 35.00
ADD HYD	POND	4&41	42	.06205	103.34	5.416 ←	1.63647	1.550	2.602	
ADD HYD	TEST	17&42	19	.06430	108.04	5.699	1.66170	1.550	2.625	
*S THESE FLOWS ARE ROUTED THROUGH THE TAFT SCHOOL DETENTION POND										
*S SITE AND CONTROLLED BY A 8.0 INCH DIA. ORIFICE LOCATED										
*S AT THE SOLAR ROAD MANHOLE WHICH WILL MAKE THE										
*S POND AND STORM DRAIN PERFORM AS A SURGE POND AND LIMIT THE PEAK										
*S OUTFLOW AT THE SOUTH END OF THE PROJECT TO LESS THAN 5 C.F.S.										
ROUTE RESERVOIR	40.OUT	42	43	.06205	4.77 ←	5.399	1.63144	2.700	.120	AC-FT= 3.951
*S ROUTE EAST IN 60" PIPE - FROM TAFT MID SCHOOL TO 4TH BANK DI										
ROUTE	41.PIP	43	41	.06205	4.77	5.399	1.63138	2.750	.120	
*S ROUTE SOUTH ALONG 4TH IN 60" PIPE - FROM BANK DI TO NARA VISA										
ROUTE	21.PIP	41	21	.06205	4.77	5.399	1.63136	2.750	.120	
*S ROUTE NORTH ALONG 4TH IN 60" PIPE - FROM NARA VISA TO OSUNA										

100-yr.

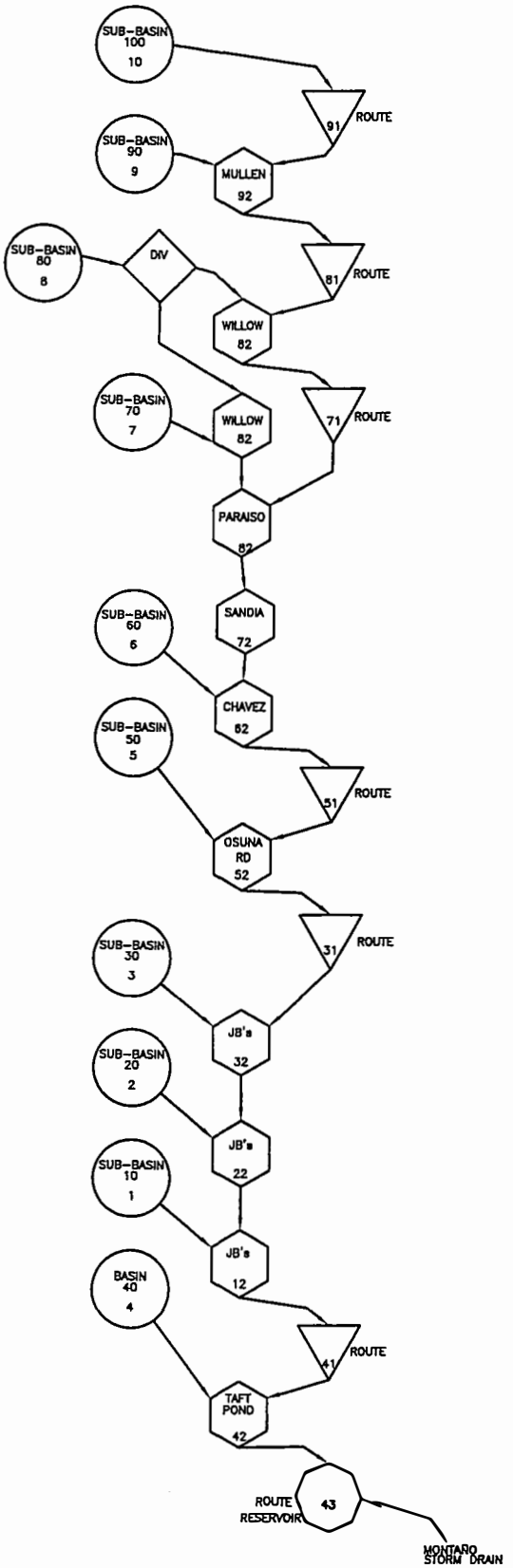
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02b RUN DATE (MON/DAY/YR) =10/20/2005
INPUT FILE = C:\PPDIV100.txt USER NO.= AHYMO-S-9702c3LarkinG-AH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION

*S
*S THIS MODEL IS AN ADAPTATION OF THE AHYMO_97 HYDROLOGIC MODEL FOR:
*S
*S ORIGINALLY THE NORTH VALLEY DRAINAGE MANAGEMENT PLAN
*S
*S ORIGINALLY PREPARED FOR AMAFCA
*S PREPARED BY SMITH ENGINEERING (PLS, MDM, JNM)
*S
*S MODEL DESCRIPTION -
*S
*S 1. THIS MODEL ADDRESSES THE DRAINAGE FOR THE AREA IMMEDIATELY
*S ADJACENT TO THE PROPOSED 4TH STREET IMPROVEMENTS FROM
*s SCHULTE TO CAMINO ESPANOL.
*S
*S 2. AS PER CURRENT VILLAGE OF LOS RANCHOS ORDINANCES THIS MODEL
*S WILL ADDRESS AND QUANTIFY THE "EXISTING" DEVELOPMENT CONDITIONS
*S FOR RUNOFF RATES AND VOLUMES.
*S
*S 3. THE STORM DRAIN DIAMETERS USED FOR ROUTINGS IN THIS MODEL ARE
*S LARGER THAN NEEDED, DUE TO AHYMO_97 INABILITY TO MODEL
*S PRESSURE FLOW. FOR AN ACCURATE MODELING OF THE
*S STORM DRAINS SEE THE STORM CAD RESULTS. THE STORM DRAIN
*S ROUTINGS IN THIS MODEL ARE THEREFORE USED TO ROUTE THE
*S HYDROGRAPHS, NOT NECESSARILY TO SIZE THE STORM DRAINS
*S
*S 4. NO SEDIMENT BULKING APPLIED DUE TO
*S A. MOST BASINS ARE DEVELOPED
*S B. MOST AREAS POND WATER, NOT MOVING WATER, THEREFORE
*S LITTLE CHANCE FOR EROSION AND SEDIMENT TRANSPORT
*S
*S 5. USE PROCEDURES FROM COA DPM SECTION 22
*S

START									TIME=	.00
LOCATION	BERNALILLO COUNTY									
*S100 YEAR 24HR STORM										
RAINFALL TYPE= 2									RAIN24=	2.750
*S BEGINNING BASINS THAT WILL DISCHARGE TO THE PROPOSED 4TH STORM DRAIN										
*S*** SUB-BASIN 100 ********CAMINO ESPANOL										
COMPUTE NM HYD	B-100	-	10	.00240	6.82	.302	2.35904	1.500	4.439 PER IMP=	90.00
*S DIVIDE HYD										
*S FLOW IN EXCESS OF 8." ORIFICE CAPACITY FLOWS NORTH TO POND										
DIVIDE HYD	17.MSD	10	17	.00225	4.70	.283	2.35893	1.450	3.270	
	13.PIP	and	2	.00015	2.12	.019	2.35893	1.500	21.424	
*S ROUTE NORTH ALONG 4TH IN 24" PIPE - FROM MULLEN TO WILLOW										
ROUTE	91.PIP	2	91	.00015	1.63	.020	2.40909	1.550	16.504	
*S*** SUB-BASIN 90 ********* MULLEN TO WILLOW										
COMPUTE NM HYD	B-90	-	9	.00270	5.16	.187	1.29956	1.500	2.985 PER IMP=	30.00
ADD HYD	92.00	9&91	92	.00285	6.63	.207	1.35923	1.500	3.632	
*S ROUTE NORTH ALONG 4TH IN 36" PIPE - FROM WILLOW TO STARLET										

4th STREET CORRIDOR IMPROVEMENTS
VILLAGE OF LOS RANCHOS de ALBUQUERQUE



AHYMO_97 MODELING SCHEMATIC

A-1

The proposed 886 linear feet of storm drain in 4th Street at the south end of the project site to the existing Montaño Storm Drain will have approximately 0.42 ft of head loss below the orifice plate at the proposed discharge rate (See calculations Appendix C-2).

The use of an orifice plate and twenty-four inch pipe is roughly equivalent to replacing the 2000 feet of twenty-four inch pipe with fifteen inch pipe.

8.0 Conclusions

The storm drain improvements for this project will collect and convey the 70 c.f.s., 100-yr 24-hour runoff from the project area, at a combined time to peak of 1.6 hours. The storm drain main lines will convey the flows to and from the Taft Middle School Pond.

The detention pond is sized to attenuate the 100-yr event from the street project area only. Any additional flows introduced to the system will require evaluation of the gravity discharge capabilities and expansion of detention pond storage capacity. While the detention pond will have approximately one foot of free board, the controlling factor will be the peak water surface elevation in relation to the elevation of the existing downstream structures and project street grades. The system will provide improved protection from other events such as larger storms or irrigation channel breaks.

In the event of a tanker truck spill, emergency response agencies should be aware that this system drains to the river by way of the Montaño Pump Station.

This pond will provide the storage capacity required for attenuating the project area runoff from the 100-yr-storm event to a maximum of 4.8 c.f.s. at a time to peak of 2.8 hours (Appendix A-32) while producing a maximum water surface elevation of 4979.3 in the detention pond. This pond will attenuate the runoff from the 25-yr-storm event to a maximum of 4.7 c.f.s. at a time to peak of 2.5 hours (Appendix A-6) with a maximum water surface elevation of 4979.0 in the detention pond. This pond will attenuate the runoff from the 10-yr-storm event to a maximum of 4.44 c.f.s. at a time to peak of 2.5 hours (Appendix A-69) with a maximum water surface elevation of 4978.3 in the detention pond.

The invert elevation of the 60" storm drain at the Taft Middle School Pond junction box structure will be 4973.5 (Appendix B-4 & B-6). The average elevation of the buried pipe detention basin below the playing field is 4973.7. The above ground pond bottom elevation will be 4977.5. See Appendix B-6 for pond layout. With the proposed detention pond set at a minimum bottom elevation of 4973.6 and the 100-yr. maximum water surface elevation (W.S.EL.) of 4979.3, it will be possible to drain the detention pond by gravity with minimal surcharging of the downstream storm drain inlets.

7.1 Detention Pond Outlet

A 24 inch pipe at 0.085% slope (Appendix B-1 & B-2) will be adequate to drain the system to the existing storm drain system at 4th Street and Alamosa Road. This detention pond system will require an 8.0 inch orifice plate (Appendix C-1) to control the outflow rate. The orifice plate in the outlet pipe will be in a manhole at Solar Road with a center elevation of 4971.25.

The performance of the orifice plate will be controlled by the water depth (HGL) in the pipe downstream. When the downstream pipe is flowing half full and the maximum system head of 8.4 feet is applied to the orifice, the discharge will be 4.5 cfs. With the pipe downstream of the orifice flowing with the full two foot depth, the discharge will be 4.2 cfs and with the HGL two feet above the top of the downstream pipe, the discharge will be 3.5 cfs.

Storm water from this pond and pipe system will be discharged to an existing storm drain in 4th Street near the intersection with Alamosa, southeast of the Smith's Grocery Store. The Taft Middle School pond crest elevation is slightly higher than the ground surface downstream of Alamosa Road. Therefore the storm drain system has been designed to keep water levels below inlet grate elevations in the area of Alamosa Road.

An elevation survey indicates an average elevation of approximately 4980 at the south end of the project area downstream of the orifice plate. As built drawings of the existing storm drain at 4th Street and Alamosa show an invert elevation of 4970.16 on the existing storm drain line this project proposes drain to.

7.0 Detention Pond Improvements

In the 4th Street Corridor Drainage Report (Appendix D-2) the discharge to the Montaño Road storm drain at 4th Street and Alamosa is restricted to less than 5 c.f.s to keep the hydraulic grade line at least 6-inches below the inlet grates along Montaño Road. This requirement can be met by the construction of a detention pond at the Taft Middle School (see Appendix B-6). The detention system will be both an open surface pond and a buried pipe reservoir. The buried detention capacity of the system will be obtained by excavating soil and installing storage vessels such as corrugated High Density Polyethylene (HDPE) pipes. The elevation of the buried pipe will be lower than the surface pond to reduce the frequency of standing water on the school site.

The buried pipe does not provide for infiltration to site soils. This system protects ground water from street runoff contaminants and the potential damage to structures caused by saturated soils. Groundwater levels in the area have dropped to a depth of approximately 40 feet according to well records of the State Engineer Office. Resaturating these soils may cause damage to neighboring buildings.

The system is also designed to accept the flows from the Taft Middle School site (40.23 c.f.s. Appendix A-3) with a time to peak of 1.6 hours.

For this study 4500 feet of 42" HDPE pipe has been assumed. The stage storage characteristics of the proposed pond with buried pipe storage are presented in Table 4.

Table 4 Proposed Detention Stage Storage

Elevation (feet)	Surface Area (acres)	Accumulated Volume (acre feet)
4970.2	Pipe Storage	0.01
4971.0	Pipe Storage	0.04
4972.0	Pipe Storage	0.07
4973.0	Pipe Storage	0.17
4974.0	0.11 *	0.28
4975.0	0.4 *	0.68
4976.0	0.49 *	1.17
4977.0	0.36 *	1.53
4978.0	0.3	1.83
4978.5	0.96	2.31
4979.0	0.96	2.79
4979.5	3.76	4.67
4980.0	4.68	7.01
4980.25	6.12	8.55
4980.5	6.16	10.08

* Buried pipe and pond storage

Alamosa Road to Montaño Road were measured during site surveys in 2005. The only as-built drawings found in the COA Maps and Records files and the COA Storm Drainage Atlas show 15" and 21" pipes for the storm drains south of Alamosa Road to Gene Avenue near Montaño Road.

6.2 Osuna Road Storm Drain Improvements

Four Type A inlets, 3 manholes and 575 feet of concrete pipe will be installed on Osuna Road.

The proposed Osuna Road storm drain (Appendix B-4) will collect and convey the project area 100-yr event flow rate in a 24 inch RCP storm drain at 0.20% slope to a manhole at the intersection of 4th Street and Osuna. As the proposed street section for Osuna Road is only three lanes with one being a center turn lane, it would be cost prohibitive to provide one clear lane of traffic each way. Therefore the inlets on Osuna have been sized and located to keep one half of the outside lane and the center lane clear for traffic (see computations Appendix C-5, C-6, & C-7) during the 100-yr storm event.

Table 3b Proposed Osuna Road Storm Drain Improvements

Osuna Rd. Storm Drain Reach	Proposed Storm Drain		
	Pipe size & slope	Peak Q (cfs)	HGL Elev.
Osuna Rd. 1st Inlet	24" RCP @ 0.20%	15	4878.95
Osuna Rd. 2nd Inlet	24" RCP @ 0.10%	9	4879.39

6.1 Fourth Street Storm Drain Improvements

Nine Type A inlets, 14 manholes and 3750 feet of concrete pipe will be installed on 4th Street. 360 feet of concrete pipe will connect the 4th Street pipe to the Taft Middle School Pond.

The storm drain improvements listed in Table 3 for this portion of the project (Appendix B-2 & B-3) will collect and convey the 100-yr 24 hour runoff from the project area. This routed runoff is approximately 50 c.f.s. in the pipe with a combined time to peak of 1.55 hours (Appendix A-55).

When the rate of water flowing into the system is greater than the water leaving through the orifice plate, water will fill the pipe and then the detention pond at the Taft Middle School at the north end of the site. When water enters the system at a rate higher than the amount leaving through the orifice plate, the water surface will move upslope in the pipe. During high runoff storms the amount of water flowing in the pipe toward the Taft Middle School Pond increases at each inlet. The greatest flow rate and the largest pipe will be nearest the Taft Middle School Pond. After the storm the pond will drain by gravity flow through the same system pipes.

Table 3 Proposed 4th Street Storm Drain Improvements

4th St. Storm Drain Reaches	Proposed Storm Drain		
	Pipe size & slope	Peak Q (cfs) 100-yr	HGL Elev.
Above Orifice at Solar Rd.	24" RCP @ 0.085%	5	4878.37
Mullen Rd. to north	24" RCP @ 0.085%	2	4878.76
Willow Rd. to north	36" RCP @ 0.085%	14	4878.74
Sandia View Rd. to north	36" RCP @ 0.085%	22	4878.28
Chavez Rd. to north	48" RCP @ 0.085%	30	4877.98
Osuna Rd. to north	60" RCP @ 0.085%	32	4877.92
Nara Visa to north	60" RCP @ 0.085%	44	4877.84
4th St to Taft Middle School Pond	60" RCP @ 0.085%	65	4877.81

Although not subject to the C.O.A. D.P.M., these guidelines regarding water surface profiles and detention ponds require that water be present in the pond at the start of the storm. The project storm drains were sized to convey the 100-yr peak runoff rate with the water surface in the pond at the 10-yr event elevation. For the proposed detention basin this elevation was established at 4978.5 (see Appendix A-30). The sizes of the individual storm drain pipe reaches (see Appendix B-1 through B-4) were determined as required to keep the hydraulic grade line (HGL) below the proposed street flow line elevation. The slope of the pipe is constant from the pond to the connection with the existing system at Alamosa Road.

The existing storm drain system in 4th Street that ends at Alamosa Road had been upgraded from the 15" pipe built in 1953 to 24" pipe sometime after 1978. The manholes along the system from

The 100-yr 24 hour runoff from the project area will be routed through a detention pond that is proposed to be constructed near the north end of the Phase I project area at the Taft Middle School. The peak runoff rate from the street areas and contributing sub-basins not including the Taft Middle School is approximately 66 c.f.s. with a time to peak of 1.55 hours (see Appendix A-3). See Section 7.0 for a discussion of the pipe storage and detention pond. If areas are redeveloped, the Village of Los Ranchos de Albuquerque requires the 100-yr. peak rates of flow will be no more than for existing conditions.

6.0 Storm Drain Improvements

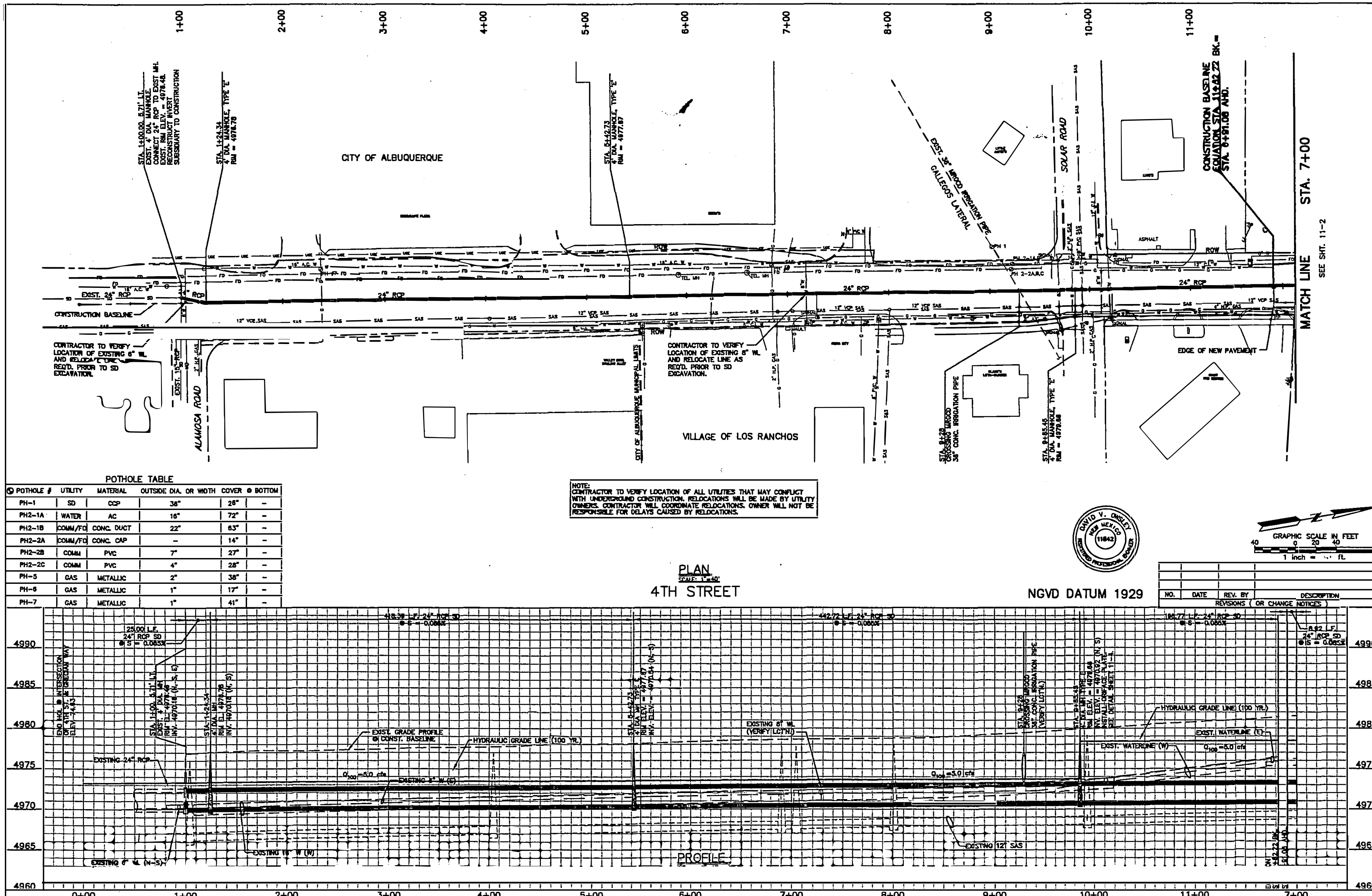
Storm drain improvements have been sized to collect and convey the 100-yr 24-hour runoff from 4th Street, Osuna Road and sub-basins that are immediately adjacent to them.

Improvements will include 13 curb inlets at street profile low points, and intermediate points. The inlets on 4th Street have been sized and located to allow one clear through lane of traffic flow in each direction during the 100-yr. storm event. The inlets on Osuna have been sized and located to keep one half of the outside lane and the center lane clear for traffic (see computations Appendix C-5, & C-6) during the 100-yr storm event.

One drainage inlet will be installed in the parking lot at El Paraiso Center and one at the JB's Restaurant parking lot.

The proposed storm drain will have sufficient capacity to convey the 100-yr event flow to the Taft Middle School Pond site during the storm. This pond will be enlarged from the existing school site pond. The two smaller ponds proposed in the 4th Street Corridor Drainage Report by Wilson & Co. were not included in this project due to the high cost of the required land.

The individual areas adjacent to the proposed street improvements that will not drain directly to the street will be individually evaluated. These may require the installation of area inlets outside of the street ROWs as illustrated in Figure 4. In this situation, additional drainage easements, for both construction and maintenance, will be necessary.

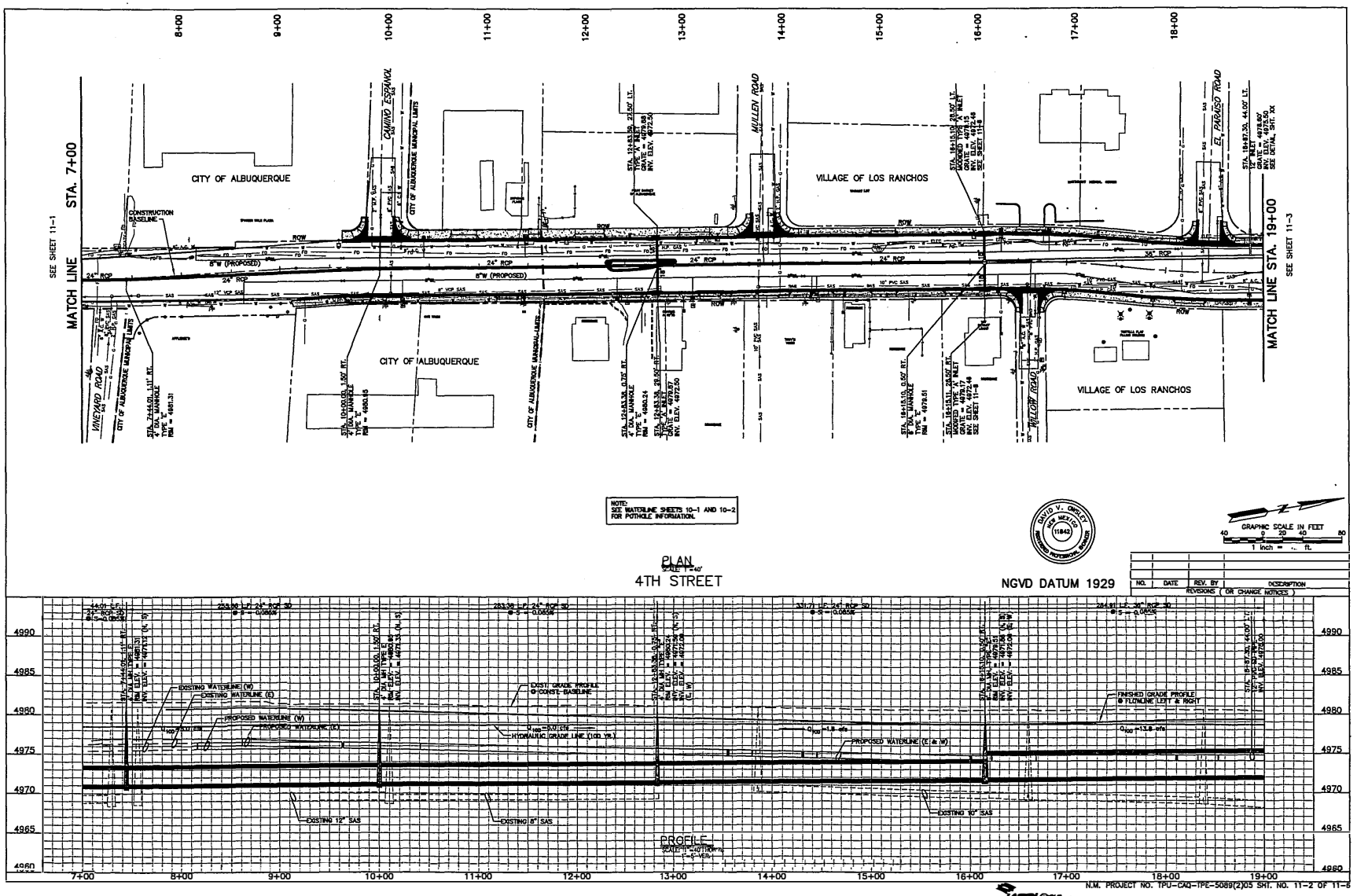


POTHOLE TABLE

POTHOLE #	UTILITY	MATERIAL	OUTSIDE DIA. OR WIDTH	COVER	@ BOTTOM
PH-1	SD	CCP	36"	26"	–
PH2-1A	WATER	AC	16"	72"	–
PH2-1B	COMM/FO	CONC. DUCT	22"	63"	–
PH2-2A	COMM/FO	CONC. CAP	–	14"	–
PH2-2B	COMM	PVC	7"	27"	–
PH2-2C	COMM	PVC	4"	28"	–
PH-5	GAS	METALLIC	2"	38"	–
PH-6	GAS	METALLIC	1"	17"	–
PH-7	GAS	METALLIC	1"	41"	–

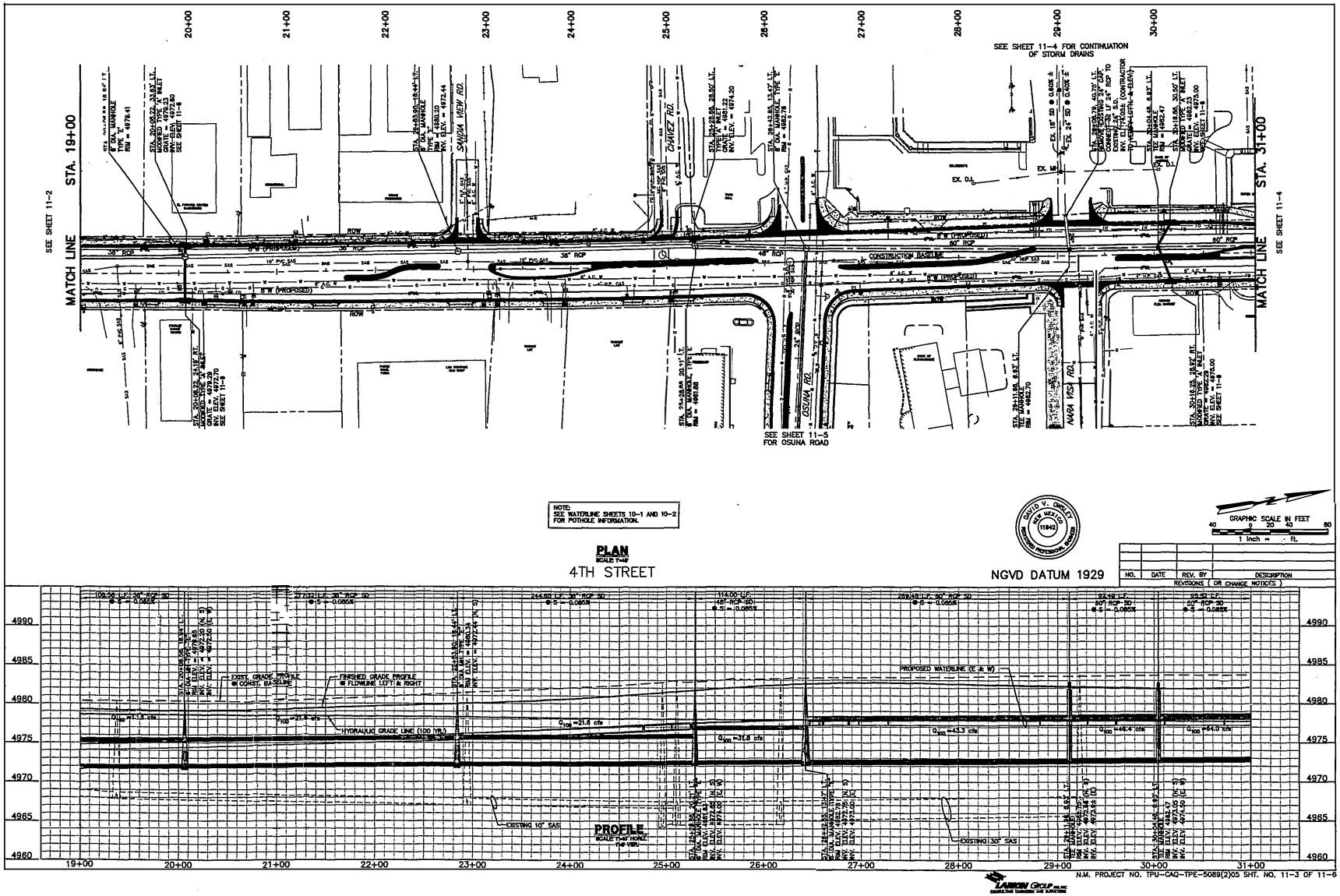
NOTE:
CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES THAT MAY CONFLICT WITH UNDERGROUND CONSTRUCTION. RELOCATIONS WILL BE MADE BY UTILITY OWNERS. CONTRACTOR WILL COORDINATE RELOCATIONS. OWNER WILL NOT BE RESPONSIBLE FOR DELAYS CAUSED BY RELOCATIONS.

APPENDIX B-1



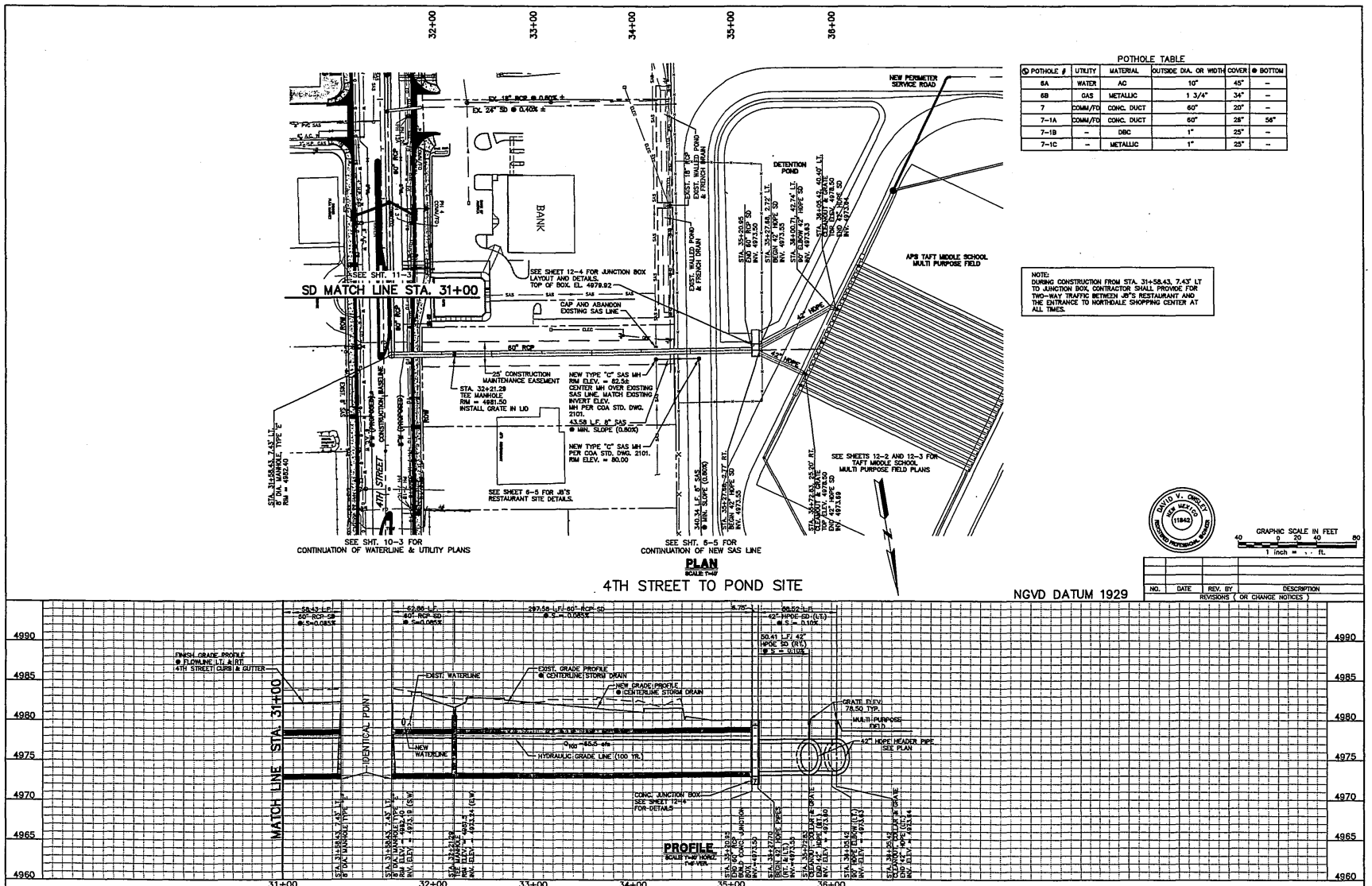
N.M. PROJECT NO. TPU-CAQ-TPE-5089(2)05 SHT. NO. 11-2 OF 11-5

APPENDIX B-2



N.M. PROJECT NO. TPU-CAQ-TPE-5089(2)05 SHT. NO. 11-3 OF 11-6

APPENDIX B-3



PLAN
SCALE: 1"=40'

4TH STREET TO POND SITE

NGVD DATUM 1929

POTHOLE TABLE

Ⓟ POTHOLE #	UTILITY	MATERIAL	OUTSIDE DIA. OR WIDTH	COVER	@ BOTTOM
6A	WATER	AC	10"	45"	–
6B	GAS	METALLIC	1 3/4"	34"	–
7	COMM/FO	CONC. DUCT	60"	20"	–
7-1A	COMM/FO	CONC. DUCT	60"	28"	56"
7-1B	–	DBC	1"	25"	–
7-1C	–	METALLIC	1"	25"	–

NOTE:
DURING CONSTRUCTION FROM STA. 31+58.43, 7.43' LT TO JUNCTION BOX, CONTRACTOR SHALL PROVIDE FOR TWO-WAY TRAFFIC BETWEEN JB'S RESTAURANT AND THE ENTRANCE TO NORTHDALE SHOPPING CENTER AT ALL TIMES.

DAVID V. ORDUEZ
NEW MEXICO
11843
REGISTERED PROFESSIONAL ENGINEER

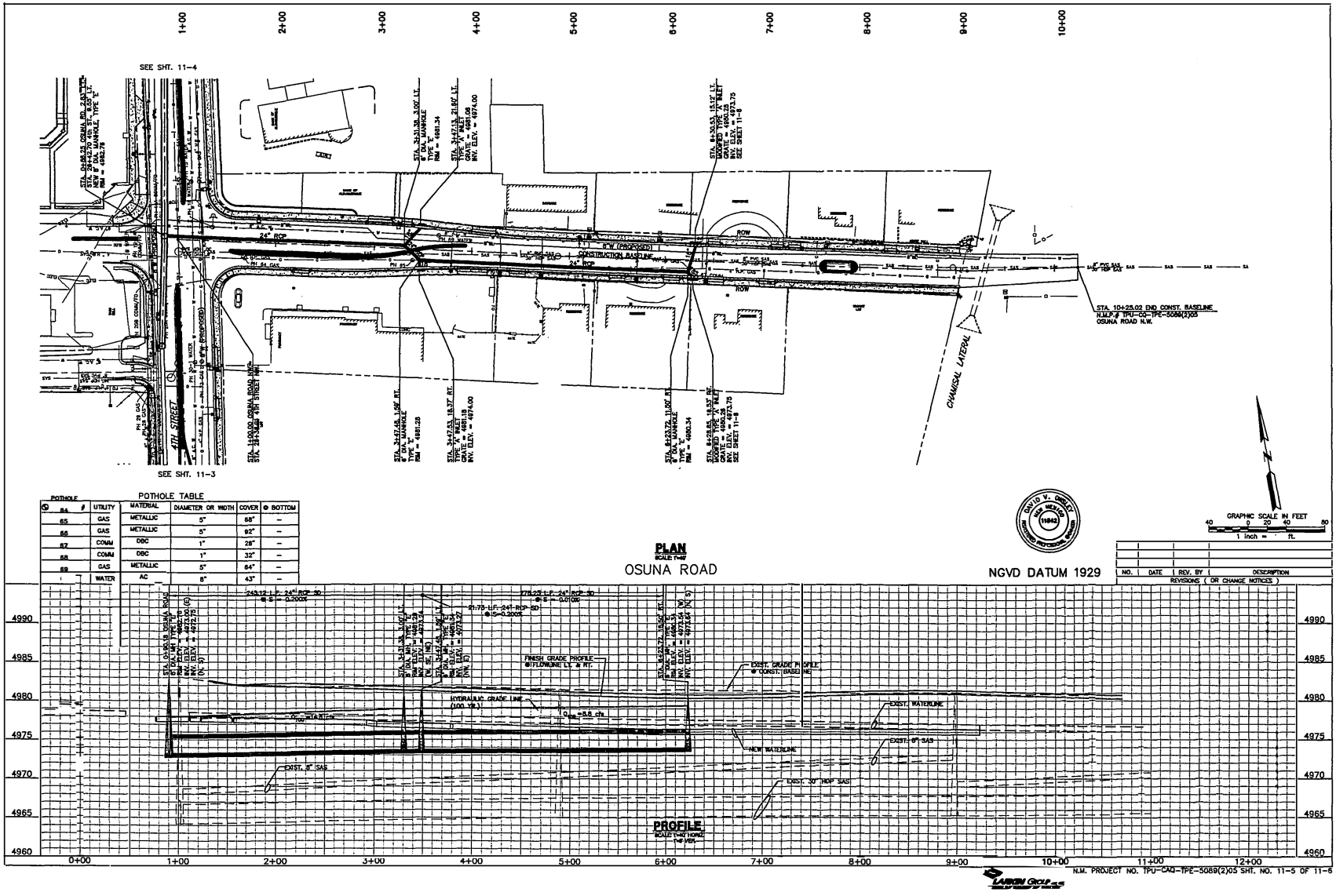
GRAPHIC SCALE IN FEET
40 0 20 40 80
1 inch = ' ft.

NO.	DATE	REV. BY	DESCRIPTION
			REVISIONS (OR CHANGE NOTICES)

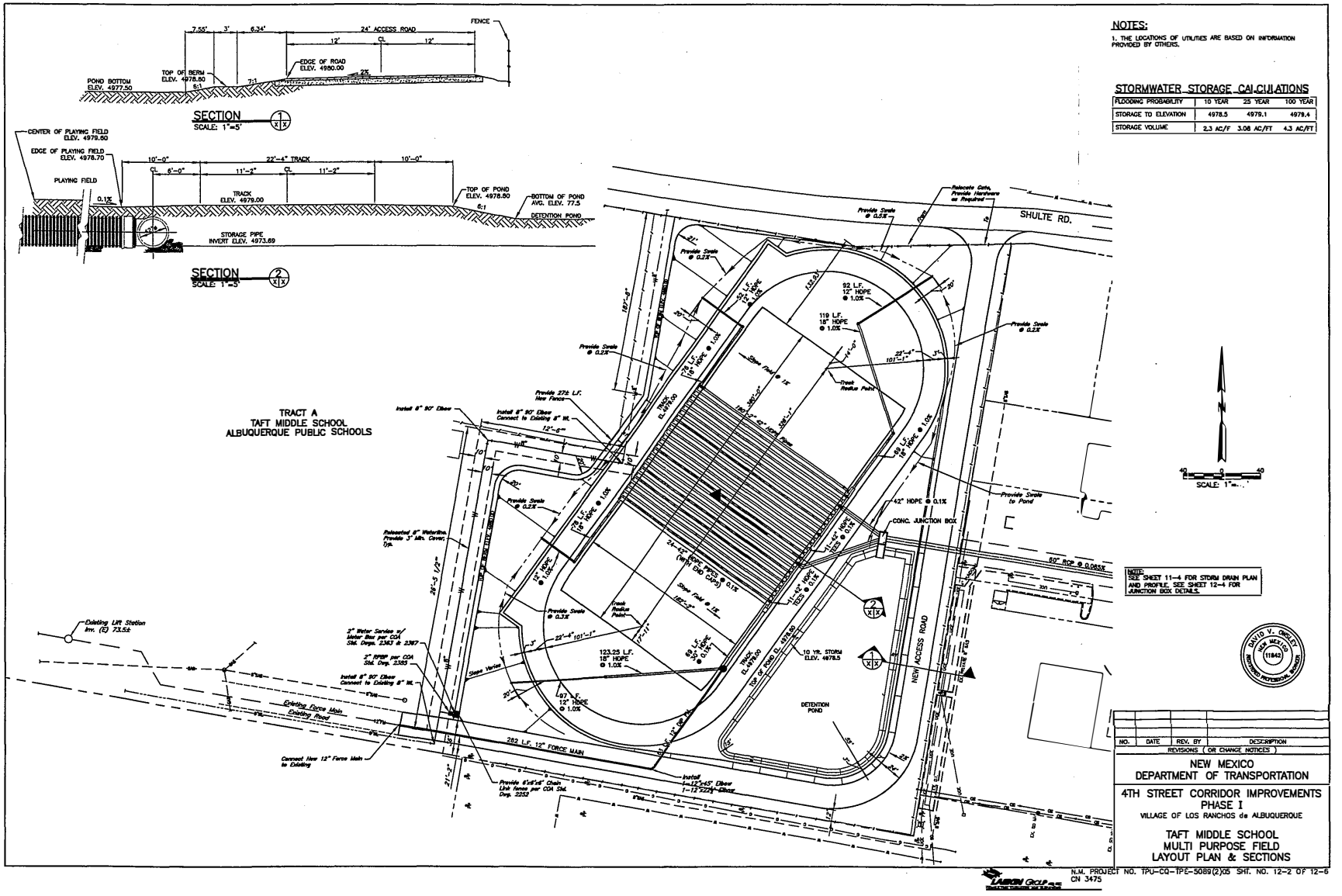
PROFILE
SCALE: 1"=40' HORIZ. 1"=4' VERT.

LARKIN GROUP
CIVIL ENGINEERING SURVEYING

N.M. PROJECT NO. TPU-CAQ-TPE-5089(2)05 SHT. NO. 11-4 OF 11-6


1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
SEE SHT. 11-4
SEE SHT. 11-3
4TH STREET
CONSTRUCTION BASELINE
ROW
24" RCP
CHAMISAL LATERAL
STA. 10+25.02 END CONST. BASELINE
N.M.P.# TPU-CO-TPE-5089(2)05
OSUNA ROAD N.W.
POTHOLE TABLE
POTHOLE #
UTILITY
MATERIAL
DIAMETER OR WIDTH
COVER
Ø BOTTOM
84 GAS METALLIC 5" 58" –
85 GAS METALLIC 5" 92" –
87 COMM DBC 1" 28" –
88 COMM DBC 1" 32" –
89 GAS METALLIC 5" 64" –
WATER AC 8" 43" –
PLAN
SCALE 1"=50'
OSUNA ROAD
NGVD DATUM 1929
GRAPHIC SCALE IN FEET
1 inch = ft.
NO. DATE REV. BY DESCRIPTION
REVISIONS (OR CHANGE NOTICES)
FINISH GRADE PROFILE @ FLOWLINE Lt. & Rt.
EXIST. GRADE PROFILE @ CONST. BASELINE
HYDRAULIC GRADE LINE (100 YR.)
EXIST. WATERLINE
NEW WATERLINE
EXIST. 8" SAS
EXIST. 8" SAS
EXIST. 30" MHP SAS
PROFILE
SCALE 1"=50' HORIZ.
1"=5' VERT.
4990
4985
4980
4975
4970
4965
4960
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
N.M. PROJECT NO. TPU-CAQ-TPE-5089(2)05 SHT. NO. 11-5 OF 11-6

APPENDIX B-5



NOTES:

1. THE LOCATIONS OF UTILITIES ARE BASED ON INFORMATION PROVIDED BY OTHERS.

STORMWATER STORAGE CALCULATIONS

FLOODING PROBABILITY	10 YEAR	25 YEAR	100 YEAR
STORAGE TO ELEVATION	4978.5	4979.1	4979.4
STORAGE VOLUME	2.3 AC/F	3.08 AC/FT	4.3 AC/FT

NOTE:
SEE SHEET 11-4 FOR STORM DRAIN PLAN AND PROFILE. SEE SHEET 12-4 FOR JUNCTION BOX DETAILS.

DAVID V. OBIDZINSKI
NEW MEXICO
11842
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REV. BY	DESCRIPTION
REVISIONS (OR CHANGE NOTICES)			

NEW MEXICO
DEPARTMENT OF TRANSPORTATION

4TH STREET CORRIDOR IMPROVEMENTS
PHASE I
VILLAGE OF LOS RANCHOS de ALBUQUERQUE

TAFT MIDDLE SCHOOL
MULTI PURPOSE FIELD
LAYOUT PLAN & SECTIONS

LARSEN GOLF LLC

N.M. PROJECT NO. TPU-CQ-TPE-5089(2)05 SHT. NO. 12-2 OF 12-6
CN 3475

The Orifice Equation

Where
d = Opening diameter, inches
h = Height of water above inlet centerline, feet
K = Pipe inlet Conditions

$d := 7.88$ inches

$K := 0.6$

$g := 32.2$

$$A := \pi \cdot \frac{\left(\frac{d}{12}\right)^2}{4}$$

$h := .75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 1.41$	cfs
$h := 1.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 2.16$	cfs
$h := 2.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 2.7$	cfs
$h := 3.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 3.16$	cfs
$h := 4.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 3.55$	cfs
$h := 5.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 3.91$	cfs
$h := 6.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 4.24$	cfs
$h := 7.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 4.54$	cfs
$h := 8.75$	above cl	$Q := K \cdot A \cdot \sqrt{2 \cdot g \cdot h}$	$Q = 4.82$	cfs

Hazen Williams Equation for frictional head losses per 100 ft. length.

$$h_f := \frac{3.022 \cdot V^{1.85} \cdot L}{C^{1.85} \cdot D^{1.165}}$$

Values for C from Appendix 17 C E Reference Manual

$Q := 5.0$ cfs $\quad D := 2.0$ ft $\quad L := 100$ ft $\quad C := 100$

$$V := \frac{Q}{\pi \cdot \frac{D^2}{4}} \qquad h_f := \frac{3.022 \cdot V^{1.85} \cdot L}{C^{1.85} \cdot D^{1.165}} \qquad h_f = 0.064$$

Total head loss for 1000 lf. of pipe would be $\quad length := 1000$ ft

$$H_T := h_f \cdot \frac{length}{100} \qquad H_T = 0.635 \text{ feet}$$

$Q := 4.20$ cfs

$$V := \frac{Q}{\pi \cdot \frac{D^2}{4}} \qquad h_f := \frac{3.022 \cdot V^{1.85} \cdot L}{C^{1.85} \cdot D^{1.165}} \qquad h_f = 0.046$$

Total head loss for 1000 lf. of pipe would be $\quad length := 1000$ ft

$$H_T := h_f \cdot \frac{length}{100} \qquad H_T = 0.46 \text{ feet}$$

$Q := 4.70$ cfs

$$V := \frac{Q}{\pi \cdot \frac{D^2}{4}} \qquad h_f := \frac{3.022 \cdot V^{1.85} \cdot L}{C^{1.85} \cdot D^{1.165}} \qquad h_f = 0.057$$

Total head loss for 1000 lf. of pipe would be $\quad length := 1000$ ft

$$H_T := h_f \cdot \frac{length}{100} \qquad H_T = 0.57 \text{ feet}$$

4th St. Street Flows

Fourth Street 100 year 24 hr Flow Rates Zone 2

The typical section for Fourth Street with a 2% crown, 12.5 ft lane and 8" curb will provide a flow depth of 0.21 ft and flow area of:

$Area := 1.57$

with Manning's N of $\eta := 0.018$

and a wetted perimeter of $Per := 12.72$

and a longitudional slope of $s := .03$

Gives an allowable street flow with one lane open of:

$$Q := Area \cdot \left(\frac{1.486}{\eta}\right) \cdot \left(\frac{Area}{Per}\right)^{\frac{2}{3}} \cdot \sqrt{s} \qquad Q = 5.565 \quad cfs$$

The typical section for Fourth Street with a 2% crown, 14 ft lane and 8" curbs will provide a flow depth of 0.26 ft and a flow area of:

$Area := 2.06$

with Manning's N of $\eta := 0.018$

and a wetted perimeter of $Per := 14.26$

and a longitudional slope of $s := .03$

Gives an allowable street flow with one lane open of:

$$Q := Area \cdot \left(\frac{1.486}{\eta}\right) \cdot \left(\frac{Area}{Per}\right)^{\frac{2}{3}} \cdot \sqrt{s} \qquad Q = 8.11 \quad cfs$$

Osuna Rd. Street Flows

Osuna 100 year 24 hr Flow Rates **Zone 2**

The typical section for Osuna with a 2% crown, 14 ft lane and 8" curb. Using the outside one half of each lane will provide a flow depth of 0.12 ft and a flow area of

$Area := 0.483$

with Manning's N of $\eta := 0.018$

and a wetted perimeter of $Per := 14.26$

and a longitudinal slope of $s := .03$

Gives an allowable street flow with one half each outside lane open and the inside lane clear of:

$$Q := Area \cdot \left(\frac{1.486}{\eta}\right) \cdot \left(\frac{Area}{Per}\right)^{\frac{2}{3}} \cdot \sqrt{s} \qquad Q = 0.723 \quad cfs$$

HGL of Storm Drain in 4th St

Location	Sta	Dist	Pipe Size	n	Area	R	Q	V	HGL Slope	Manhole Ls	HGL Elev
		ft	in.		sq ft	ft	cfs	ft/s	ft/ft	ft	ft
Taft Pond w/ 10-yr Stor.	**3520**										**77.50**
Taft Pond w/ 10-yr Stor.	3520		60	0.013	19.63	1.25	65.9	3.36	0.000640	1	
DI at JB's	**3221**	299								0.009	77.69
DI at JB's	3221		60	0.013	19.63	1.25	65.3	3.33	0.000629	1	
DI 4th at Bank	**3004**	217								0.009	77.83
DI 4th at Bank	3004		60	0.013	19.63	1.25	47.7	2.43	0.000335	1	
Northdale@ Nara Visa	**2911**	93								0.005	77.86
Northdale@ Nara Visa	2911		60	0.013	19.63	1.25	43.6	2.22	0.000280	1	
Osuna	**2642**	269								0.004	77.93
Osuna	2642		48	0.013	12.57	1	32.8	2.61	0.000521	1	
Chavez Rd	**2513**	129								0.005	**78.00**
Chavez Rd	2513		36	0.013	7.07	0.75	31.3	4.43	0.002202	1	
Sub-basin-60 Manhole	**2450**	63								0.015	78.14
Sub-basin-60 Manhole	2450		36	0.013	7.07	0.75	21.5	3.04	0.001039	1	
Sandia View	**2284**	166								0.007	**78.31**
Sandia View	2284		36	0.013	7.07	0.75	21.5	3.04	0.001039	1	
D.I. at Starlet Dance	**2006**	278								0.007	**78.60**
D.I. at Starlet Dance	2006		36	0.013	7.07	0.75	12	1.70	0.000324	1	
D.I. S of Willow	**1615**	391								0.002	78.73
D.I. S of Willow	1615		24	0.013	3.14	0.5	1.5	0.48	0.000044	1	
D.I. S of Mullen	**1283**	332								0.000	78.74
D.I. S of Mullen	1283		24	0.013	3.14	0.5	5	1.59	0.0004885	1	
Cam Espanol	**1000**	283								0.002	78.60
Cam Espanol	1000		24	0.013	3.14	0.5	5	1.59	0.0004885	1	
Vineyard	**744.01**	255.99								0.002	78.48
Vineyard	744.01		24	0.013	3.14	0.5	5	1.59	0.0004885	1	
Solar	**985.45**	249.7								0.002	78.36

HGL of Storm Drain in 4th St

Location	Sta	Dist	Pipe Size	n	Area	R	Q	V	HGL Slope	Manhole Ls	HGL Elev
		ft	in.		sq ft	ft	cfs	ft/s	ft/ft	ft	ft
System Below the Orifice Plate											
Solar Road	**985.45**		24	0.013	3.14	0.5	5	1.59	0.0004885	1	**75.33**
Smith's MH	**542.73**	442.72								0.002	
Smith's MH	542.73		24	0.013	3.14	0.5	5	1.59	0.0004885	1	**75.11**
Alamosa N	**124.34**	418.39								0.002	
Alamosa N	124.34		24	0.013	3.14	0.5	5	1.59	0.0004885	1	**74.91**
Alamosa S	**100**	24.34								0.002	
Alamosa S	100		24	0.013	3.14	0.5	7	2.23	0.0009575	1	**74.89**
Grecian Ave	**-130**	230								0.004	
Grecian Ave	-130		24	0.013	3.14	0.5	8	2.55	0.0012506	1	74.67
La Plata	**-400**	270								0.005	
La Plata	-400		24	0.013	3.14	0.5	9	2.86	0.0015828	1	**74.34**
Placitas Rd	**-902**	502								0.006	
Placitas Rd	-902		24	0.013	3.14	0.5	10	3.18	0.0019541	1	**73.54**
Sandia Rd	**-1390**	488								0.008	
Sandia Rd	-1390		24	0.013	3.14	0.5	11	3.50	0.0023644	1	**72.59**
Gene Ave	**-1851**	461								0.010	
Gene Ave	-1851		30	0.013	4.91	0.625	12	2.44	0.0008559	1	**71.50**
Montaño Rd	**-2315**	464								0.005	**71.10**
HGL-Wilson Rpt Sept 03											
End of 4th Street											
Osuna & 4th	90		24	0.013	3.14	0.5	14.8	4.71	0.0042802	1	**77.93**
First Osuna D.I. West	**330**	240								0.017	**78.96**
First Osuna D.I. West	330		24	0.013	3.14	0.5	8.8	2.80	0.0015132	1	
East Osuna D.I.	**624**	294								0.006	**79.41**

LARKIN GROUP NM INC.

8500 Menaul Boulevard NE, Suite A-440
Albuquerque, New Mexico 87112
Phone: 505-275-7500
Fax: 505-275-0748
e-mail: info@larkinnm.com

February 17, 2005

Mr. Brad Bingham, P.E.
City of Albuquerque
Public Works Department
Development and Building Services Division
P.O. Box 1293
Albuquerque, NM 87103

Reference: **Village of Los Ranchos 4th Street Improvements Project Phase I**
Proposed Storm Drain Outfall Connection to COA Facilities

Dear Mr. Bingham:

According to my records we met on June 17, 2004 to discuss a proposed storm drain outfall connection to City of Albuquerque drainage facilities from the proposed Phase I Village of Los Ranchos 4th Street Improvements Project. The Phase I project includes street improvements to 4th Street between approximately Camino Espanol Road on the south and Schulte Road on the north and improvements to Osuna Road between 4th Street on the west and the Chamisal Lateral on the east. Street improvements will include new pavement, the addition of a center left turn lane, curb and gutter and sidewalk. Runoff from the street improvements will be directed to a detention basin sized to accommodate runoff from the 100-year storm. Discharge from the detention basin and new storm drain will be controlled so as not to exceed 5 cfs during the 100-year event. As we discussed on 6-17-04, it is proposed to connect the controlled-rate discharge storm drain from the Phase I project to the existing City of Albuquerque storm drain system located at 4th Street and Alamosa Road. This proposed connection point is located approximately 1,200 feet south of the Phase I project.

You stated in our meeting that connection to the COA storm drain at 4th Street and Alamosa Road with a controlled discharge rate of 5 cfs would be acceptable. You also stated that construction of the proposed storm drain improvements within City of Albuquerque ROW would have to be done through the City's work order process. It will be necessary for the Village of Los Ranchos to enter into a Development Agreement with the City of Albuquerque. The City will perform a review of plans that relate to improvements within the City's ROW. The Village will be required to pay City review fees. The City will perform inspections of all construction done within City ROW. A Close-out Package must be submitted to the City once construction is complete.

If you agree that connection of the proposed controlled-rate discharge storm drain is acceptable and concur with the other conditions all as described in the above paragraph, please indicate your approval by signing and dating in the spaces provided below and returning the original letter to the Larkin Group office:

ACCEPTED:

Bradley L. Bingham
Brad Bingham, P.E., Hydrology Engineer, City of Albuquerque

2/24/05
Date

K:\2003-0011-Los Ranchos de Albuquerque-4th Street Impvts Phase I\CORRESPONDENCE\COA Bingham Letter 02-17-05.doc

4TH STREET CORRIDOR DRAINAGE REPORT

CHAMISAL LATERAL TO GALLEGOS LATERAL

PREPARED FOR:

PREPARED BY:

WILSON &COMPANY
4900 Lang Ave. NE, Albuquerque, NM 87109

SEPTEMBER 2003 Appendix D-2

WILSON &COMPANY

SECTION 4.2 – RECOMMENDATIONS

Discharge to the Montaño Road storm drain through the storm drain at Grecian Avenue is possible as long as discharge from the last pond in the 4th Street system is set to approximately 5-cfs. Discharge of the 4th Street system into the Montaño Road system appears to be the most cost effective option for the Village of Los Ranchos. The Village has the opportunity to utilize an already existing storm drain that can adequately convey drainage to the Montaño pump station. A preliminary analysis of the Montaño Road system was completed using the Hydraflow program and as-built information dated 11/05/96 (attached in Appendix E). Discharge of 5-cfs into the system should keep the hydraulic grade line at least 6-inches below the inlet grates along Montaño. A final analysis will be required to ensure that the as-built drawings are in accordance with the field conditions and that hydrologic conditions in the Montaño Road system have not changed.

With the division of the original 4th Street basin presented in the NVDMP, three of the original ponds recommended can be removed. The remaining ponds, as shown on Figure 1, are suggested locations based on existing vacant lots (vacant at the time of this report) within the Village limits. Pond properties used in modeling the 4th Street system are based on orthophoto mapping provided by Bernalillo County. Final design incorporating field topographic survey will be necessary to determine actual pond locations, depths and geometry.

MONTAÑO PUMP STATION

We looked at the Moñtano Pump Station to review the cycling of the pumps and the potential for backwater to hold water under the Rio Grande Bridge at Montaño Road. Based on the elevations for the Pump Station high water and the elevation at the low point in the road, we don't believe that the pump station will cause backwater to stand in the roadway (see sketch in Appendix F). Based on the size of the wet well, the cycling of the pumps can be adjusted so that each pump would run for a minimum of three to four minutes assuming that no new water enters the pump station once the pump turns on. The pumps should then alternate starts allowing for the pumps to cycle no more than five starts per hour. With the size of the pumps currently designed any event less than the 5-year event would only utilize one pump at a time. Once an event greater than the 5-year event occurs multiple pumps will run. The pump station with the four pumps has the capacity to convey 100-cfs with each pump having 25-cfs to 30-cfs capacity. In order to keep the large pumps from running during the smaller storms the City of Albuquerque may want to consider adding two smaller pumps attached to the unused outlet manifold. These two smaller pumps could be sized to match one of the existing pumps to maintain the existing capacity. This will allow for controls to be set to obtain longer run times for all pumps when in use. The Montaño Pump Station can handle the additional flow to be conveyed from 4th Street. The allowable discharge to the 60-inch line is approximately 5-cfs.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	510.0	0.00	0.00	0.00	0.00	0.00	0.0	24.8	0.0	99.00	106.2	6.85	66	0.10	4956.19	4955.68	4960.29	4958.39	4971.29	4972.50	
2	1	375.0	0.00	0.00	0.00	0.00	0.00	0.0	23.3	0.0	99.00	106.9	4.17	66	0.10	4956.58	4956.20	4962.01	4961.70	4971.94	4971.29	
3	2	525.0	0.00	0.00	0.00	0.00	0.00	0.0	21.2	0.0	99.00	86.73	4.17	66	0.07	4956.93	4956.58	4962.54	4962.08	4969.52	4971.94	
4	3	160.0	0.00	0.00	0.00	0.00	0.00	0.0	20.5	0.0	99.00	79.59	4.17	66	0.06	4957.02	4956.93	4962.72	4962.58	4970.15	4969.52	
5	4	440.0	0.00	0.00	0.00	0.00	0.00	0.0	18.8	0.0	99.00	124.0	4.17	66	0.14	4957.62	4957.02	4963.12	4962.76	4978.35	4970.15	
6	5	200.0	0.00	0.00	0.00	0.00	0.00	0.0	18.0	0.0	99.00	100.7	4.17	66	0.09	4957.80	4957.62	4963.30	4963.16	4973.35	4978.35	
7	6	330.0	0.00	0.00	0.00	0.00	0.00	0.0	16.6	0.0	99.00	118.4	4.18	66	0.12	4958.21	4957.80	4963.61	4963.34	4975.00	4973.35	
8	7	223.0	0.00	0.00	0.00	0.00	0.00	0.0	15.8	0.0	99.00	138.6	4.19	66	0.17	4958.59	4958.21	4963.88	4963.71	4974.80	4975.00	
9	8	247.0	0.00	0.00	0.00	0.00	0.00	0.0	14.8	0.0	99.00	70.99	4.17	66	0.04	4958.70	4958.59	4964.31	4964.09	4973.81	4974.80	
10	9	504.0	0.00	0.00	0.00	0.00	0.00	0.0	12.7	0.0	99.00	114.9	4.17	66	0.12	4959.29	4958.70	4964.77	4964.35	4975.14	4973.81	
11	10	496.0	0.00	0.00	0.00	0.00	0.00	0.0	11.1	0.0	99.00	68.18	5.04	60	0.07	4959.63	4959.29	4965.53	4964.81	4972.87	4975.14	
12	11	250.0	0.00	0.00	0.00	0.00	0.00	0.0	10.3	0.0	99.00	52.12	5.04	60	0.04	4959.73	4959.63	4965.95	4965.59	4974.10	4972.87	
13	12	145.0	0.00	0.00	0.00	0.00	0.00	0.0	9.8	0.0	99.00	96.78	5.04	60	0.14	4959.93	4959.73	4966.22	4966.01	4974.71	4974.10	
14	13	94.0	0.00	0.00	0.00	0.00	0.00	0.0	9.5	0.0	99.00	46.37	5.04	60	0.03	4959.96	4959.93	4966.42	4966.28	4974.24	4974.71	
15	14	197.0	0.00	0.00	0.00	0.00	0.00	0.0	8.8	0.0	99.00	109.8	5.04	60	0.18	4960.31	4959.96	4966.76	4966.47	4973.43	4974.24	
16	15	114.0	0.00	0.00	0.00	0.00	0.00	0.0	8.5	0.0	99.00	64.46	5.04	60	0.06	4960.38	4960.31	4966.98	4966.82	4973.01	4973.43	
17	16	400.0	0.00	0.00	0.00	0.00	0.00	0.0	7.1	0.0	99.00	108.2	5.04	60	0.17	4961.07	4960.38	4967.62	4967.04	4974.81	4973.01	
18	17	400.0	0.00	0.00	0.00	0.00	0.00	0.0	5.8	0.0	99.00	59.68	5.04	60	0.05	4961.28	4961.07	4968.26	4967.68	4973.30	4974.81	
19	18	410.0	0.00	0.00	0.00	0.00	0.00	0.0	4.5	0.0	99.00	79.34	5.04	60	0.09	4961.66	4961.28	4968.91	4968.32	4974.94	4973.30	
20	19	390.0	0.00	0.00	0.00	0.00	0.00	0.0	3.2	0.0	99.00	93.26	5.04	60	0.13	4962.16	4961.66	4969.53	4968.97	4973.30	4974.94	
21	20	622.0	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	99.00	81.56	5.04	60	0.10	4962.77	4962.16	4970.49	4969.59	4971.55	4973.30	

Project File: Montano.stm | IDF File: sampleFHA.IDF | Total number of lines: 23 | Run Date: 09-26-2003

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; Initial tailwater elevation = 4958.39 (ft)

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
22	21	123.0	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	99.00	62.06	5.04	60	0.06	4962.84	4962.77	4970.73	4970.55	4972.11	4971.55	
23	22	216.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	99.00	197.4	5.04	60	0.57	4964.08	4962.84	4971.10	4970.79	4973.41	4972.11	

Montano Rd & 4th St.

Project File: Montano.stm | IDF File: sampleFHA.IDF | Total number of lines: 23 | Run Date: 09-26-2003

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; Initial tailwater elevation = 4958.39 (ft)

Exhibit C

Village of Los Ranchos 4th Street Phase I Storm System