Prepared for:
The City of Albuquerque
October 2019

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN

Infrastructure Needs Assessment Report

WCI Project: 1660006501

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WILSON & COMPANY

discipline | intensity | collaboration | shared ownership | solutions

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FINAL-REVISED

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The City of Albuquerque

WCI Project: 1660006501

Prepared by:

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OCTOBER 2019

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A. INTRODUCTION

The purpose of this report is to provide the infrastructure analysis, development, and costs for the area described in the **Volcano Heights Sector Development Plan**. The Sector Plan area is located on the West Mesa of Albuquerque, and is bounded on the east by the *Petroglyph National Monument lands***,** on the south by the extended southern alignment of Paseo Del Norte Boulevard, on the west by Universe Boulevard, and on the north by the existing Paradise Hills development. See **Exhibit I-Sector Plan Location Map** for orientation to the area, and the boundary of the sector plan. This **Needs Assessment Report** is conceptual and further analysis and design is necessary to determine more detailed needs for the area. This report is intended to give property owners a better understanding of the costs associated with developing the major backbone infrastructure and to present funding alternatives. Costs associated with the improvements and zoning used for the report are subject to change.

Volcano Heights Sector Development Plan (VHSDP) (Amended November 5, 2014)
The study prepared by the City of Albuquerque provides the guidelines and zoning for the development of this area. The VHSDP was originally adopted by the City of Albuquerque's City Council and signed by the Mayor in August 2013 (Ref: File No. R-13-132 / City Enactment No. 2013-068). The plan was amended as of November 5, 2014, and is the senior document that will provide for quality development of the area; additionally, the VHSDP is the plan being utilized for the infrastructure analysis, various infrastructure developments, and costs. This infrastructure report is intended to provide preliminary water, sanitary sewer, stormwater, roadway, and dry utility improvements consistent with the sector plan.

The VHSDP area is largely undeveloped, except for the intersecting arterial roadways, and is surrounded by largely developed lands. All or most of the area to the north, west, and south is currently developed, and the impacts to the east for the monument are required to be minimal. The land requirement for open space is intended to be satisfied by the monument open-space. Major school complexes currently are located along the northern border and southwest of the sector. The sector includes the location of two main arterial roads, Unser Boulevard (N-S) and Paseo Del Norte Boulevard (E-W); both are intended to be limited-access with an intersection.

The Infrastructure Needs Assessment Report is intended to accomplish the following:

1. Provide for reasonable overall development density of the 568.6 development acres to develop the water and sanitary sewer inputs and account for the deduction of the roadway Rights-of-Way (ROW) and the storm water pond areas.

2. Provide water analysis by utilizing: (1) the City of Albuquerque Integrated Development Ordinance, 2018 (IDO), for analysis of the allowable uses in the mixed-use development areas; and (2) the ABCWUA (Water Authority) -developed unit water flows and sewer flows as provided on 8/5/2019 for this report in table form. This report summarizes the same as Table 1, for both residential and non-residential areas, for modeling for water flow system elements, including pipe sizing, lengths, and other appurtenances.

3. Provide sanitary sewer analysis, also utilizing the City of Albuquerque IDO (2018) for all developed densities for mixed-use areas, as modified, and utilizing the ABCWUA-developed unit water and sewer flow table (Table 1), with spreadsheet-developed sewer flow system elements, including pipe sizing, manholes, and other appurtenances.

PARADISE BLVD NW

PASEO DEL NORTE BLVD NW

UNSER BLVD NW

VOLCANO HEIGHTS
SECTOR PLAN

PETROGLYPH
NATIONAL
MONUMENT

GOLF COURSE RD NW

UNIVERSE BLVD NW

KIMMICK DR NW

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

N

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN
NEEDS ASSESSMENT REPORT

SECTOR PLAN LOCATION MAP
EXHIBIT I

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4. Provide analysis, roadway layout, and street cross-sections based on the VHSDP.

5. Summarize the Storm Drainage Plan, based upon the "**Upper Piedras Marcadas Watershed Drainage and Water Quality Management Plan" (UPMDMP)** completed by Wilson & Company for the Albuquerque Metropolitan Area Flood Control Authority (AMAFCA), dated April 2017.

6. Provide layout plans for the water, sanitary sewer, streets, storm sewer, and dry utilities alignments.

7. Provide preliminary cost estimates for the public infrastructure improvements, including for water, sanitary sewer, stormwater, roadways, and dry utilities.

B. EXISTING CONDITIONS

Description of the Land

The proposed Volcano Heights Sector Development Plan area is in the "Established Urban In-Fill" area of the City. The area is vacant land with the following paved streets:

- Universe Blvd. (Compass Ave.) – Asphalt 2-lane roadway with rural roadway section, or half-street curbs along developments.
- Unser Blvd – from southern border at Avenida De Jamito to northern connection with existing Unser near Cold Creek Avenue- variable sections- 2-lane divided to 4-lanes total at Paseo Del Norte.
- Paseo del Norte –from southeastern border to northwestern border– variable sections- 4-lane divided to 3-lanes total at Unser to two-lanes divided

Except for the described paved streets, the existing sector land consists of a mesa-type vacant land, containing numerous volcanic (basaltic) rock outcroppings. The land generally slopes approximately one to two percent running from west to east, and is bordered on the east by the Petroglyph National Monument, which falls off more steeply within the monument, the drastic elevation change can more accurately be defined as an escarpment.

Extensive rock excavation, possible blasting, and significant cut and fill are all anticipated in order to develop the infrastructure for this plan.

Northwest Mesa Escarpment Plan

This sector plan is within the limits of the Northwest Mesa Escarpment Plan (NWMEP). *The lots within the impact area (eastern boundary) of the NWMEP (200+/- feet from the Petroglyph National Monument boundary) have the following restrictions:*

1. No wall or fence along the monument boundary.
2. Height of buildings restricted to 15 feet.
3. Street lighting restrictions on height and required shielding.
4. Architectural restrictions to prevent glare and distractions from the escarpment.

These restrictions are repeated in the Volcano Heights Sector Plan, Amended November 5, 2014. ***(None of these restrictions affect the Infrastructure analysis, development, or costs.)***

Northwest Service Area Infrastructure Plan

The Northwest Services Area Infrastructure Plan, Integrated Infrastructure Plan, Project Task Memorandum No. 1, July 2012 (IIP), provided long-range plans for the water and sewer backbone to serve Northwest Albuquerque. The IIP does not get into the specific needs for the Volcano Heights area, but does include recommendations for major trunk lines through the area. Specifically, the IIP calls for the following:

1. 16-inch waterline along Unser Blvd.
2. 12-inch waterline along Paseo Del Norte Blvd.
3. 21-inch sewer interceptor from the existing Lift Station 380 east along Paseo Del Norte to the southeast corner of Volcano Heights.

Infrastructure sizing has been more recently revised with updated information for the sector plan area of the IIP and the ABCWUA is looking at several options for the water system layout and zone boundaries. Also, the ABCWUA commissioned a sewer system study in August 2017 which revised the sewer system interceptor in Paseo Del Norte to 15-inch. All of the newer information is considered in this infrastructure development for Volcano Heights.

Adjacent Development

The proposed sector plan improvements are adjacent to the following developments:

1. SOUTH of the Sector Plan – Existing SAD 228, Volcano Cliffs Subdivision vacant lots and Legacy Development (La Cuentista) are located along the western portion of the south side of the Sector Plan – drainage and sanitary sewer from these developments generally drain southward. A large vacant area to the south, midway of the sector boundary, is currently being operated as a rock excavation area, which may be developed in the future. Several mixed-use areas bound the sector along the southeastern border, and parallel to the south side of Paseo Del Norte (PDN) Right-of-Way (ROW). Development of these areas are uncertain, as access to the PDN roadway will be limited through this alignment.

    - Water connections from Unser Boulevard northward and along with the Universe Boulevard extension also provide possible future water system connections for the western edge and southern edge upper-zone (Zone 4W) water supply systems.

    - The sanitary sewer master plan lines along the west via the Universe Boulevard extension along the western edge of the Volcano Heights Sector Area. Unser Boulevard, as extended, also provides the access and sanitary sewer infrastructure from the south. At the southeast corner of the sector, an existing 15-inch sanitary sewer in Paseo Del Norte is available for discharge of the Volcano Heights sanitary sewer system, thus running to the east, to near Golf Course Road.

    - Stormwater runoff to the south of the VHSDP area and west of Unser Boulevard drains southward to the Boca Negra Dam, while the majority of the area east of Unser and south of the VHSDP area drains to the Mariposa Basin. Stormwater conveyance infrastructure to the Mariposa Basin and Boca Negra Dam are limited to downstream sections. A small basin south of the VHSDP area toward the east end of the area drains into the Piedras Marcadas Dam via a storm drain system along Paseo Del Norte and the Piedras Marcadas Channel.

2. WEST of the Sector Plan - A series of subdivisions entitled “The Trails” along the west boundary contain existing development in which infrastructure is fully developed or in the process of construction.

    - Multiple water system connections may be made to this infrastructure for the upper-zone water supply for Volcano Heights.

    - The sanitary sewer located in Universe Boulevard currently takes the western sanitary flow south to the existing Unser trunk sewer, and does not require connection to the sector sanitary sewers. A future flow-split may be considered between the Unser Trunk and the flow east via the Paseo Del Norte sanitary sewer.

    - Stormwater runoff from the west is diverted south to the Boca Negra Dam via storm drain along Universe Boulevard. Storm drainage ponds, (located within the VHSDP area just east of, and parallel to, the alignment of Universe Boulevard) will provide stormwater detention for some areas within the sector, but also for several drainage areas located to the west of Universe Boulevard.

3. NORTH of the Sector Plan- Along the north boundary, a series of existing developed areas border on the sector plan. These developments are named, ranging from west to east from the northwest corner and along the northern sector border. They are: Commercial lots and storage facilities; the Vittoria Gated Community; Villa de Chamisa Subdivision; Chamisa Ridge Subdivision; James Monroe Middle School; The Boulder Subdivision; and Sundance Estates. The final two named subdivisions are located on either side of the existing Unser Boulevard.

    - Water system connection to the existing main line in Paradise Boulevard may be made for upper-zone water supply through the western boundary of the Middle School, and extension south of the existing main line in Unser Boulevard may be utilized for lower-zone water system pressures.

    - Most of the sanitary systems located in the developments from the border north all drain northward to the Paradise Boulevard Interceptor, and thus are not expected to impact the sector sanitary sewers. Two exceptions will change in the future, as the Water Authority intends that lift Stations #381 and #382 be re-routed to connect to the south, and be absorbed into the Volcano Heights sanitary system.

    - Stormwater runoff from the north of the VHSDP area is diverted to the north via a storm drain along Unser Boulevard to the Calabacillas Arroyo. This diversion is known as the Chamisa/Lyon Storm Drain, which is routed through a detention pond before draining into the Calabacillas Arroyo. This system is discussed in detail in the UPMDMP.

4. EAST of the Sector Plan - To the east, the boundary of the **Petroglyph National Monument** abuts the Volcano Heights Sector. Development is limited above-ground in several respects within 200 feet of the monument (See the “**Northwest Mesa Escarpment Plan”** found on page 3 of this report for descriptions). No utilities, streets, or any type of development is allowed within the monument. Stormwater discharge is limited to 120 cubic feet per second (cfs) to the monument from the VHSDP area.

C. PROPOSED CONDITIONS

The infrastructure analysis, development and sizing of facilities required proceeding with a number of assumptions, primarily developing densities of the various mixed development areas, based upon the Volcano Heights Sector Plan description of acceptable uses within the number of mixed use zones.

Primarily *only 1. Water Infrastructure sizing and 2. Sanitary Sewer Infrastructure sizing* is dependent upon the development densities. Roadway development and dry utilities development depend upon other elements.

1. Water system infrastructure sizing is developed utilizing the development densities and the sizing procedure is detailed in the following sections.
2. Sanitary Sewer System Infrastructure sizing is developed utilizing the development densities, the sizing procedure is detailed in the subsequent sections
3. Stormwater infrastructure analysis presented in the UPMDMP utilized the VHSDP Zoning to calculate the land treatment types for hydrologic calculations. Alternatives identified in the UPMDMP are included in Appendix A of this report.
4. Roadway development sizing, street widths, and related infrastructure are based on the VHSDP street layout.
5. Specific dry utility improvements have not been identified in this report, as the plan is too conceptual for the dry utility companies to determine required infrastructure. In general, developers would be responsible for funding PNM infrastructure improvements in the area, while other dry utility companies are responsible for their respective improvements necessary for development. For the purposes of this report, we have included costs for PNM facilities in the detailed estimates included in Appendix B.

C-1. Development Densities and Flow Characteristics for Water & Sanitary Sewer Infrastructure

The Volcano Heights Sector Development Plan, as modified by the Integrated Development Ordinance (IDO), provided a number of mixed-use areas providing no exact definitions of development densities, choosing instead to define areas as: “High Intensity-Mixed Use Zone”; “Non-Residential-Business Park Zone”; “Moderate Intensity-Mixed Use Zones”; and several “Mixed Use-Transition Zones” areas, by updating and combining previous zoning for residential, commercial, institutional and Industrial areas. This approach is intended to provide maximum flexibility in development, but fails to provide any development densities for determining water and sanitary sewer infrastructure. This infrastructure report has developed projected densities and subsequent water and sanitary sewer accumulated flows utilizing the following documents:

(1) The Average unit water and wastewater flows, both average and peak, are developed by the Water Authority in chart form from a document submitted for use in this report, dated 8/05/2019, which provides water and wastewater (sewer) unit flows and peaking factors per type of land use, translated into flows per acreage for peak water and sanitary sewer flows, which includes several types of land use. The Table provides unit flow water and sewer data for several different Residential Development densities, and a variety of Non-Residential Development, including the land use categories of: “Light commercial, Heavy Commercial, Light Institutional, Heavy Institutional, Light Industrial, Medium Industrial, and

Heavy Industrial“, with the developed flow characteristics of Gallons per Acre of land per Day (GPAD) for each land use. The Chart as provided is re-produced in this report as **Table 1: Unit Water and Sewer Flows**

(2) The City of Albuquerque's **Integrated Development Ordinance (IDO),** as updated in May 2019, was utilized in depth, for reviewing the various overall land use densities as described in the **Volcano Heights Sector Development plan.** This Infrastructure study for the development plan used the IDO, and specifically, the land use descriptions for each of the mixed-use zones described in the Sector Development plan, for use in determining the relevant densities to be derived from Table 1.

C-2 Development of Mixed-Use Zone Densities:

As developed and explained earlier in this report, the Integrated Development Ordinance (IDO) allows for a wide variety of land uses for the several mixed-use zones occurring within the Volcano Heights Sector Development Plan. Therefore this report establishes a "blend" of various land use densities per each zone to approximate the development overall density for establishing water and sewer flows. See **Exhibit II – Demand Classifications**, which defined the development classifications and divided the sub-area acreages to be developed.

(1) According to the IDO, the **Mixed-Use-High Intensity Zone District (MX-H)** consists of high-intensity commercial & institutional uses, as well as high-intensity residential uses. This report developed the water and sewer density of use from 50% Heavy Residential and 50% Heavy Commercial densities from Table 1.

(2) The **Non-Residential-Business Park Zone District (NR-BP)** consists of mixture of a wide range of non-residential uses. Included are a wide variety of office, commercial, light Industrial and institutional uses. This report developed the water and sewer density of use from 25% Light Commercial and 75% Heavy Commercial densities from Table 1.

(3) The **Mixed-Use-Moderate Intensity Zone District (MX-M)** consists of a wide array of moderate-intensity retail, commercial, and institutional uses, with moderate-density residential uses, with taller multi-story buildings encouraged in centers and corridors. This report developed the water and sewer density of use from 25% Light Commercial, 25% Heavy Commercial, and 50% Medium-density residential densities from Table 1.

(4) The **Mixed-Use-Transition Zone District (MX-T)** consists of low-density multi-family residential and small-scale office, institutional and commercial uses. This report developed the water and sewer density of use from 50% Light Residential-(Westside-New), 25% Light Commercial and 25% Heavy Commercial densities from Table 1.

(5) Two existing areas along the Northwest boundary of the Volcano Heights Sector needed to be added as contributing to the sanitary sewer flows (see **Exhibit IV).** From a Sewer study dated August 14, 2017, the ABCWUA intends that lift Stations #381 and #382 be re-routed to connect to the south, and be absorbed into the Volcano Heights sanitary system.(a)The westernmost area (LS #381) meets existing Zoning of **R-ML,** and the report developed the sewer density as 100% Light Residential High. (b) The easternmost area (LS #382) meets existing Zoning of **R-1B** and the report developed the density of 100% Light Residential-(Westside-New)

ALL Water & wastewater (sewer) Tables are found in **Appendix C.**

PARCEL NO 72
19.36 ACRES

PARCEL NO 71
8.73 ACRES

PARCEL NO 1
11.95 AC MX-M
WL DESIGN: 45.8 GPM
SAS DESIGN: 22.8 GPM

PARCEL NO 2
7.06 AC MX-M
WL DESIGN: 27.1 GPM
SAS DESIGN: 13.5 GPM

PARCEL NO 3
5.49 AC MX-M
WL DESIGN: 21.0 GPM
SAS DESIGN: 10.5 GPM

POND
5.7 ACRES

POND
4.3 ACRES

PARCEL NO 4
3.79 AC MX-M
WL DESIGN: 14.5 GPM
SAS DESIGN: 7.2 GPM

POND
4.4 ACRES

PARCEL NO 5
3.80 AC MX-M
WL DESIGN: 14.6 GPM
SAS DESIGN: 7.3 GPM

PARCEL NO 6
12.31 AC MX-M
WL DESIGN: 47.2 GPM
SAS DESIGN: 23.5 GPM

PARCEL NO 7
11.42 AC MX-M
WL DESIGN: 43.0 GPM
SAS DESIGN: 21.9 GPM

PARCEL NO 8
3.33 AC MX-M
WL DESIGN: 12.8 GPM
SAS DESIGN: 6.4 GPM

PARCEL NO 9
4.99 AC MX-M
WL DESIGN: 19.1 GPM
SAS DESIGN: 9.5 GPM

PARCEL NO 10
3.28 AC MX-M
WL DESIGN: 12.6 GPM
SAS DESIGN: 6.3 GPM

PARCEL NO 11
3.88 AC NR-BP
WL DESIGN: 22.8 GPM
SAS DESIGN: 12.5 GPM

PARCEL NO 12
8.83 AC MX-M
WL DESIGN: 33.8 GPM
SAS DESIGN: 16.8 GPM

PARCEL NO 13
19.46 AC NR-BP
WL DESIGN: 114.5 GPM
SAS DESIGN: 62.8 GPM

PARCEL NO 14
11.87 AC NR-BP
WL DESIGN: 69.8 GPM
SAS DESIGN: 38.3 GPM

PARCEL NO 15
8.40 AC MX-M
WL DESIGN: 32.2 GPM
SAS DESIGN: 16.0 GPM

PARCEL NO 16
15.04 AC MX-M
WL DESIGN: 56.6 GPM
SAS DESIGN: 28.9 GPM

PARCEL NO 17
12.63 AC NR-BP
WL DESIGN: 74.3 GPM
SAS DESIGN: 40.7 GPM

PARCEL NO 18
8.20 AC NR-BP
WL DESIGN: 48.3 GPM
SAS DESIGN: 26.5 GPM

PARCEL NO 19
8.04 AC NR-BP
WL DESIGN: 47.3 GPM
SAS DESIGN: 25.9 GPM

PARCEL NO 20
8.86 AC NR-BP
WL DESIGN: 52.1 GPM
SAS DESIGN: 28.6 GPM

PARCEL NO 21
3.59 AC NR-BP
WL DESIGN: 21.1 GPM
SAS DESIGN: 11.6 GPM

PARCEL NO 22
9.22 AC MX-M
WL DESIGN: 35.3 GPM
SAS DESIGN: 17.6 GPM

PARCEL NO 23
4.55 AC MX-M
WL DESIGN: 17.1 GPM
SAS DESIGN: 8.7 GPM

PARCEL NO 24
2.20 AC MX-M
WL DESIGN: 8.4 GPM
SAS DESIGN: 4.2 GPM

PARCEL NO 25
8.63 AC MX-M
WL DESIGN: 33.1 GPM
SAS DESIGN: 16.5 GPM

PARCEL NO 26
3.81 AC MX-M
WL DESIGN: 14.6 GPM
SAS DESIGN: 7.3 GPM

PARCEL NO 27
5.26 AC NR-BP
WL DESIGN: 31.0 GPM
SAS DESIGN: 17.0 GPM

PARCEL NO 28
3.04 AC MX-H
WL DESIGN: 22.5 GPM
SAS DESIGN: 11.0 GPM

PARCEL NO 29
5.36 AC MX-H
WL DESIGN: 39.7 GPM
SAS DESIGN: 19.4 GPM

PARCEL NO 30
5.97 AC MX-H
WL DESIGN: 44.1 GPM
SAS DESIGN: 21.6 GPM

PARCEL NO 31
5.99 AC MX-H
WL DESIGN: 44.3 GPM
SAS DESIGN: 21.7 GPM

PARCEL NO 32
11.90 AC MX-H
WL DESIGN: 88.0 GPM
SAS DESIGN: 43.0 GPM

PARCEL NO 33
4.13 AC MX-H
WL DESIGN: 30.5 GPM
SAS DESIGN: 14.9 GPM

PARCEL NO 34
3.75 AC MX-H
WL DESIGN: 27.7 GPM
SAS DESIGN: 13.6 GPM

PARCEL NO 35
7.09 AC MX-M
WL DESIGN: 27.2 GPM
SAS DESIGN: 13.5 GPM

PARCEL NO 36
5.65 AC NR-BP
WL DESIGN: 33.2 GPM
SAS DESIGN: 18.2 GPM

PARCEL NO 37
2.64 AC MX-H
WL DESIGN: 19.6 GPM
SAS DESIGN: 9.6 GPM

PARCEL NO 38
4.05 AC MX-H
WL DESIGN: 29.9 GPM
SAS DESIGN: 14.6 GPM

PARCEL NO 39
3.94 AC MX-H
WL DESIGN: 29.2 GPM
SAS DESIGN: 14.3 GPM

PARCEL NO 40
4.00 AC MX-H
WL DESIGN: 29.6 GPM
SAS DESIGN: 14.5 GPM

PARCEL NO 41
3.96 AC MX-H
WL DESIGN: 29.3 GPM
SAS DESIGN: 14.3 GPM

PARCEL NO 42
7.76 AC MX-H
WL DESIGN: 57.4 GPM
SAS DESIGN: 28.1 GPM

POND
1.7 ACRES

ROAD AREA
107.52 AC

PARCEL NO 44
7.08 AC MX-M
WL DESIGN: 27.1 GPM
SAS DESIGN: 13.5 GPM

PARCEL NO 43
8.85 AC NR-BP
WL DESIGN: 52.0 GPM
SAS DESIGN: 28.5 GPM

PARCEL NO 45
4.63 AC MX-M
WL DESIGN: 17.7 GPM
SAS DESIGN: 8.8 GPM

PARCEL NO 46
4.65 AC MX-M
WL DESIGN: 17.8 GPM
SAS DESIGN: 8.9 GPM

PARCEL NO 47
4.55 AC MX-M
WL DESIGN: 17.4 GPM
SAS DESIGN: 8.7 GPM

PARCEL NO 48
4.54 AC MX-M
WL DESIGN: 17.4 GPM
SAS DESIGN: 8.7 GPM

PARCEL NO 49
7.32 AC MX-M
WL DESIGN: 28.1 GPM
SAS DESIGN: 14.0 GPM

PARCEL NO 50
7.18 AC MX-M
WL DESIGN: 27.0 GPM
SAS DESIGN: 13.8 GPM

PARCEL NO 51
4.37 AC MX-M
WL DESIGN: 16.4 GPM
SAS DESIGN: 8.4 GPM

PARCEL NO 52
8.44 AC MX-M
WL DESIGN: 31.8 GPM
SAS DESIGN: 16.2 GPM

PARCEL NO 53
6.71 AC MX-M
WL DESIGN: 25.7 GPM
SAS DESIGN: 12.8 GPM

PARCEL NO 54
3.99 AC MX-M
WL DESIGN: 15.3 GPM
SAS DESIGN: 7.6 GPM

PARCEL NO 55
3.99 AC MX-M
WL DESIGN: 15.3 GPM
SAS DESIGN: 7.6 GPM

PARCEL NO 56
4.21 AC MX-M
WL DESIGN: 16.1 GPM
SAS DESIGN: 8.0 GPM

PARCEL NO 57
4.23 AC MX-M
WL DESIGN: 16.2 GPM
SAS DESIGN: 8.1 GPM

PARCEL NO 58
9.16 AC NR-BP
WL DESIGN: 53.9 GPM
SAS DESIGN: 29.6 GPM

PARCEL NO 59
5.03 AC MX-M
WL DESIGN: 19.3 GPM
SAS DESIGN: 9.6 GPM

PARCEL NO 60
4.07 AC MX-M
WL DESIGN: 15.6 GPM
SAS DESIGN: 7.8 GPM

PARCEL NO 61
4.09 AC MX-M
WL DESIGN: 15.7 GPM
SAS DESIGN: 7.8 GPM

PARCEL NO 63
3.83 AC MX-M
WL DESIGN: 14.7 GPM
SAS DESIGN: 7.3 GPM

PARCEL NO 62
3.78 AC MX-M
WL DESIGN: 14.5 GPM
SAS DESIGN: 7.2 GPM

PARCEL NO 64
4.11 AC MX-M
WL DESIGN: 15.5 GPM
SAS DESIGN: 7.9 GPM

PARCEL NO 65
1.96 AC MX-M
WL DESIGN: 7.4 GPM
SAS DESIGN: 3.8 GPM

PARCEL NO 66
7.18 AC MX-M
WL DESIGN: 27.5 GPM
SAS DESIGN: 13.7 GPM

PARCEL NO 68
19.95 AC MX-M
WL DESIGN: 75.1 GPM
SAS DESIGN: 38.3 GPM

PARCEL NO 67
4.70 AC MX-M
WL DESIGN: 17.7 GPM
SAS DESIGN: 9.0 GPM

POND
2.9 ACRES

MX-M
MX-T
MX-H
NR-BP
MX-L
R-ML
R-1A
R-1B
R-1D
NR-PO-B

Unser Blvd NW
Paseo del Norte NW
Avenida de Jaimito NW
Valiente Rd NW
Valiente Rd
Blue Feather Ave NW
Cold Creek Ave NW
Boulder Canyon Rd NW
Mud Union Ave NW
Madreselva Dr NW
Universe Blvd NW
Piedras Marcadas Canyon
Petroglyph National Monument
Elementary

LEGEND

NR-BP
MX-L
MX-T
MX-M
MX-H
BOUNDARY

GRAPHIC SCALE

250 0 125 250 500 1000

(IN FEET)
1 inch = 250 ft.

N

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN
INFRASTRUCTURE NEEDS ASSESSMENT REPORT

DEMAND CLASSIFICATIONS
EXHIBIT - II

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C – 3 Development of Water System Infrastructure

Water system flow characteristics are developed utilizing the Unit Water flows from Table 1 and the various area densities that were developed from the various Mixed-Use zoning density representations described in the previous subsection. The resulting area flows are represented in a table identified as the "**Volcano Heights-Mixed Zone Calculated Water Demands**" and designated as **Table II-W.**

The methods described previously now allow us to develop the water system demands and apply them to the infrastructure locations for the water system. Matching the different parcels, or sub-areas within the development (See Exhibit II) with the demands is the basis for determining the size of the water system elements. The individual area water demands are summarized in **Table III-W – "Individual Area Water Demands".**

The water system within the development is separated into two distinct pressure zones (**Zone 4W and Zone 3W)** as established by the existing surrounding development and the city-wide water system plan. As previously described, the Volcano Heights sector is surrounded by existing developed areas on three sides, and requires water connections to the existing infrastructure on the west, the north and the south. Approximately 55% of the sector plan area occurs within the water pressure Zone 4W, which is primarily described as on or above ground elevation 5370 feet Above Mean Sea Level (AMSL). The water system layout, including piping and other appurtenances, is to be provided by following the proposed street and roadway network as presented in the **Volcano Heights Sector Development Plan.** To follow the street network requires some minor relocation of the pressure **Zone 4W** and **Zone 3W** boundary.

Utilizing the same inputs as occurring within the existing Water Authority's water system model, includes the following six interconnections to the existing water system, including four within Zone 4W, and two within Zone 3W: (1) Provide a 12-inch Zone 4W waterline connection to the north with Paradise Boulevard, via the western boundary of James Monroe Middle School; (2) Provide a 12-inch Zone 4W waterline connection from the west at the northwest corner of the sector at Paseo Del Norte and Universe Boulevard; (3) Provide a 12-inch Zone 4W waterline connection from Tree Line Avenue and Rainbow Boulevard, then south in Rainbow to Woodmont Avenue, then east in Woodmont to Universe Boulevard; (4) Provide a 12-inch Zone 4W waterline connection from the west at the southwest corner of the sector at Universe Boulevard and Avenuda de Jamito; (5) Provide a 12-inch Zone 3W waterline connection from the south at Kimmick Drive; and (6) Provide a 12-inch Zone 3W waterline connection in Unser Boulevard to the north of the sector.

As part of the Water Authority review of this report update, the engineers were tasked to analyze three options for development of the water system, consisting of: (Option 1) Two Pressure Reducing Stations (PRV's) within the Sector site between pressure Zone 4W and 3W; (Option 2) One PRV between pressure Zone 4W and Zone 3W within the Sector site; and (Option 3) No PRV's between Zone 4W and 3W within the Sector site, instead relying on connections to the north and south within pressure Zone 3W.

All three proposed water line options were evaluated in Bentley WaterCAD Connect (V 10.00.00.55) to determine the availability of water pressure and fire flows throughout the Volcano Heights sector. The model base (which includes the entirety of the Water Authority / Albuquerque Water System), was previously provided by the Water Authority. The new pipelines for the Volcano Heights Sector Development Plan were integrated into the existing model to verify that the connection locations can provide the necessary flows. The friction losses in the system are modeled using the Hazen-Williams friction method, with engine

compatibility set up for EPANET V 2.00.12. All nodes within the model were evaluated to provide a minimum of 4,000 GPM Fire Flow in addition to the water demands as shown within the model. The system model was developed to verify that the proposed pipe network will operate within a 50 to 100 PSI range. This operating criteria will match water pressure zones within the existing Water Authority system, with modifications to the pressure zone locations to accommodate the existing topology and road layout. All demands shown on **Table 1** and **Table II-W** are applied as point loads located approximately at the centroid of each parcel, and connected to the nearest water distribution pipe. These demands are used to determine whether the system is capable of delivering fire flow at peak demand, and to verify that network pressures do not drop below acceptable levels during peak flows. A static alternative of the model results (with no demands) was used to analyze conditions near the zone boundary locations. These results are denoted as "static pressures" on the water system layout.

Results of this analysis was submitted to the Water Authority with recommendation to proceed on the basis of Option 2, which consists of one PRV between pressure Zone 4W and Zone 3W within the Volcano Heights sector plan. The Infrastructure is developed and pipeline sizing is completed based upon Option 2 from the modeling results. It should be stated that the water infrastructure sizing is controlled by the requirement of 4000 GPM Fire flow, which affected all of the water pipelines.

The completed layout of the water system infrastructure as developed, is provided in **Exhibit III-Water System Layout.** The water model is not included in this report, but will be provided upon request.

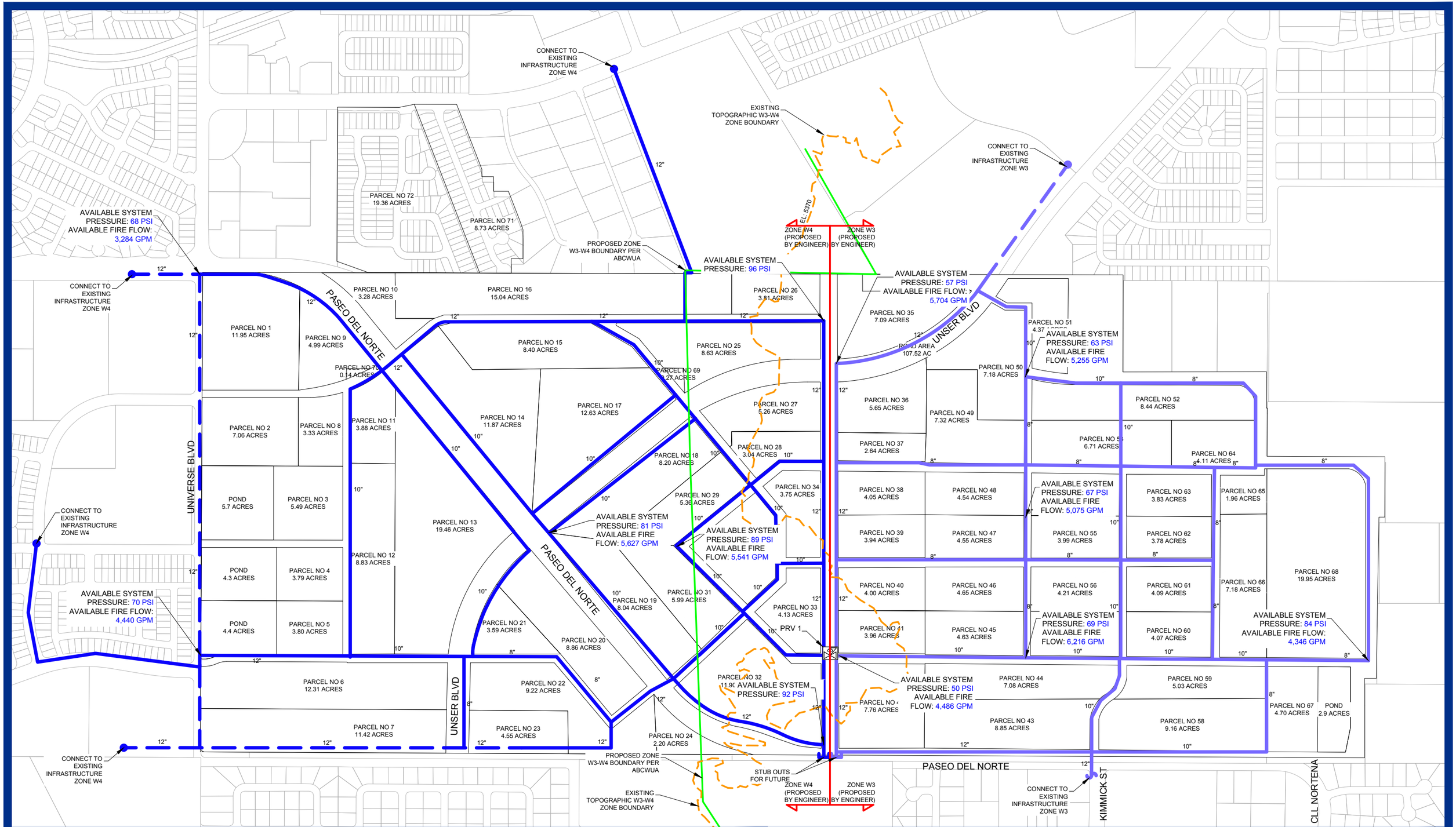
C- 4. Development of Sanitary Sewer System Infrastructure

The methods described in the sections above now allow us to develop the sanitary sewer system demands and apply them to the infrastructure locations for the sanitary sewer system. The Volcano Heights**-"Mixed Zone Calculated Sewer Demands**" are presented in **Table III-S** The sanitary sewer piping and other appurtenances are to be provided by following the street / roadway network, with some easement alignments, if more logical alignments are required.

The Volcano Heights sanitary sewer layout has been revised to agree with a service area study (Draft Memorandum dated 8/14/2017 by CDMSmith) which recommended: (a) Re-sizing the main sanitary interceptor located along the southern border of the sector plan as a 15-inch sanitary sewer; and (b) Revising the sewer alignment at the northwest border of the sector plan to include sewer access for re-routing and reconnecting two Lift Stations(LS #381 and LS # 382) from the area north of the sector.

Sanitary sewers for the existing developed areas to the north, south, and west have been generally routed to avoid or bypass the Volcano Heights Sector, except for: (1) A portion of the southern area to the southeast, which has been connected to the 15-inch sanitary sewer located in the Paseo Del Norte Boulevard ROW, and which then connects with a sanitary sewer interceptor located near the intersection of Paseo Del Norte Boulevard and Golf Course Road. This existing sanitary sewer appears as the only available sanitary sewer system outlet for the Volcano Heights Sector Plan. The interceptor extends along the southern boundary of Volcano Heights to the intersection of Universe Blvd and Avenudo. De Jaimito. The Sewer routing divides the Volcano Heights area into 3 sewer branches generally described as follows:

1. Branch A – Area west of Paseo Del Norte;



LEGEND:

- PRESSURE ZONE 4
- PRESSURE ZONE 3R
- PRESSURE ZONE 4 EXISTING
- PRESSURE ZONE 3R EXISTING
- PRESSURE REDUCING VALVE

NOTE:
SYSTEM PRESSURES ARE STATIC PRESSURES WITH NO LOADING TO BETTER DEMONSTRATE PRESSURE ZONE LOCATIONS.
ALL FIRE FLOWS ARE APPLIED ON 6" HYDRANT LEGS AT PEAK ZONE DEMANDS WITH 20 PSI RESIDUAL.

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)
1 inch = 300 ft.

N

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN
INFRASTRUCTURE NEEDS ASSESSMENT REPORT

WATER SYSTEM LAYOUT
EXHIBIT - III

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2. Branch B – Bound on the west by Paseo Del Norte, and on the east by the extension of Kimmick Street;

3. Branch C – bound on the west by the extension of Kimick Street, and on the East by the Volcano Heights area boundary.

Matching the different parcel areas with the development demands is provided to assign the flow elements to the sanitary sewer system elements. This is summarized in **Table IV-S: Individual Area Sewer Demands**, which is utilized to determine sizing of the sanitary sewer system elements.

For the Volcano Heights Sector Development Plan, the sanitary sewer system network is primarily limited to internal development for sewer flow capacity, except for possible future flow-splitting at the southwest corner of the sector, at the intersection of Universe Boulevard and Avenuda de Jamita, where the excess flows from the west may be routed eastward via the Paseo de Norte interceptor, or southward, via the Universe Boulevard / Unser boulevard interceptor. The water Authority wishes to keep the planning options open to either flow direction.

The sanitary sewer system is guided by the individual sewer system elements, the individual contributing areas, and the available local ground slopes. The planning/design team developed a sanitary system contributory area spreadsheet to assist in (1) minimizing the average depth of sewer lines (i.e., minimize rock excavation), minimize sizes of sewer lines, and provide a coverage of all expected development areas. The spreadsheet is titled as **Table V-S**–"**SEWER System Sizing Elements",** and contains three sub-sections (Branches A, B and C). The spreadsheet selected sanitary sewer alignments, sizes, and layout as developed, which are represented on **Exhibit IV- Sanitary Sewer System Layout.**

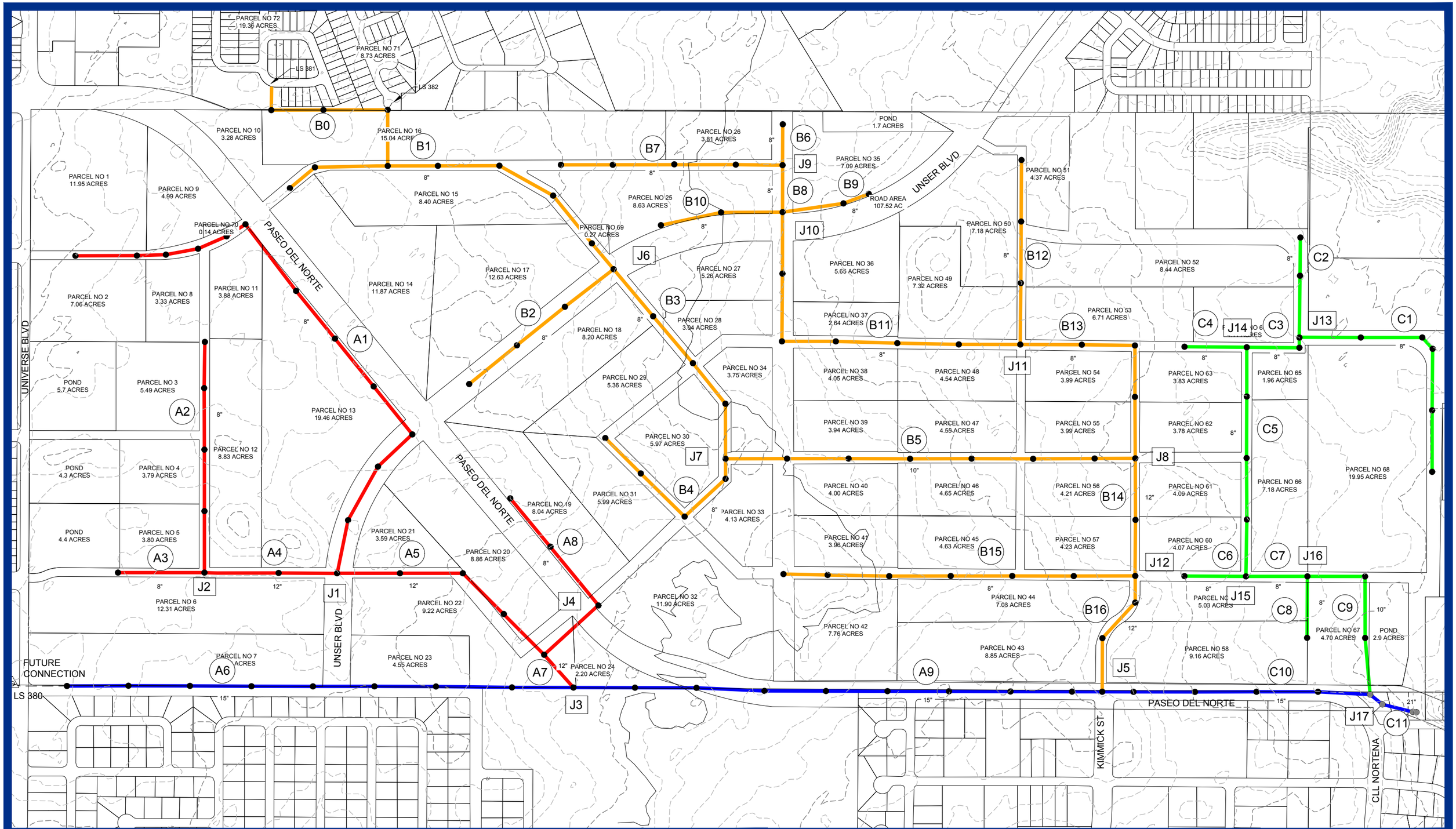
C-5. Development of Stormwater System Infrastructure

Stormwater infrastructure for the VHSDP area has been evaluated as part of the UPMDMP, completed for AMAFCA by Wilson & Company dated April, 2017. The objective of the UPMDMP was to:

- Address Limited Downstream Capacity
- Optimize Diversions to Adjacent Watersheds
- Propose Storm Drain, Detention, and Water Quality Features
- Develop Funding/Reimbursement Mechanism
- Assess Piedras Marcadas Dam with Gate Removed

Three alternatives were evaluated with the Piedras Marcadas Dam intake structure gate closed and one alternative with the gate removed. Addressing limited downstream capacity, optimizing diversions, and water quality features were the primary goals in developing the alternatives. All three gated alternatives included diversions to the Calabacillas and Boca Negra watersheds, while alternatives one and two also included a diversion to the Mariposa watershed. The 4th alternative utilized alternative three as a base model since it resulted in the highest peak flow and volume discharge to the Piedras Marcadas Dam. The alternatives are presented in **Appendix A,** including cost estimates for each alternative.

Stormwater within the watershed will be conveyed to regional ponds through public storm drain systems. Debris can be removed from the stormwater through the use of water quality



LEGEND:

- BRANCH A
- BRANCH B
- BRANCH C
- FUTURE ALIGNMENT
- FUTURE PASEO INTERCEPTOR
- EXISTING SAS
- JUNCTION NO.
- SEGMENT NO.
- NEW MH
- EXISTING MH

GRAPHIC SCALE

250 0 125 250 500 1000

(IN FEET)

1 inch = 250 ft.

N

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN INFRASTRUCTURE NEEDS ASSESSMENT REPORT

SANITARY SEWER SYSTEM LAYOUT

EXHIBIT - IV

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manholes, water quality inlets, ported risers, and filter/fence screens. Larger scale screens, grates, and traps can be constructed within regional ponds or channels to help reduce "floatable" pollutant loads

Each alternative included various ponds and storm systems. The results of the analyses showed that calculated runoff volume to the Piedras Marcadas Dam for all three alternatives, assuming the gate remains closed, is over the allowable storage for the fully developed conditions. The Dam has a gated principal spillway with capacity of 307 ac-feet without freeboard and 280 ac-feet with one foot of freeboard. Based on the findings of this study the dam can accommodate 81 ac-feet from the Upper Piedras Marcadas with the gate closed. If the gate remains closed we have identified two options for AMAFCA to ensure the dam is operating as intended during the low frequency events. Option one is to increase the storage capacity by one of two ways:

1. Excavating additional capacity in the Dam pool area
2. Providing retention ponds in the upper watershed

Both of these options would need to capture the additional volume of runoff generated by the preferred alternative for diversions out of the watershed. Option two is to restrict runoff from future developments draining into the dam by required low impact development practices to meet the reduced volume required per the preferred alternative.

If the Piedras Marcadas Dam principle spillway gate is removed and the Dam can free discharge per the principle spillway rating curve, it can accommodate the runoff peak flow and volume from each of the Upper Piedras Marcadas Watershed alternatives.

C-6. Development of Roadway Infrastructure

As part of the VHSDP, primary streets were identified throughout the area and were designated Type "A" or "B". Type "A" streets are pedestrian oriented while Type "B: streets are auto oriented. For example, Unser Boulevard and Paseo Del Norte are Type "B" streets, which are designed primarily for vehicles to travel quickly through the area, while Transit Boulevard will be a Type "A" street to create a pedestrian friendly character zone. Typical sections were developed for each primary street in the VHSDP and utilized for estimating costs as part of this report. Standard City of Albuquerque pavement sections were used for collector roads, while recent designs for Unser Boulevard and Paseo Del Norte were utilized for arterial pavement sections.

A Traffic Forecast and Circulation Assessment was completed as part of the VHSDP. With 2035 traffic forecast of about 60,000 trips per day, Paseo Del Norte will be the busiest and most travelled roadway in the area. The intersection of Paseo Del Norte and Unser Boulevard is currently signalized and is designated to be a grade separated intersection at full build-out, while the intersection of Transit Boulevard and Paseo Del Norte is designated as a High-T intersection in the future. For the purposes of estimating costs, these intersections are treated as standard at grade intersections. The VHSDP designates the following Signalized Full Access intersections:

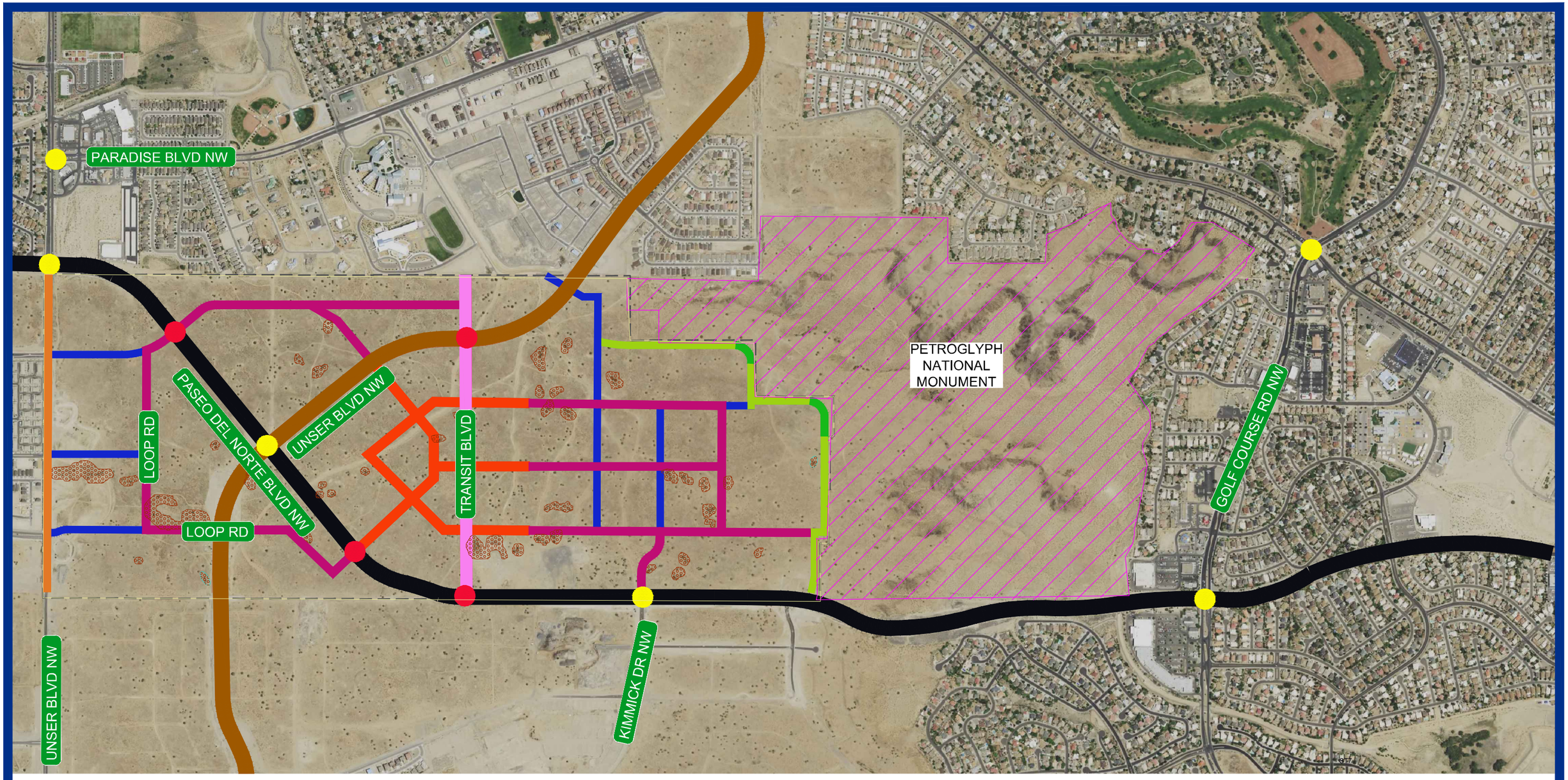
1. Paseo Del Norte and Unser Boulevard (currently signalized)
2. Paseo Del Norte and Universe Boulevard (currently signalized)
3. Paseo Del Norte and Kimmick Road (currently partially signalized)

4. Paseo Del Norte and Loop Road (future signals at 2 locations)
5. Paseo Del Norte and Transit Boulevard (future signal)
6. Unser Boulevard and Transit Boulevard (future signal)

The primary purpose of this needs assessment is to provide conceptual costs for development of the primary streets in the VHSDP area. The paving improvements will include curb and gutter, asphalt paving, drainage infrastructure, sidewalk, wheel chair ramps, streetlights, and traffic signals per the City's DPM standards. Cost estimates also include design/engineering, inspection, testing, dry utility costs, and landscaping. Even though costs were prepared as part of the UPMDMP, drainage infrastructure was included in the roadway cost to cover local storm drain inlets, manholes, and small-scale storm drain pipes. Costs for Paseo Del Norte, Unser Boulevard, and Universe Boulevard are based on expanding upon the existing roadway sections, so the cost is not for a full roadway section. The Primary Street layout is shown on Exhibit V, while the typical roadway sections are shown on Exhibit VI.

C-7. Development of Dry Utilities Infrastructure

Specific dry utility improvements have not been identified in this report, as the plan is too conceptual for the dry utility companies to determine required infrastructure. In general, developers would be responsible for funding PNM infrastructure improvements in the area, while other dry utility companies are responsible for their respective improvements necessary for development. For the purposes of this report, we have included costs for PNM facilities in the detailed estimates included in **Appendix B.**



LEGEND

- ST1 - TOWN CENTER STREET
- ST2 - CONNECTOR STREET
- ST3 - NEIGHBORHOOD STREET
- ST4.1 - PARK EDGE STREET (ONE SIDE)
- ST4.2 - PARK EDGE STREET (TWO SIDES)
- ST5 - TRANSIT BLVD
- ST6 - UNSER BLVD
- ST7 - PASEO DEL NORTE BLVD
- ST8 - UNIVERSE BLVD

- VHSDP BOUNDARY
- ROCK OUTCROPPINGS
- FUTURE SIGNALIZATION
  FULL ACCESS INTERSECTION
- EXISTING SIGNALIZATION
  FULL ACCESS INTERSECTION

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

N

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN
NEEDS ASSESSMENT REPORT

ROADWAY PLAN
EXHIBIT V

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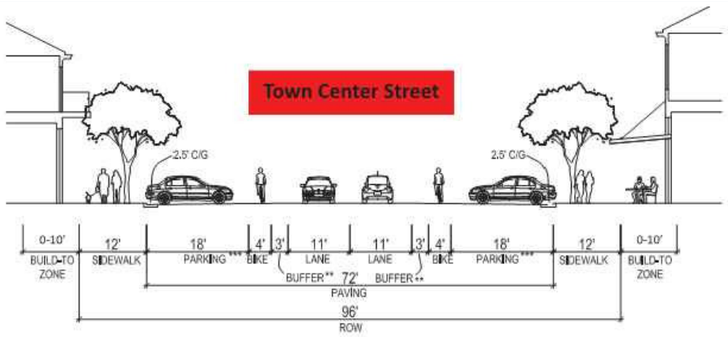
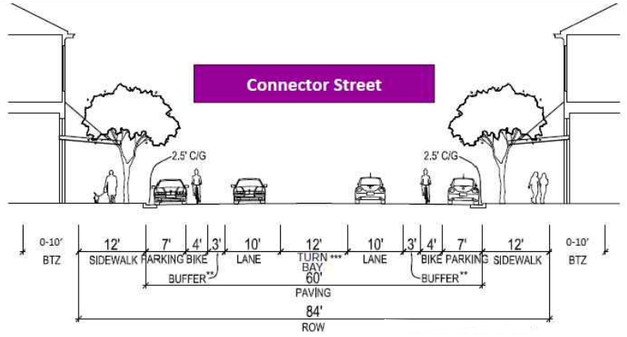
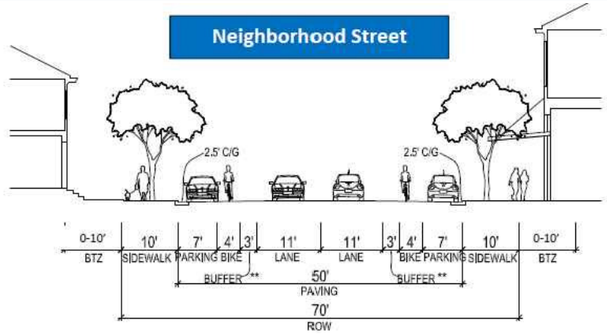


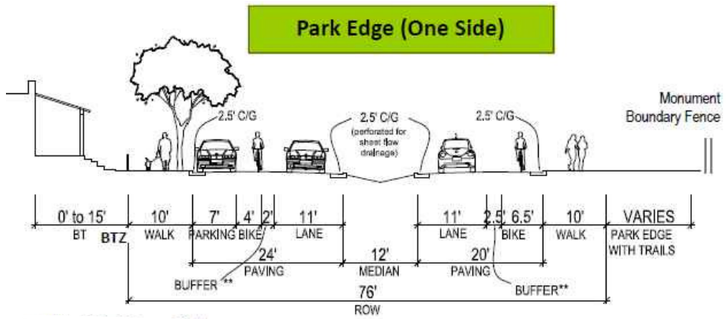
Street Type 1



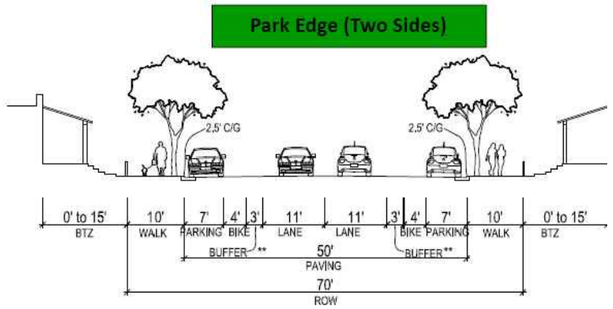
Street Type 2



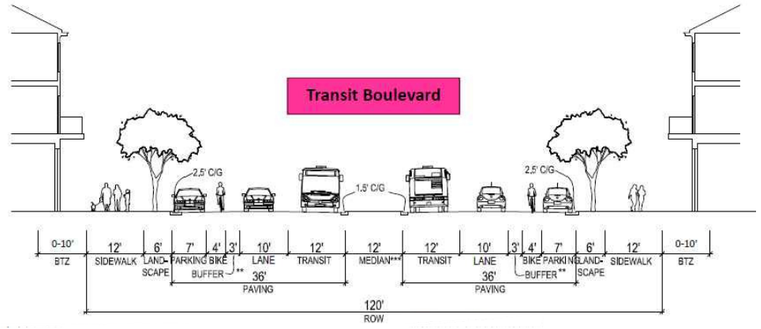
Street Type 3



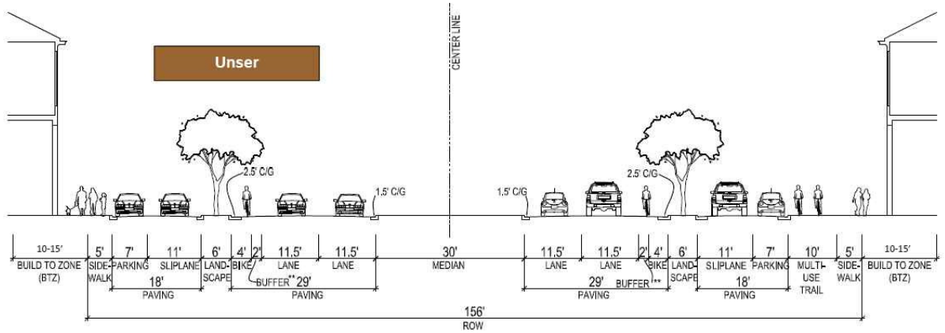
Street Type 4.1



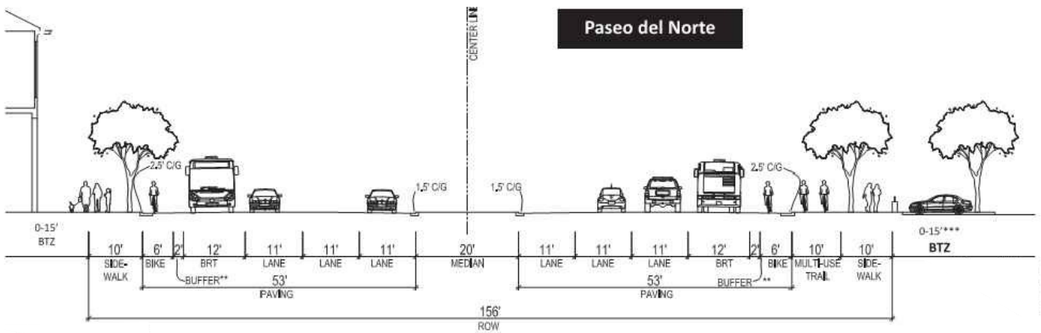
Street Type 4.2



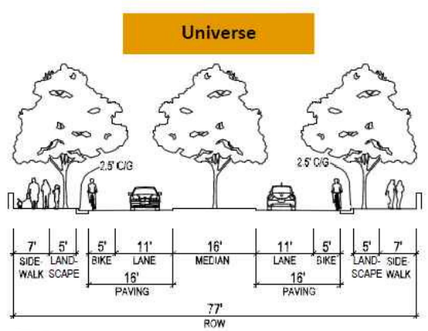
Street Type 5



Street Type 6



Street Type 7



Street Type 8

VOLCANO HEIGHTS SECTOR DEVELOPMENT PLAN
NEEDS ASSESSMENT REPORT

ROADWAY TYPICAL SECTIONS
EXHIBIT VI

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D. ESTIMATED INFRASTRUCTURE COSTS

Estimated Infrastructure cost estimates for the water, sanitary sewers, stormwater, dry utilities, and roadways/streets are provided in Appendix B. Costs are estimated higher than other locations throughout Albuquerque; however, the higher costs are due primarily to the difficulties in rock excavation. The Volcano Heights Sector Plan infrastructure, similar to the Volcano Cliffs developments to the south, is uniquely affected by the high surface level and solidity of the existing volcanic rock (which is evident throughout the sector), and adversely affects the development costs, due to the requirement of blasting for utilities, and the need for soil to be imported in order to provide for managed surface development.

D-1. Water System Infrastructure Costs

The water system cost estimates are based upon the sizing and layout **(See Exhibit III Water System Layout).** Total Estimated Waterline Improvement Costs, including contingencies, is **$11,518,854.** See **Appendix B** for Conceptual Cost Estimates.

D-2. Sanitary Sewer System Infrastructure Costs

The sanitary sewer system cost estimate is provided in Appendix B and is based upon the sizing and layout **(See Exhibit IV Sanitary Sewer System Layout).** Total Estimated Sanitary Sewer Costs, including contingencies, is **$9,174,831.**

D-3. Stormwater System Infrastructure Costs

Stormwater infrastructure cost estimates were completed as part of the UPMDMP and are included in Appendix A. The total estimated costs range from **$19.9M to $22.6M** depending on the alternative, including major ponding areas and storm drain trunk lines along primary streets. These costs reflect a 3% inflation factor per year since the estimates were originally completed.

D-4. Roadways Infrastructure Costs

Roadway infrastructure cost estimates are based on the typical sections presented in the VHSDP and are included in Appendix A. The total estimated cost for all primary streets in the area, including contingencies, is approximately **$71M**. Each individual roadway estimated cost is listed below:

ST1 (Town Center) –	$6,888,994
ST2 (Connector Street) –	$15,072,796
ST3 (Neighborhood Street) -	$5,575,659
ST4.1 (Park Edge – 1 Side) -	$3,362,845
ST4.2 (Park Edge – 2 Sides) -	$527,362
ST5 (Transit Blvd) -	$5,216,651
ST6 (Unser Blvd) -	$11,528,792
ST7 (Paseo Del Norte) -	$20,467,324
ST8 (Universe Blvd) -	$2,684,450

D-5. Dry Utilities Infrastructure Costs

The dry utility cost estimates are based upon the SAD 228 Project. It is anticipated that developers of the area would pay for trenching and backfill, as well as casings for crossing roadways. This cost also includes trenching through rock for a total of $30 per linear foot of roadway. It is assumed that the dry utility trench would be on one side of the roadway along each primary street. Total dry utility cost is estimated at **$2,035,875 excluding contingencies and NMGRT.** See Appendix B for detailed cost estimates.

E. Funding Alternatives

One of the primary goals of the Plan is to develop funding/reimbursement mechanism for development of the watershed area. The following funding sources are being considered:

- Blanket Easement
- Special Assessment District - SAD
- Infrastructure Development Zone – IDZ
- Public Improvement District – PID
- Tax Increment Financing – TIF

E-1. Easement

The idea behind this funding mechanism is for the City to obtain an easement over all of the properties within the area. As the properties are developed, the City would be reimbursed a predetermined amount in order to vacate the easement and allow for development of the property. The advantage is that the process would be simplified compared to other alternatives. The primary disadvantage is that it would be difficult to obtain 100% concurrence from all property owners.

E-2. Special Assessment District

SAD's are created to provide infrastructure improvements funded by General Obligation Bonds or Special Assessment Bonds and reimbursed by the property owners by assessment. The process consists of 5 resolutions, 2 hearings, and 2 ordinances and typically takes 2-3 years to complete. For this particular project, an SAD would be led by the City of Albuquerque, as AMAFCA does not have the authority. The advantages of an SAD is that it would provide an appraised property value benefit to the property owners and it is a proven process with adjustable assessments to fit benefits. The primary disadvantages of an SAD are that they are not popular politically and are viewed as time consuming and confusing. In general, property owners in the area that were interviewed preferred an SAD the least out of all alternatives.

E-3. Infrastructure Development Zone

IDZ's are quasi-municipal political subdivisions created to provide and finance "services", which are infrastructure and facilities. The primary financing tool is the issuance of general obligation bonds, special assessment bonds, revenue bonds or refunding bonds. An IDZ must adopt a "Service Plan" which governs the scope of its activities, which must be approved by the City of Albuquerque by resolution. A five director board is elected to govern the IDZ. The advantage of an IDZ is that it is a modernized and streamlined process compared to the SAD process and the lesser of 30% or 400 of the taxpaying electors need to sign an initial petition. The primary disadvantage of an IDZ is that one has never been completed in the State of New Mexico.

E-4. Public Improvement District

A PID is a modernized and streamlined SAD process that was introduced to New Mexico in 2001 and creates districts for public improvements through a petition and hearing process. A "General Plan" is filed with the clerk at the time the governing body adopts a resolution indicating its intention to form a PID. The General Plan includes the district boundary, description of improvements, cost estimates, financing methods and possible alternatives. The disadvantage of a PID is that they have experienced economic difficulties since the onset of the recent economic downturn. This led to legislative initiatives to reform the PID process which limited the amount of general obligation bonds that may be issues, provides that a detailed application be filed in connection with proposed PID formations, requires that notices be given to purchasers of property within a PID, and allows for the governing body forming a PID to resume governance of the PID after the end of the terms of appointed PID members.

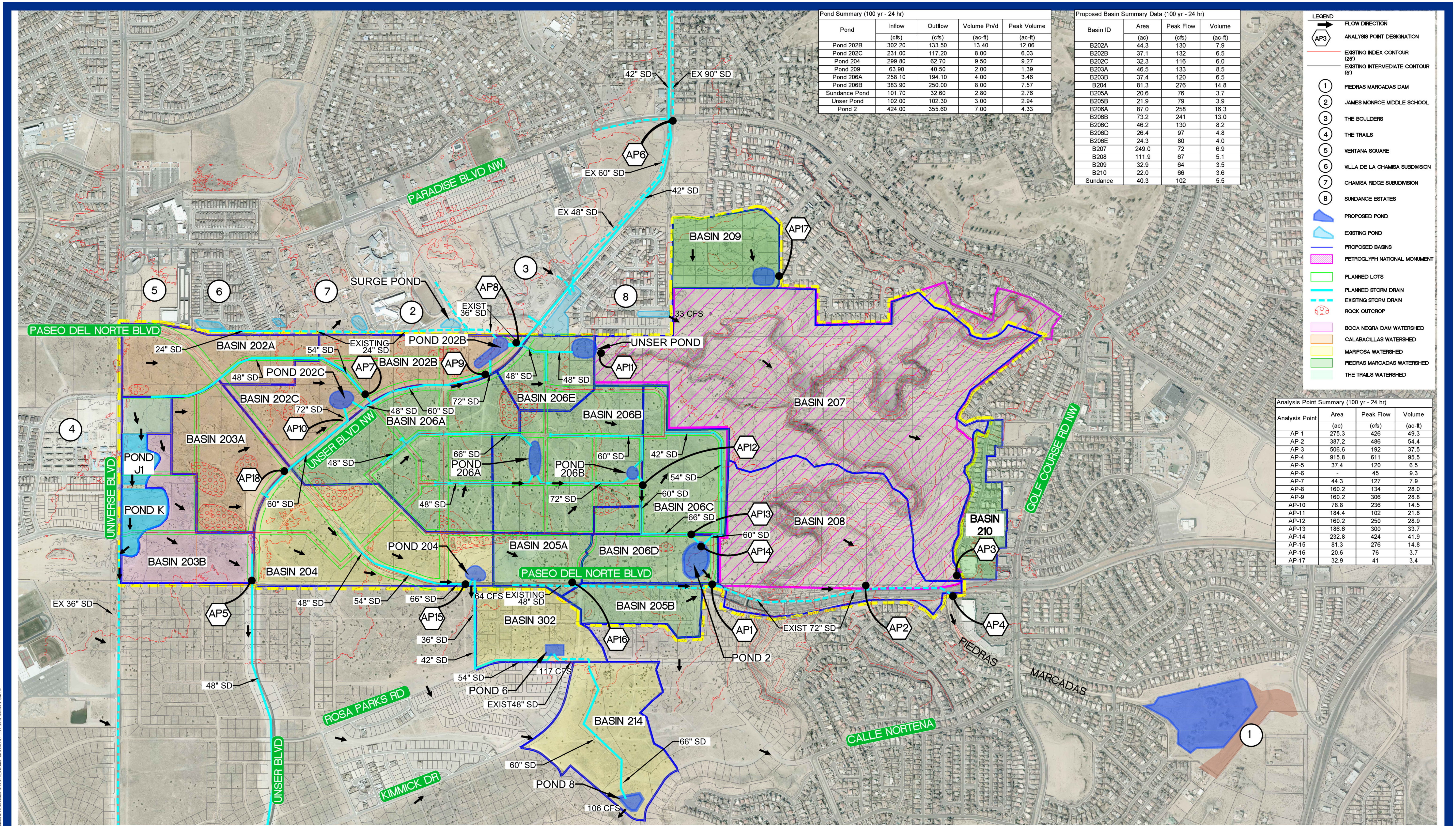
E-5. Tax Increment Financing

A TIF is a financial tool widely used by municipalities to promote economic development and redevelopment. A TIF District is formed, which is a separate political subdivision of the state with the powers that the statutes and municipality allow. There is no liability of the municipality and no pledge of any other revenues of the municipality. A TIF differs from other financing tools in that no new taxes are created, they are self-financed (no reliance on guarantees or pledges of existing revenues), they are not dependent on federal or state funding, and they allow flexibility in project activities. One disadvantage is that TIF's are limited by a revenue bond with a pledge of up to 75% of new property taxes and gross receipts taxes from the TIF District only.

APPENDIX A

WILSON & COMPANY

discipline | intensity | collaboration | shared ownership | solutions



Pond Summary (100 yr - 24 hr)				
Pond	Inflow	Outflow	Volume Prv'd	Peak Volume
	(cfs)	(cfs)	(ac-ft)	(ac-ft)
Pond 202B	302.20	133.50	13.40	12.06
Pond 202C	231.00	117.20	8.00	6.03
Pond 204	299.80	62.70	9.50	9.27
Pond 209	63.90	40.50	2.00	1.39
Pond 206A	258.10	194.10	4.00	3.46
Pond 206B	383.90	250.00	8.00	7.57
Sundance Pond	101.70	32.60	2.80	2.76
Unser Pond	102.00	102.30	3.00	2.94
Pond 2	424.00	355.60	7.00	4.33

Proposed Basin Summary Data (100 yr - 24 hr)			
Basin ID	Area	Peak Flow	Volume
	(ac)	(cfs)	(ac-ft)
B202A	44.3	130	7.9
B202B	37.1	132	6.5
B202C	32.3	116	6.0
B203A	46.5	133	8.5
B203B	37.4	120	6.5
B204	81.3	276	14.8
B205A	20.6	76	3.7
B205B	21.9	79	3.9
B206A	87.0	258	16.3
B206B	73.2	241	13.0
B206C	46.2	130	8.2
B206D	26.4	97	4.8
B206E	24.3	80	4.0
B207	249.0	72	6.9
B208	111.9	67	5.1
B209	32.9	64	3.5
B210	22.0	66	3.6
Sundance	40.3	102	5.5

Analysis Point Summary (100 yr - 24 hr)			
Analysis Point	Area	Peak Flow	Volume
	(ac)	(cfs)	(ac-ft)
AP-1	275.3	426	49.3
AP-2	387.2	486	54.4
AP-3	506.6	192	37.5
AP-4	915.8	611	95.5
AP-5	37.4	120	6.5
AP-6	-	45	9.3
AP-7	44.3	127	7.9
AP-8	160.2	134	28.0
AP-9	160.2	306	28.8
AP-10	78.8	236	14.5
AP-11	184.4	102	21.8
AP-12	160.2	250	28.9
AP-13	186.6	300	33.7
AP-14	232.8	424	41.9
AP-15	81.3	276	14.8
AP-16	20.6	76	3.7
AP-17	32.9	41	3.4

UPPER PIEDRAS MARCADAS WATERSHED DRAINAGE AND WATER QUALITY MANAGEMENT PLAN
PLATE 1 - ALTERNATIVE 1

AMAFCA

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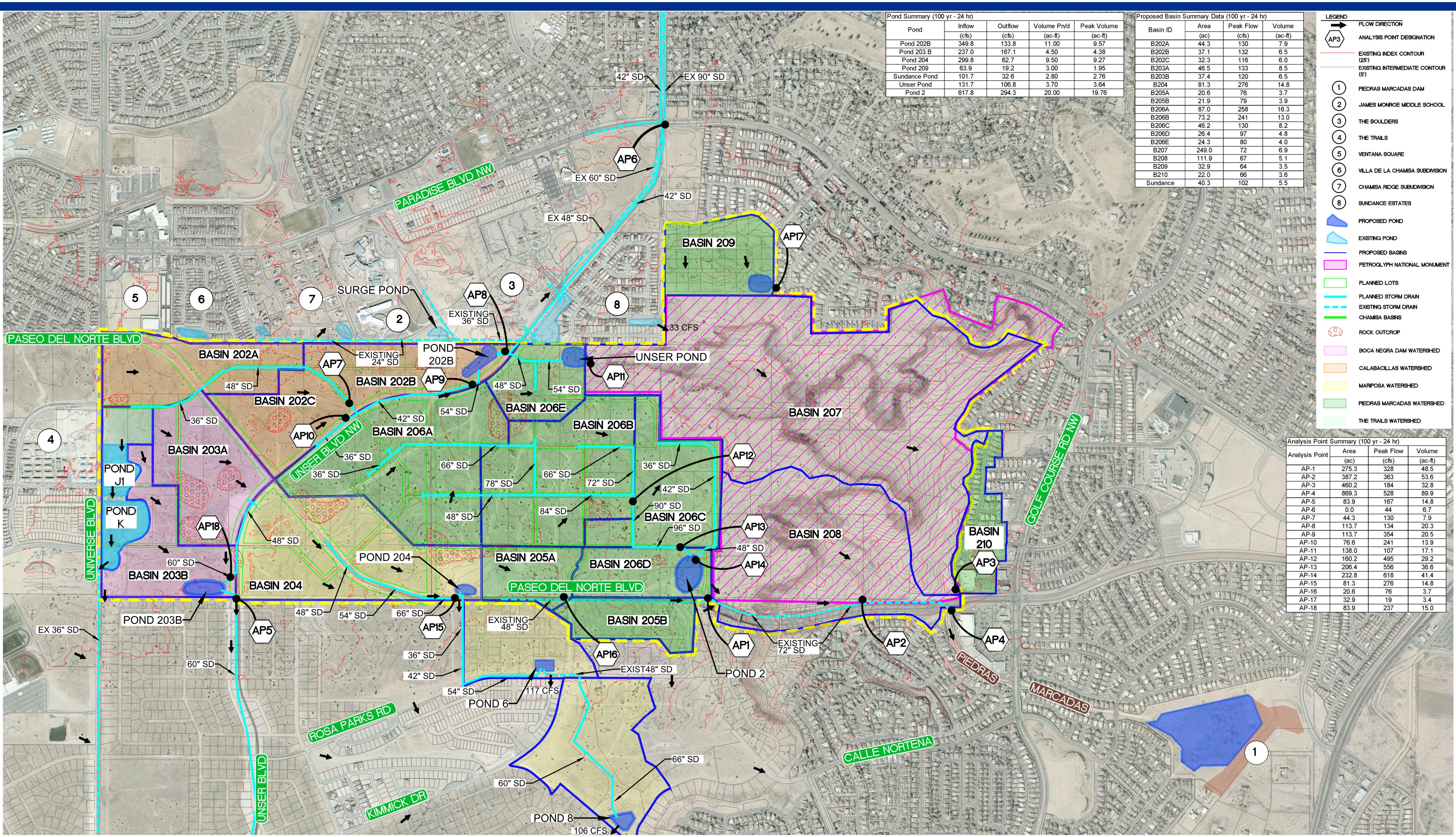
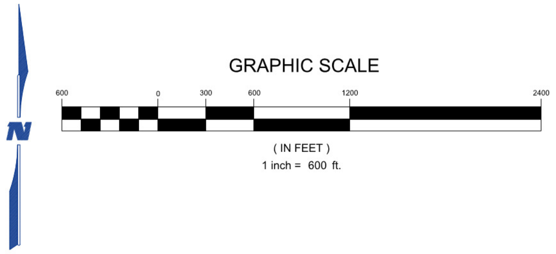


Pond Summary (100 yr - 24 hr)				
Pond	Inflow	Outflow	Volume Prv'd	Peak Volume
	(cfs)	(cfs)	(ac-ft)	(ac-ft)
Pond 202B	349.8	133.8	11.00	9.57
Pond 203.B	237.0	167.1	4.50	4.38
Pond 204	299.8	62.7	9.50	9.27
Pond 209	63.9	19.2	3.00	1.95
Sundance Pond	101.7	32.6	2.80	2.76
Unser Pond	131.7	106.8	3.70	3.64
Pond 2	617.8	294.3	20.00	19.76

Proposed Basin Summary Data (100 yr - 24 hr)			
Basin ID	Area	Peak Flow	Volume
	(ac)	(cfs)	(ac-ft)
B202A	44.3	130	7.9
B202B	37.1	132	6.5
B202C	32.3	116	6.0
B203A	46.5	133	8.5
B203B	37.4	120	6.5
B204	81.3	276	14.8
B205A	20.6	76	3.7
B205B	21.9	79	3.9
B206A	87.0	258	16.3
B206B	73.2	241	13.0
B206C	46.2	130	8.2
B206D	26.4	97	4.8
B206E	24.3	80	4.0
B207	249.0	72	6.9
B208	111.9	67	5.1
B209	32.9	64	3.5
B210	22.0	66	3.6
Sundance	40.3	102	5.5

Analysis Point Summary (100 yr - 24 hr)			
Analysis Point	Area	Peak Flow	Volume
	(ac)	(cfs)	(ac-ft)
AP-1	275.3	328	48.5
AP-2	387.2	363	53.6
AP-3	460.2	184	32.8
AP-4	869.3	528	89.9
AP-5	83.9	167	14.8
AP-6	0.0	44	6.7
AP-7	44.3	130	7.9
AP-8	113.7	134	20.3
AP-9	113.7	354	20.5
AP-10	76.6	241	13.9
AP-11	138.0	107	17.1
AP-12	160.2	495	29.2
AP-13	206.4	556	36.6
AP-14	232.8	618	41.4
AP-15	81.3	276	14.8
AP-16	20.6	76	3.7
AP-17	32.9	19	3.4
AP-18	83.9	237	15.0



GRAPHIC SCALE
(IN FEET)
1 inch = 600 ft.

UPPER PIEDRAS MARCADAS WATERSHED DRAINAGE AND WATER QUALITY MANAGEMENT PLAN
PLATE 2 - ALTERNATIVE 2

AMAFCA

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Pond Summary				
Pond	Inflow (cfs)	Outflow (cfs)	Volume Prv'd (ac-ft)	Peak Volume (ac-ft)
Pond 202B	400.7	197.8	13.40	13.28
Pond 209	63.9	19.2	3.00	1.95
Pond 10	196.3	19.9	7.00	6.9
Sundance Pond	101.7	32.6	2.80	2.76
Unser Pond	166.1	119.3	7.70	7.68
Pond 2	652.6	446.3	16.00	15.9

Proposed Basin Summary Data (100 yr - 24 hr)			
Basin ID	Area (ac)	Peak Flow (cfs)	Volume (ac-ft)
B202A	44.3	130	7.9
B202B	37.1	132	6.5
B202C	32.3	116	6.0
B203A	46.5	133	8.5
B203B	37.4	119	6.4
B204A	53.6	196	9.7
B204B	27.7	104	5.1
B205A	20.6	76	3.7
B205B	21.9	79	3.9
B206A	87.0	258	16.3
B206B	73.2	241	13.0
B206C	46.2	130	8.2
B206D	26.4	97	4.8
B206E	24.3	80	4.0
B207	249.0	72	6.9
B208	111.9	67	5.1
B209	32.9	64	3.5
B210	22.0	66	3.6
Sundance	40.3	102	5.5

LEGEND

- FLOW DIRECTION
- AP3 — ANALYSIS POINT DESIGNATION
- EXISTING INDEX CONTOUR (25')
- EXISTING INTERMEDIATE CONTOUR (5')
- 1 — PIEDRAS MARCADAS DAM
- 2 — JAMES MONROE MIDDLE SCHOOL
- 3 — THE BOULDERS
- 4 — THE TRAILS
- 5 — VENTANA SQUARE
- 6 — VILLA DE LA CHAMISA SUBDIVISION
- 7 — CHAMISA RIDGE SUBUDIVISION
- 8 — SUNDANCE ESTATES
- PROPOSED POND
- EXISTING POND
- PROPOSED BASINS
- PETROGLYPH NATIONAL MONUMENT
- PLANNED LOTS
- PLANNED STORM DRAIN
- EXISTING STORM DRAIN
- ROCK OUTCROP
- BOCA NEGRA DAM WATERSHED
- CALABACILLAS WATERSHED
- MARIPOSA WATERSHED
- PIEDRAS MARCADAS WATERSHED
- THE TRAILS WATERSHED

Analysis Point Summary (100-yr, 24- hr)			
Analysis Point	Area	Peak Flow	Volume
	ac	cfs	ac-ft
AP-1	356.6	570	63.4
AP-2	468.5	612	68.5
AP-3	506.6	157	40.2
AP-4	997.1	730	112.2
AP-5	37.4	119	6.4
AP-6	0.0	47	6.6
AP-7	44.3	130	7.9
AP-8	160.2	198	27.9
AP-9	160.2	402	28.5
AP-10	78.8	226	14.5
AP-11	184.4	119	24.5
AP-12	160.2	473	29.2
AP-13	186.6	537	34.0
AP-14	232.8	653	42.2
AP-15	53.6	196	9.7
AP-16	101.9	177	17.8
AP-17	32.9	19	3.4
AP-18	81.3	110	14.1

GRAPHIC SCALE

600 0 300 600 1200 2400

(IN FEET)

1 inch = 600 ft.

UPPER PIEDRAS MARCADAS WATERSHED DRAINAGE AND WATER QUALITY MANAGEMENT PLAN
PLATE 3 - ALTERNATIVE 3

AMAFCA

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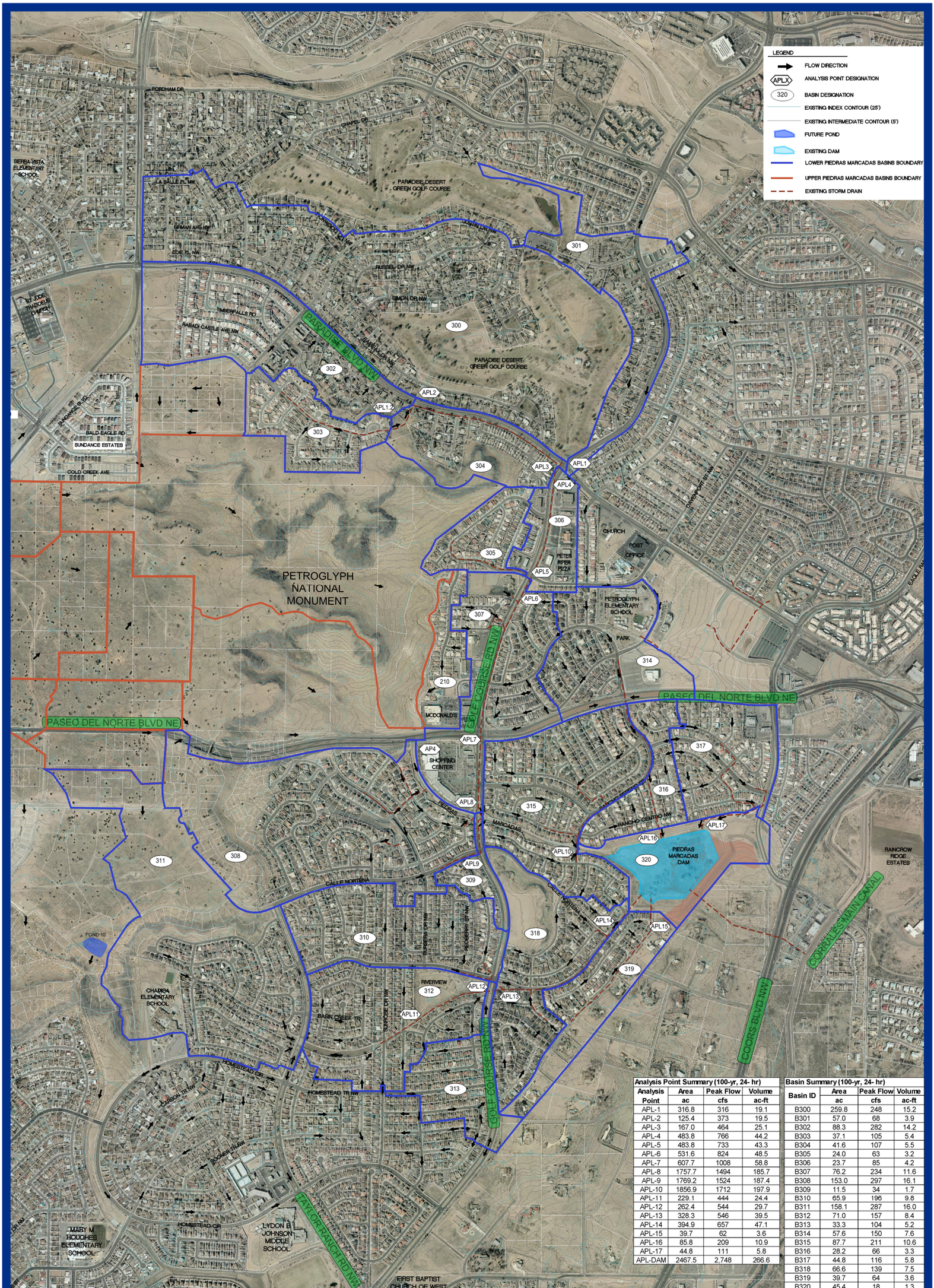

Analysis Point Summary (100-yr, 24- hr)

Analysis Point	Area ac	Peak Flow cfs	Volume ac-ft
APL-1	316.8	316	19.1
APL-2	125.4	373	19.5
APL-3	167.0	464	25.1
APL-4	483.8	766	44.2
APL-5	483.8	733	43.3
APL-6	531.6	824	48.5
APL-7	607.7	1008	58.8
APL-8	1757.7	1494	185.7
APL-9	1769.2	1524	187.4
APL-10	1856.9	1712	197.9
APL-11	229.1	444	24.4
APL-12	262.4	544	29.7
APL-13	328.3	546	39.5
APL-14	394.9	657	47.1
APL-15	39.7	62	3.6
APL-16	85.8	209	10.9
APL-17	44.8	111	5.8
APL-DAM	2467.5	2,748	266.6

Basin Summary (100-yr, 24- hr)

Basin ID	Area ac	Peak Flow cfs	Volume ac-ft
B300	259.8	248	15.2
B301	57.0	68	3.9
B302	88.3	282	14.2
B303	37.1	105	5.4
B304	41.6	107	5.5
B305	24.0	63	3.2
B306	23.7	85	4.2
B307	76.2	234	11.6
B308	153.0	297	16.1
B309	11.5	34	1.7
B310	65.9	196	9.8
B311	158.1	287	16.0
B312	71.0	157	8.4
B313	33.3	104	5.2
B314	57.6	150	7.6
B315	87.7	211	10.6
B316	28.2	66	3.3
B317	44.8	116	5.8
B318	66.6	139	7.5
B319	39.7	64	3.6
B320	45.4	18	1.3

PLATE 4
LOWER PIEDRAS MARCADAS BASIN MAP

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Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 1

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
1	Site Clearing & Grubbing, Complete	AC	$1,150.00	15	$17,250.00
2	Unclassified Excavation	CY	$5.00	110,300	$551,500.00
3	Import	CY	$8.50	27,575	$234,387.50
4	Rock Excavation, Utility Trench, Remove & Dispose, Compl	CY	$29.00	65,000	$1,885,000.00
5	Surface Rock Excavation, Remove & Dispose, Compl	CY	$83.17	23,270	$1,935,365.90
6	24" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$80.00	250	$20,000.00
7	30" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$100.00	696	$69,600.00
8	36" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$140.00	2,009	$281,260.00
9	42" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$160.00	8,919	$1,427,040.00
10	48" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$195.00	9,146	$1,783,470.00
11	54" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$260.00	6,208	$1,614,080.00
12	60" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$285.00	5,481	$1,562,085.00
13	66" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$380.00	2,393	$909,340.00
14	72" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$470.00	2,385	$1,120,950.00
15	78" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$510.00	446	$227,460.00
16	Manhole, 4' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$3,100.00	17	$52,700.00
17	Manhole, 4' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$4,500.00	11	$49,500.00
18	Manhole, 6' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$5,200.00	71	$369,200.00

Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 1

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
19	Manhole, 6' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$5,500.00	26	$143,000.00
20	Manhole, 8' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$11,000.00	4	$44,000.00
21	Catch Basin	EA	$4,500.00	253	$1,137,990.00
22	Pond Inlet Structure	EA	$7,000.00	1	$7,000.00
23	Pond Water Quality Structure	EA	$20,000.00	10	$200,000.00
	Sub-Total Bid Items				**$15,642,178.40**
Miscellaneous Items					
24	Construction Staking	LS	$219,000.00	1	$219,000.00
25	Construction Project Sign, per Contract Special Provisions, CIP	EA	$750.00	4	$3,000.00
26	Mobilization, Complete	LS	$746,200.00	1	$746,200.00
27	Demobilization, Complete	LS	$47,000.00	1	$47,000.00
28	Construction Traffic Control & Barricading, Complete	LS	$328,500.00	1	$328,500.00
29	NPDES Permitting, Complete	LS	$98,600.00	1	$98,600.00
	Sub-Total Miscellaneous Items				**$1,442,300.00**
	Total Bid Items				**$17,084,478.40**
	Contingency @ 10%				**$1,708,447.84**
	New Mexico Gross Receipt Tax (NMGRT) @ 7.3125%				**$1,249,302.48**
	Total Cost Including NMGRT				**$20,042,228.72**

Note: CIP referes to complete in place

Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 2

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
1	Site Clearing & Grubbing, Complete	AC	$1,150.00	15	$17,250.00
2	Unclassified Excavation	CY	$5.00	110,300	$551,500.00
3	Import	CY	$8.50	27,575	$234,387.50
4	Rock Excavation, Utility Trench, Remove & Dispose, Compl	CY	$29.00	77,877	$2,258,433.00
5	Surface Rock Excavation, Remove & Dispose, Compl	CY	$83.17	22,000	$1,829,740.00
6	24" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$80.00	250	$20,000.00
7	30" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$100.00	696	$69,600.00
8	36" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$140.00	2,669	$373,660.00
9	42" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$160.00	8,919	$1,427,040.00
10	48" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$195.00	6,035	$1,176,825.00
11	54" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$260.00	4,760	$1,237,600.00
12	60" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$285.00	7,133	$2,032,905.00
13	66" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$380.00	2,547	$967,860.00
14	72" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$470.00	2,126	$999,220.00
15	78" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$510.00	1,108	$565,080.00
16	84" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$558.00	1,275	$711,450.00
17	90" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$620.00	690	$427,800.00
18	96" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$675.00	850	$573,750.00

Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 2

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
19	Manhole, 4' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$3,100.00	8	$24,800.00
20	Manhole, 4' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$4,500.00	11	$49,500.00
21	Manhole, 6' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$5,200.00	68	$353,600.00
22	Manhole, 6' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$5,500.00	35	$192,500.00
23	Manhole, 8' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$11,000.00	4	$44,000.00
24	Catch Basin	EA	$4,500.00	260	$1,171,740.00
25	Pond Inlet Structure	EA	$7,000.00	8	$56,000.00
26	Pond Water Quality Structure	EA	$20,000.00	8	$160,000.00
	Sub-Total Bid Items				**$17,526,240.50**
Miscellaneous Items					
27	Construction Staking	LS	$245,400.00	1	$245,400.00
28	Construction Project Sign, per Contract Special Provisions, CIP	EA	$750.00	4	$3,000.00
29	Mobilization, Complete	LS	$836,100.00	1	$836,100.00
30	Demobilization, Complete	LS	$52,600.00	1	$52,600.00
31	Construction Traffic Control & Barricading, Complete	LS	$368,100.00	1	$368,100.00
32	NPDES Permitting, Complete	LS	$110,500.00	1	$110,500.00
	Sub-Total Miscellaneous Items				**$1,615,700.00**
	Total Bid Items				**$19,141,940.50**
	Contingency @ 10%				**$1,914,194.05**
	New Mexico Gross Receipt Tax (NMGRT) @ 7.3125%				**$1,399,754.40**
	Total Cost Including NMGRT				**$22,455,888.95**

Note: CIP referes to complete in place

Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 3

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
1	Site Clearing & Grubbing, Complete	AC	$1,150.00	15	$17,250.00
2	Unclassified Excavation	CY	$5.00	118,000	$590,000.00
3	Import	CY	$8.50	29,500	$250,750.00
4	Rock Excavation, Utility Trench, Remove & Dispose, Compl	CY	$29.00	79,100	$2,293,900.00
5	Surface Rock Excavation, Remove & Dispose, Compl	CY	$83.17	20,100	$1,671,717.00
6	24" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$80.00	1,115	$89,200.00
7	30" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$100.00	696	$69,600.00
8	36" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$140.00	1,238	$173,320.00
9	42" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$160.00	8,906	$1,424,960.00
10	48" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$195.00	9,391	$1,831,245.00
11	54" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$260.00	4,356	$1,132,560.00
12	60" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$285.00	3,123	$890,055.00
13	66" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$380.00	939	$356,820.00
14	72" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$470.00	3,407	$1,601,290.00
15	78" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$510.00	446	$227,460.00
16	84" RCP, CL III, Incl Trenching, Backfill & Compaction, CIP	LF	$558.00	468	$261,144.00
17	Manhole, 4' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$3,100.00	15	$46,500.00
18	Manhole, 4' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$4,500.00	11	$49,500.00

Upper Piedras Mercadas
Drainage and Water Quality Management Plan
Conceptual Cost Estimate - Alternative 3

WILSON & COMPANY

April 3, 2017

No	Description	Unit	Unit Cost	Quantity	Total
19	Manhole, 6' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$5,200.00	53	$275,600.00
20	Manhole, 6' DIA, Type "C" OR "E", 10' to 14' deep, CIP	EA	$5,500.00	26	$143,000.00
21	Manhole, 8' DIA, Type "C" OR "E", 6' to 10' deep, CIP	EA	$11,000.00	6	$66,000.00
22	Catch Basin	EA	$4,500.00	227	$1,022,550.00
23	Pond Inlet Structure	EA	$7,000.00	5	$35,000.00
24	Pond Water Quality Structure	EA	$20,000.00	5	$100,000.00
	Sub-Total Bid Items				**$14,619,421.00**
Miscellaneous Items					
25	Construction Staking	LS	$204,700.00	1	$204,700.00
26	Construction Project Sign, per Contract Special Provisions, CIP	EA	$750.00	4	$3,000.00
27	Mobilization, Complete	LS	$697,400.00	1	$697,400.00
28	Demobilization, Complete	LS	$43,900.00	1	$43,900.00
29	Construction Traffic Control & Barricading, Complete	LS	$307,100.00	1	$307,100.00
30	NPDES Permitting, Complete	LS	$92,200.00	1	$92,200.00
	Sub-Total Miscellaneous Items				**$1,348,300.00**
	Total Bid Items				**$15,967,721.00**
	Contingency @ 10%				**$1,596,772.10**
	New Mexico Gross Receipt Tax (NMGRT) @ 7.3125%				**$1,167,639.60**
	Total Cost Including NMGRT				**$18,732,132.70**

Note: CIP referes to complete in place

APPENDIX B

WILSON & COMPANY

discipline | intensity | collaboration | shared ownership | solutions

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE SUMMATION

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	407,500	1,049,312.50
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	183,900	2,083,587.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	150,240	739,691.62
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	925,540	495,719.22
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	815,000	12,225,000.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	183,900	3,678,000.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBGRADE PREP	$15.00	SY	16,120	241,800.00
8	340.010	SDWK, 4", PCC	$41.20	SY	134,060	5,523,272.00
9	340.050	C & G STD, PCC	$30.00	LF	135,725	4,071,750.00
10	340.060	C & G MDN, PCC	$20.00	LF	50,050	1,001,000.00
		SUBTOTAL PAVING				31,109,132.34
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		2,177,639.26
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		1,555,456.62
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		3,110,913.23
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		777,728.31
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		1,555,456.62
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		867,668.81
17		DRY UTILITIES (PNM)	$30.00	LF	67863	2,035,875.00
18	422.XXX	LIGHTING @ 2%		%		677,050.73
		SUBTOTAL MISCELLANEOUS				12,757,788.58
		SUBTOTAL CONSTRUCTION				**43,866,920.92**
		CONTINGENCIES @ 25%				10,966,730.23
		SUBTOTAL				**54,833,651.15**
		NMGRT @ 7.5%				4,112,523.84
		TOTAL CONSTRUCTION				**58,946,174.98**
		STAKING @ 3%				1,768,385.25
		DESIGN/ENGINEERING @ 8%				4,715,694.00
		INSPECTION @ 8%				4,715,694.00
		TESTING @ 2%				1,178,923.50
		GRAND TOTAL				**71,324,871.73**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST1

TOWN CENTER

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	54975	141,560.63
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	0	0.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	0	0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	54975	29,444.61
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	109950	1,649,250.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	0	0.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	19400	799,280.00
9	340.050	C & G STD, PCC	$30.00	LF	14550	436,500.00
10	340.060	C & G MDN, PCC	$20.00	LF	0	0.00
		SUBTOTAL PAVING				3,056,035.24
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		213,922.47
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		152,801.76
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		305,603.52
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		76,400.88
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		152,801.76
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		0.00
17		DRY UTILITIES (PNM)	$30.00	LF	7275	218,250.00
18	422.XXX	LIGHTING @ 2%		%		61,120.70
		SUBTOTAL MISCELLANEOUS				1,180,901.10
		SUBTOTAL CONSTRUCTION				**4,236,936.33**
		CONTINGENCIES @ 25%				1,059,234.08
		SUBTOTAL				**5,296,170.42**
		NMGRT @ 7.5%				397,212.78
		TOTAL CONSTRUCTION				**5,693,383.20**
		STAKING @ 3%				170,801.50
		DESIGN/ENGINEERING @ 8%				455,470.66
		INSPECTION @ 8%				455,470.66
		TESTING @ 2%				113,867.66
		GRAND TOTAL				**6,888,993.67**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST2

CONNECTOR ST

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	110015	283,288.63
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	0	0.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	0	0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	110015	58,924.03
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	220030	3,300,450.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	0	0.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	47150	1,942,580.00
9	340.050	C & G STD, PCC	$30.00	LF	35365	1,060,950.00
10	340.060	C & G MDN, PCC	$20.00	LF	0	0.00
		SUBTOTAL PAVING				6,646,192.66
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		465,233.49
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		332,309.63
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		664,619.27
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		166,154.82
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		332,309.63
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		0.00
17		DRY UTILITIES (PNM)	$30.00	LF	17682.5	530,475.00
18	422.XXX	LIGHTING @ 2%		%		132,923.85
		SUBTOTAL MISCELLANEOUS				2,624,025.69
		SUBTOTAL CONSTRUCTION				**9,270,218.35**
		CONTINGENCIES @ 25%				2,317,554.59
		SUBTOTAL				**11,587,772.93**
		NMGRT @ 7.5%				869,082.97
		TOTAL CONSTRUCTION				**12,456,855.90**
		STAKING @ 3%				373,705.68
		DESIGN/ENGINEERING @ 8%				996,548.47
		INSPECTION @ 8%				996,548.47
		TESTING @ 2%				249,137.12
		GRAND TOTAL				**15,072,795.64**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST3

NEIGHBORHOOD ST

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	38790	99,884.25
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	0	0.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	0	0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	38790	20,775.92
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	77580	1,163,700.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	0	0.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	16865	694,838.00
9	340.050	C & G STD, PCC	$30.00	LF	15180	455,400.00
10	340.060	C & G MDN, PCC	$20.00	LF	0	0.00
		SUBTOTAL PAVING				2,434,598.17
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		170,421.87
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		121,729.91
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		243,459.82
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		60,864.95
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		121,729.91
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		0.00
17		DRY UTILITIES (PNM)	$30.00	LF	7590	227,700.00
18	422.XXX	LIGHTING @ 2%		%		48,691.96
		SUBTOTAL MISCELLANEOUS				994,598.42
		SUBTOTAL CONSTRUCTION				**3,429,196.60**
		CONTINGENCIES @ 25%				857,299.15
		SUBTOTAL				**4,286,495.75**
		NMGRT @ 7.5%				321,487.18
		TOTAL CONSTRUCTION				**4,607,982.93**
		STAKING @ 3%				138,239.49
		DESIGN/ENGINEERING @ 8%				368,638.63
		INSPECTION @ 8%				368,638.63
		TESTING @ 2%				92,159.66
		GRAND TOTAL				**5,575,659.34**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST4.1

PARK EDGE - 1 SIDE

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	16150	41,586.25
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	0	0.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	0	0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	16150	8,649.94
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	32300	484,500.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	0	0.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	8970	369,564.00
9	340.050	C & G STD, PCC	$30.00	LF	16145	484,350.00
10	340.060	C & G MDN, PCC	$20.00	LF	0	0.00
		SUBTOTAL PAVING				1,388,650.19
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		97,205.51
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		69,432.51
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		138,865.02
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		34,716.25
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		69,432.51
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		0.00
17		DRY UTILITIES (PNM)	$30.00	LF	8072.5	242,175.00
18	422.XXX	LIGHTING @ 2%		%		27,773.00
		SUBTOTAL MISCELLANEOUS				679,599.81
		SUBTOTAL CONSTRUCTION				**2,068,250.00**
		CONTINGENCIES @ 25%				517,062.50
		SUBTOTAL				**2,585,312.50**
		NMGRT @ 7.5%				193,898.44
		TOTAL CONSTRUCTION				**2,779,210.94**
		STAKING @ 3%				83,376.33
		DESIGN/ENGINEERING @ 8%				222,336.87
		INSPECTION @ 8%				222,336.87
		TESTING @ 2%				55,584.22
		GRAND TOTAL				**3,362,845.23**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST4.2

PARK EDGE - 2 SIDES

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	3670	9,450.25
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	0	0.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	0	0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	3670	1,965.65
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	7340	110,100.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	0	0.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	1595	65,714.00
9	340.050	C & G STD, PCC	$30.00	LF	1435	43,050.00
10	340.060	C & G MDN, PCC	$20.00	LF	0	0.00
		SUBTOTAL PAVING				230,279.90
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		16,119.59
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		11,514.00
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		23,027.99
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		5,757.00
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		11,514.00
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		0.00
17		DRY UTILITIES (PNM)	$30.00	LF	717.5	21,525.00
18	422.XXX	LIGHTING @ 2%		%		4,605.60
						94,063.17
		SUBTOTAL CONSTRUCTION				**324,343.07**
		CONTINGENCIES @ 25%				81,085.77
		SUBTOTAL				**405,428.84**
		NMGRT @ 7.5%				30,407.16
		TOTAL CONSTRUCTION				**435,836.00**
		STAKING @ 3%				13,075.08
		DESIGN/ENGINEERING @ 8%				34,866.88
		INSPECTION @ 8%				34,866.88
		TESTING @ 2%				8,716.72
		GRAND TOTAL				**527,361.56**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST5

TRANSIT BLVD

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	24200	62,315.00
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	24200	274,186.00
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY		0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	72600	38,884.56
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	48400	726,000.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	24200	484,000.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	8800	362,560.00
9	340.050	C & G STD, PCC	$30.00	LF	6600	198,000.00
10	340.060	C & G MDN, PCC	$20.00	LF	6600	132,000.00
		SUBTOTAL PAVING				2,277,945.56
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		159,456.19
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		113,897.28
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		227,794.56
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		56,948.64
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		113,897.28
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		113,897.28
17		DRY UTILITIES (PNM)	$30.00	LF	3300	99,000.00
18	422.XXX	LIGHTING @ 2%		%		45,558.91
		SUBTOTAL MISCELLANEOUS				930,450.13
		SUBTOTAL CONSTRUCTION				**3,208,395.69**
		CONTINGENCIES @ 25%				802,098.92
		SUBTOTAL				**4,010,494.61**
		NMGRT @ 7.5%				300,787.10
		TOTAL CONSTRUCTION				**4,311,281.71**
		STAKING @ 3%				129,338.45
		DESIGN/ENGINEERING @ 8%				344,902.54
		INSPECTION @ 8%				344,902.54
		TESTING @ 2%				86,225.63
		GRAND TOTAL				**5,216,650.87**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST6

UNSER BLVD

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	49660	127,874.50
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	49660	562,647.80
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	49660	244,496.04
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	198640	106,391.58
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	99320	1,489,800.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	49660	993,200.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	6060	90,900.00
8	340.010	SDWK, 4", PCC	$41.20	SY	6060	249,672.00
9	340.050	C & G STD, PCC	$30.00	LF	21800	654,000.00
10	340.060	C & G MDN, PCC	$20.00	LF	21800	436,000.00
		SUBTOTAL PAVING				4,954,981.93
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		346,848.73
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		247,749.10
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		495,498.19
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		123,874.55
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		247,749.10
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		247,749.10
17		DRY UTILITIES (PNM)	$30.00	LF	10900	327,000.00
18	422.XXX	LIGHTING @ 2%		%		99,099.64
		SUBTOTAL MISCELLANEOUS				2,135,568.40
		SUBTOTAL CONSTRUCTION				**7,090,550.33**
		CONTINGENCIES @ 25%				1,772,637.58
		SUBTOTAL				**8,863,187.91**
		NMGRT @ 7.5%				664,739.09
		TOTAL CONSTRUCTION				**9,527,927.01**
		STAKING @ 3%				285,837.81
		DESIGN/ENGINEERING @ 8%				762,234.16
		INSPECTION @ 8%				762,234.16
		TESTING @ 2%				190,558.54
		GRAND TOTAL				**11,528,791.68**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST7

PASEO DEL NORTE

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	100580	258,993.50
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	100580	1,139,571.40
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY	100580	495,195.57
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	402320	215,482.59
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	201160	3,017,400.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	100580	2,011,600.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	10060	150,900.00
8	340.010	SDWK, 4", PCC	$41.20	SY	20120	828,944.00
9	340.050	C & G STD, PCC	$30.00	LF	18100	543,000.00
10	340.060	C & G MDN, PCC	$20.00	LF	18100	362,000.00
		SUBTOTAL PAVING				9,023,087.06
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		631,616.09
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		451,154.35
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		902,308.71
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		225,577.18
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		451,154.35
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		451,154.35
17		DRY UTILITIES (PNM)	$30.00	LF	9050	271,500.00
18	422.XXX	LIGHTING @ 2%		%		180,461.74
		SUBTOTAL MISCELLANEOUS				3,564,926.78
		SUBTOTAL CONSTRUCTION				**12,588,013.84**
		CONTINGENCIES @ 25%				3,147,003.46
		SUBTOTAL				**15,735,017.30**
		NMGRT @ 7.5%				1,180,126.30
		TOTAL CONSTRUCTION				**16,915,143.60**
		STAKING @ 3%				507,454.31
		DESIGN/ENGINEERING @ 8%				1,353,211.49
		INSPECTION @ 8%				1,353,211.49
		TESTING @ 2%				338,302.87
		GRAND TOTAL				**20,467,323.76**

VHSDP
NEEDS ASSESSMENT
ROADWAY ESTIMATE

ST8

UNIVERSE BLVD

6 ITEM NO.	SPEC NO.	7 SHORT DESCRIPTION	8 EST. UNIT PRICE	UNIT	9 EST. QUANTITY	10 EST. AMOUNT
		PAVING				
1	301.020	SUBGRADE PREP, 12"	$2.58	SY	9460	24,359.50
2	302.02	AGGREGATE BASE COURSE, 8"	$11.33	SY	9460	107,181.80
3	329.01	SEAL COAT, PLAN MIX, 5/8"	$4.92	SY		0.00
4	336.01	PRIME COAT AND/OR TACK COAT	$0.54	SY	28380	15,200.33
5	336.022	ASP CONC, TYPE SPB, 1-2" LIFT	$15.00	SY	18920	283,800.00
6	336.024	ASP CONC, TYPE SPA, 1-3" LIFT	$20.00	SY	9460	189,200.00
7	336.05	BIKE ASP CONC, TRAIL, 2" SPC, 8" SUBG	$15.00	SY	0	0.00
8	340.010	SDWK, 4", PCC	$41.20	SY	5100	210,120.00
9	340.050	C & G STD, PCC	$30.00	LF	6550	196,500.00
10	340.060	C & G MDN, PCC	$20.00	LF	3550	71,000.00
		SUBTOTAL PAVING				1,097,361.63
		MISCELLANEOUS				
11	201/202	ROADWAY EXCAV & BORROW @ 7%		%		76,815.31
12	202.02	ROADWAY ROCK EXCAVATION @ 5%		%		54,868.08
13	9XX.XXX	ROADWAY DRAINAGE @ 10%		%		109,736.16
14	450.00X	SIGNAGE/STRIPING @ 2.5%		%		27,434.04
15	1005.01	LANDSCAPING @ 5% - IN SW 2 SIDES		%		54,868.08
16	1005.02	LANDSCAPING @ 5% - IN MEDIAN		%		54,868.08
17		DRY UTILITIES (PNM)	$30.00	LF	3275	98,250.00
18	422.XXX	LIGHTING @ 2%		%		76,815.31
		SUBTOTAL MISCELLANEOUS				553,655.08
		SUBTOTAL CONSTRUCTION				**1,651,016.70**
		CONTINGENCIES @ 25%				412,754.18
		SUBTOTAL				**2,063,770.88**
		NMGRT @ 7.5%				154,782.82
		TOTAL CONSTRUCTION				**2,218,553.70**
		STAKING @ 3%				66,556.61
		DESIGN/ENGINEERING @ 8%				177,484.30
		INSPECTION @ 8%				177,484.30
		TESTING @ 2%				44,371.07
		GRAND TOTAL				**2,684,449.97**

VHSDP
NEEDS ASSESSMENT

WATER ESTIMATE
10/22/2019
CONCEPTUAL DESIGN

ITEM NO.	SHORT DESCRIPTION	EST. UNIT PRICE	UNIT	EST. QUANTITY	EST. AMOUNT
	CONSTRUCTION				
1	EXCAV & DISP, ROCK	$102.00	CY	27338	$2,788,476.00
2	FILL, BORROW, HAUL & COMP	$12.00	CY	33414	$400,968.00
3	ART PVMT, R&R, W/M	$60.00	SY	4000	$240,000.00
4	DIRECTIONAL DRILL, CARRIER PIPE NOT INCL	$450.00	LF	640	$288,000.00
5	6" WL PIPE	$27.00	LF	6550	$176,850.00
6	8" WL PIPE	$36.00	LF	11801	$424,836.00
7	10" WL PIPE	$39.00	LF	23855	$930,345.00
8	12" WL PIPE	$45.00	LF	18546	$834,570.00
9	6" GATE VLV	$2,000.00	EA	134	$268,000.00
10	8" GATE VLV	$2,400.00	EA	24	$57,600.00
11	10" GATE VLV	$2,900.00	EA	39	$113,100.00
12	12" GATE VLV	$4,500.00	EA	25	$112,500.00
13	FITTINGS	$4.50	LB	53138	$239,121.00
14	PRESSURE REDUCING VALVE VAULT	$94,000.00	EA	1	$94,000.00
15	FIRE HYDRANTS	$3,800.00	EA	134	$509,200.00
	SUBTOTAL CONSTRUCTION				**$7,477,566.00**
	CONTINGENCIES @ 20%				$1,495,513.20
	SUBTOTAL				**$8,973,079.20**
	NMGRT @ 7.875%				$706,629.99
	TOTAL CONSTRUCTION				**9,679,709.19**
	STAKING @ 3%				290,391.28
	DESIGN/ENGINEERING @ 10%				967,970.92
	INSPECTION @ 4%				387,188.37
	TESTING @ 2%				193,594.18
	GRAND TOTAL				**11,518,853.93**

VHSDP
NEEDS ASSESSMENT

SANITARY SEWER ESTIMATE
10/22/2019
CONCEPTUAL DESIGN

ITEM NO.	SHORT DESCRIPTION	EST. UNIT PRICE	UNIT	EST. QUANTITY	EST. AMOUNT
	CONSTRUCTION				
1	TRCH, 4-15" SAS, <12'	$19.00	LF	42172	$801,268.00
2	EXCAV & DISP, ROCK	$102.00	CY	27457	$2,800,614.00
3	FILL, BORROW, HAUL & COMP	$12.00	CY	32026	$384,312.00
4	ART PVMT, R&R, W/M	$60.00	SY	3600	$216,000.00
5	DIRECTIONAL DRILL, CARRIER PIPE NOT INCL	$450.00	LF	940	$423,000.00
6	8" SAS PIPE	$18.50	LF	26353	$487,530.50
7	10" SAS PIPE	$21.00	LF	4626	$97,146.00
8	12" SAS PIPE	$24.00	LF	3778	$90,672.00
9	15" SAS PIPE	$32.00	LF	7415	$237,280.00
10	MH, 4' DIA, C OR E 6-10' D	$2,800.00	EA	101	$282,800.00
11	MH, 6' DIA, C OR E, 6-10' D	$4,100.00	EA	33	$135,300.00
	SUBTOTAL CONSTRUCTION				**$5,955,922.50**
	CONTINGENCIES @ 20%				$1,191,184.50
	SUBTOTAL				**$7,147,107.00**
	NMGRT @ 7.875%				$562,834.68
	TOTAL CONSTRUCTION				**$7,709,941.68**
	STAKING @ 3%				$231,298.25
	DESIGN/ENGINEERING @ 10%				$770,994.17
	INSPECTION @ 4%				$308,397.67
	TESTING @ 2%				$154,198.83
	GRAND TOTAL				**$9,174,830.59**

APPENDIX C

WILSON & COMPANY

discipline | intensity | collaboration | shared ownership | solutions

TABLE 1 - WATER/SEWER UNIT FLOW TABLE (PER ABCWUA)

NO.	DESCRIPTION	ABBREVIATION	AVG. DAY UNIT WASTEWATER FLOW (GPAD)	WW PEAKING FACTOR	AVG DAY UNIT WATER (GPAD)	WATER PEAKING FACTOR	
1	LIGHT RESIDENTIAL	LT-RES	800	1.62	1800	1.6325	
1.1	LR WESTSIDE NEW	LT-RES_WSIDE_NEW	800	1.62	1800	1.6325	(1)
1.2	LR WESTSIDE OLD	LT-RES_WSIDE_OLD	800	1.42	1800	2.04375	
1.3	LR EASTSIDE NEW	LT-RES_ESIDE_NEW	800	1.85	1800	2.74442	
1.4	LR EASTSIDE OLD	LT-RES_ESIDE_OLD	800	2.13	1800	2.24875	
1.5	LR HIGH	LT-RES_HIGH	800	1.73	1800	3.25	
1.6	RURAL RESIDENTIAL	RURAL-RES	120	1.78	240	1.6325	
2	MEDIUM RESIDENTIAL	MED-RES	979	1.3	2203	1.4094	(1)
3	HEAVY RESIDENTIAL	HVY-RES	2592	1.64	5832	1.6679	(1)
4	LIGHT COMMERCIAL	LT-COMM	1172	1.87	1875	2.2184	(1)
5	HEAVY COMMERCIAL	HVY-COMM	2344	1.89	3750	2.14009	(1)
6	LIGHT INDUSTRIAL	LT-IND	1563	1.52	2500	2.2264	
8	HEAVY INDUSTRIAL	HVY-IND	3125	1.18	5000	1.1454	
9	LIGHT INSTITUTIONAL	LT-INST	469	1.62	750	2.3433	
10	HEAVY INSTITUTIONAL	HVY-INST	1875	1.79	3000	2.1711	

NOTE: Flows and peaking factors are as reproduced from a chart provided by the Water Authority, dated Aug 5 2019

(1) - Development Uses present within the Volcano Heights sector development plan

TABLE II-W - MIXED-USE ZONES-CALCULATED WATER DEMANDS

Mixed Zone Designation:	MX Zone Makeup				MX Zone Demands		
	Component Zones	Weight	Water Demand (GPAD)	Water Peaking Factor	Calculated MX Water Demand (GPAD)	Calculated MX Water Peak Demand	Calculated MX Water Design* Demand
MX-H	HVY-RES	50%	5832.00	1.67	**4791.00**	**8876.27**	**10651.52**
	HVY-COMM	50%	3750.00	2.14			
NR-BP	LT-COMM	25%	1875.00	2.22	**3281.25**	**7058.88**	**8470.65**
	HVY-COMM	75%	3750.00	2.14			
MX-M	LT-COMM	25%	1875.00	2.22	**2507.75**	**4598.66**	**5518.40**
	HVY-COMM	25%	3750.00	2.14			
	MED-RES	50%	2203.00	1.41			
MX-T	LT-RES_WSIDE_NEW	50%	1800.00	1.63	**2306.25**	**4515.46**	**5418.55**
	HVY-COMM	25%	3750.00	2.14			
	LT-COMM	25%	1875.00	2.22			

* Design Demands are calculated by multiplying the Peak Demand by a factor of 1.20, per the City of Albuquerque DPM.

TABLE III-W: INDIVIDUAL AREA WATER DEMANDS

PARCEL NO	DEMAND CLASS	AVERAGE DEMAND (GPD/AC)	DESIGN DEMAND (GPD/AC)	AREA (AC)	AVERAGE DEMAND (GPD)	DESIGN DEMAND (GPD)
1	MX-M	2508	5518	11.95	29978	65967
2	MX-M	2508	5518	7.06	17710	38971
3	MX-M	2508	5518	5.49	13763	30285
4	MX-M	2508	5518	3.79	9499	20904
5	MX-M	2508	5518	3.80	9527	20964
6	MX-M	2508	5518	12.31	30873	67937
7	MX-T	2306	5419	11.42	26330	61864
8	MX-M	2508	5518	3.33	8356	18387
9	MX-M	2508	5518	4.99	12514	27537
10	MX-M	2508	5518	3.28	8228	18106
11	NR-BP	3281	8471	3.88	12718	32832
12	MX-M	2508	5518	8.83	22131	48700
13	NR-BP	3281	8471	19.46	63853	164839
14	NR-BP	3281	8471	11.87	38952	100555
15	MX-M	2508	5518	8.40	21058	46338
16	MX-T	2306	5419	15.04	34693	81511
17	NR-BP	3281	8471	12.63	41432	106959
18	NR-BP	3281	8471	8.21	26923	69502
19	NR-BP	3281	8471	8.04	26378	68096
20	NR-BP	3281	8471	8.86	29062	75025
21	NR-BP	3281	8471	3.59	11770	30384
22	MX-M	2508	5518	9.22	23111	50858
23	MX-T	2306	5419	4.55	10503	24676
24	MX-M	2508	5518	2.20	5515	12135
25	MX-M	2508	5518	8.64	21654	47651
26	MX-M	2508	5518	3.81	9552	21020
27	NR-BP	3281	8471	5.27	17276	44598
28	MX-H	4791	10652	3.04	14545	32338
29	MX-H	4791	10652	5.36	25689	57113
30	MX-H	4791	10652	5.97	28583	63547
31	MX-H	4791	10652	5.99	28698	63803
32	MX-H	4791	10652	11.90	57018	126764
33	MX-H	4791	10652	4.13	19768	43948
34	MX-H	4791	10652	3.75	17961	39933
35	MX-M	2508	5518	7.09	17772	39109
36	NR-BP	3281	8471	5.65	18546	47876
37	MX-H	4791	10652	2.64	12667	28163
38	MX-H	4791	10652	4.05	19384	43096
39	MX-H	4791	10652	3.94	18896	42010
40	MX-H	4791	10652	4.00	19164	42606
41	MX-H	4791	10652	3.96	18992	42223

TABLE III-W: INDIVIDUAL AREA WATER DEMANDS

PARCEL NO	DEMAND CLASS	AVERAGE DEMAND (GPD/AC)	DESIGN DEMAND (GPD/AC)	AREA (AC)	AVERAGE DEMAND (GPD)	DESIGN DEMAND (GPD)
42	MX-H	4791	10652	7.76	37188	82677
43	NR-BP	3281	8471	8.85	29036	74957
44	MX-M	2508	5518	7.08	17742	39043
45	MX-M	2508	5518	4.63	11603	25534
46	MX-M	2508	5518	4.65	11656	25650
47	MX-M	2508	5518	4.55	11408	25103
48	MX-M	2508	5518	4.54	11378	25037
49	MX-M	2508	5518	7.32	18359	40400
50	MX-T	2306	5419	7.18	16563	38916
51	MX-T	2306	5419	4.37	10078	23679
52	MX-T	2306	5419	8.44	19462	45727
53	MX-M	2508	5518	6.71	16830	37034
54	MX-M	2508	5518	3.99	10001	22007
55	MX-M	2508	5518	3.99	9998	22002
56	MX-M	2508	5518	4.21	10558	23232
57	MX-M	2508	5518	4.23	10595	23315
58	NR-BP	3281	8471	9.16	30066	77617
59	MX-M	2508	5518	5.03	12604	27735
60	MX-M	2508	5518	4.07	10207	22460
61	MX-M	2508	5518	4.09	10267	22592
62	MX-M	2508	5518	3.78	9482	20865
63	MX-M	2508	5518	3.83	9597	21119
64	MX-T	2306	5419	4.11	9488	22292
65	MX-T	2306	5419	1.96	4516	10610
66	MX-M	2508	5518	7.18	18011	39633
67	MX-T	2306	5419	4.70	10842	25473
68	MX-T	2306	5419	19.95	46010	108100
69	NR-BP	3281	8471	19.36	63538	164026
70	NR-BP	3281	8471	0.14	453	1169
71	R-1B	#N/A	#N/A	8.73	#N/A	#N/A
72	R-ML	#N/A	#N/A	19.36	#N/A	#N/A
			TOTAL:	**441.70**	**1324584.62**	**3081935.26**

TABLE III-S - MIXED-USE ZONES-CALCULATED SEWER DEMANDS

Mixed Zone Designation:	MX Zone Makeup				MX Zone Demands		
	Component Zones	Weight	SAS Demand (GPAD)	SAS Peaking Factor	Calculated MX SAS Demand (GPAD)	Calculated MX SAS Peak Demand	Calculated MX SAS Design* Demand
MX-H	HVY-RES	50%	2592.00	1.64	**2468.00**	**4340.52**	**5208.62**
	HVY-COMM	50%	2344.00	1.89			
NR-BP	LT-COMM	25%	1172.00	1.87	**2051.00**	**3870.53**	**4644.64**
	HVY-COMM	75%	2344.00	1.89			
MX-M	LT-COMM	25%	1172.00	1.87	**1368.50**	**2291.80**	**2750.16**
	HVY-COMM	25%	2344.00	1.89			
	MED-RES	50%	979.00	1.30			
MX-T	LT-RES_WSIDE_NEW	50%	800.00	1.62	**1279.00**	**2303.45**	**2764.14**
	HVY-COMM	25%	2344.00	1.89			
	LT-COMM	25%	1172.00	1.87			
R-ML **	LT-RES_HIGH	100%	800.00	1.73	**800.00**	**1384.00**	**1660.80**
R-1B **	LT-RES_WSIDE_NEW	100%	800.00	1.62	**800.00**	**1296.00**	**1555.20**

* Design Demands are calculated by multiplying the Peak Demand by a factor of 1.20, per the City of Albuquerque DPM.

** Existing areas outside the sector development plan which the ABBCWUA has requested to be included in the sewer demand calculations within the sector.

TABLE IV-S: INDIVIDUAL AREA SEWER DEMANDS

PARCEL NO	DEMAND CLASS	AVERAGE DEMAND (GPD/AC)	DESIGN DEMAND (GPD/AC)	AREA (AC)	AVERAGE DEMAND (GPD)	DESIGN DEMAND (GPD)
1	MX-M	1369	2750	11.95	16359	32875
2	MX-M	1369	2750	7.06	9664	19422
3	MX-M	1369	2750	5.49	7510	15093
4	MX-M	1369	2750	3.79	5184	10418
5	MX-M	1369	2750	3.80	5199	10448
6	MX-M	1369	2750	12.31	16848	33857
7	MX-T	1279	2764	11.42	14602	31558
8	MX-M	1369	2750	3.33	4560	9164
9	MX-M	1369	2750	4.99	6829	13723
10	MX-M	1369	2750	3.28	4490	9023
11	NR-BP	2051	4645	3.88	7950	18003
12	MX-M	1369	2750	8.83	12077	24270
13	NR-BP	2051	4645	19.46	39912	90385
14	NR-BP	2051	4645	11.87	24347	55136
15	MX-M	1369	2750	8.40	11491	23093
16	MX-T	1279	2764	15.04	19240	41581
17	NR-BP	2051	4645	12.63	25898	58648
18	NR-BP	2051	4645	8.21	16828	38109
19	NR-BP	2051	4645	8.04	16488	37338
20	NR-BP	2051	4645	8.86	18166	41138
21	NR-BP	2051	4645	3.59	7357	16660
22	MX-M	1369	2750	9.22	12612	25345
23	MX-T	1279	2764	4.55	5825	12588
24	MX-M	1369	2750	2.20	3009	6048
25	MX-M	1369	2750	8.64	11817	23748
26	MX-M	1369	2750	3.81	5213	10475
27	NR-BP	2051	4645	5.27	10799	24454
28	MX-H	2468	5209	3.04	7493	15813
29	MX-H	2468	5209	5.36	13233	27929
30	MX-H	2468	5209	5.97	14724	31075
31	MX-H	2468	5209	5.99	14783	31200
32	MX-H	2468	5209	11.90	29372	61988
33	MX-H	2468	5209	4.13	10183	21491
34	MX-H	2468	5209	3.75	9253	19527
35	MX-M	1369	2750	7.09	9699	19490
36	NR-BP	2051	4645	5.65	11592	26251
37	MX-H	2468	5209	2.64	6525	13772
38	MX-H	2468	5209	4.05	9986	21074
39	MX-H	2468	5209	3.94	9734	20543
40	MX-H	2468	5209	4.00	9872	20834
41	MX-H	2468	5209	3.96	9783	20647

TABLE IV-S: INDIVIDUAL AREA SEWER DEMANDS

PARCEL NO	DEMAND CLASS	AVERAGE DEMAND (GPD/AC)	DESIGN DEMAND (GPD/AC)	AREA (AC)	AVERAGE DEMAND (GPD)	DESIGN DEMAND (GPD)
42	MX-H	2468	5209	7.76	19157	40429
43	NR-BP	2051	4645	8.85	18149	41100
44	MX-M	1369	2750	7.08	9682	19457
45	MX-M	1369	2750	4.63	6332	12725
46	MX-M	1369	2750	4.65	6361	12783
47	MX-M	1369	2750	4.55	6225	12510
48	MX-M	1369	2750	4.54	6209	12477
49	MX-M	1369	2750	7.32	10019	20134
50	MX-T	1279	2764	7.18	9186	19852
51	MX-T	1279	2764	4.37	5589	12079
52	MX-T	1279	2764	8.44	10793	23327
53	MX-M	1369	2750	6.71	9184	18456
54	MX-M	1369	2750	3.99	5458	10968
55	MX-M	1369	2750	3.99	5456	10965
56	MX-M	1369	2750	4.21	5761	11578
57	MX-M	1369	2750	4.23	5782	11619
58	NR-BP	2051	4645	9.16	18793	42559
59	MX-M	1369	2750	5.03	6878	13822
60	MX-M	1369	2750	4.07	5570	11193
61	MX-M	1369	2750	4.09	5603	11259
62	MX-M	1369	2750	3.78	5174	10398
63	MX-M	1369	2750	3.83	5237	10525
64	MX-T	1279	2764	4.11	5262	11372
65	MX-T	1279	2764	1.96	2504	5412
66	MX-M	1369	2750	7.18	9829	19752
67	MX-T	1279	2764	4.70	6013	12994
68	MX-T	1279	2764	19.95	25516	55145
69	NR-BP	2051	4645	0.27	554	1254
70	NR-BP	2051	4645	0.14	283	641
			TOTAL:	**441.70**	**742227.86**	**1579125.89**

TABLE V-S - SEWER SYSTEM SIZING ELEMENTS

CUMULATIVE FLOWS FOR BRANCH A

PIPE SEG	INFLOWS	INFLOW PERCENT	ADTL FLOW (GPM)	TOTAL FLOW (GPM)	DIA.	PIPE SLOPE	FULL PIPE FLOW (GPM)	PERCENT FULL
A1	PARCEL NO 1	100.00%	22.83	22.83	8 in	2.00%	769.09	2.97%
A1	PARCEL NO 2	100.00%	13.49	36.32	8 in	2.00%	769.09	4.72%
A1	PARCEL NO 8	50.00%	3.18	39.50	8 in	2.00%	769.09	5.14%
A1	PARCEL NO 9	100.00%	9.53	49.03	8 in	2.00%	769.09	6.37%
A1	PARCEL NO 70	100.00%	0.45	49.47	8 in	2.00%	769.09	6.43%
A1	PARCEL NO 11	50.00%	6.25	55.73	8 in	0.48%	376.78	14.79%
A1	PARCEL NO 13	50.00%	31.38	87.11	8 in	0.48%	376.78	23.12%
A1	PARCEL NO 14	50.00%	19.14	106.25	8 in	0.48%	376.78	28.20%
A1	PARCEL NO 13	50.00%	31.38	137.64	8 in	0.40%	343.95	40.02%
A1	PARCEL NO 20	50.00%	14.28	151.92	8 in	0.40%	343.95	44.17%
SUBTOTAL	**SAS PIPE A1**	**N/A**	**0.00**	**151.92**	**8 in**	**0.40%**	**343.95**	**44.17%**
A2	PARCEL NO 6	50.00%	11.76	11.76	8 in	2.07%	782.44	1.50%
A2	PARCEL NO 11	50.00%	6.25	18.01	8 in	2.07%	782.44	2.30%
A2	PARCEL NO 3	100.00%	10.48	28.49	8 in	0.50%	384.55	7.41%
A2	PARCEL NO 12	100.00%	16.85	45.34	8 in	0.50%	384.55	11.79%
A2	PARCEL NO 4	100.00%	7.23	52.58	8 in	0.50%	384.55	13.67%
A2	PARCEL NO 5	100.00%	7.26	59.83	8 in	0.50%	384.55	15.56%
SUBTOTAL	**SAS PIPE A2**	**N/A**	**0.00**	**59.83**	**8 in**	**1.45%**	**654.86**	**9.14%**
A3	PARCEL NO 6	50.00%	11.76	11.76	8 in	0.48%	376.78	3.12%
SUBTOTAL	**SAS PIPE A3**	**N/A**	**0.00**	**11.76**	**8 in**	**1.45%**	**654.86**	**1.80%**
A4	SAS PIPE A2	100.00%	59.83	59.83	12 in	0.48%	1110.87	5.39%
A4	SAS PIPE A3	100.00%	11.76	71.59	12 in	0.48%	1110.87	6.44%
A4	PARCEL NO 6	50.00%	11.76	83.34	12 in	0.48%	1110.87	7.50%
SUBTOTAL	**SAS PIPE A4**	**100.00%**	**0.00**	**83.34**	12 in	0.48%	1110.87	7.50%
A5	SAS PIPE A1	100.00%	151.92	151.92	12 in	0.48%	1110.87	13.68%
A5	SAS PIPE A4	100.00%	83.34	235.27	12 in	0.48%	1110.87	21.18%
A5	PARCEL NO 21	100.00%	11.57	246.83	12 in	0.48%	1110.87	22.22%
A5	PARCEL NO 22	50.00%	8.80	255.64	12 in	0.48%	1110.87	23.01%
A5	PARCEL NO 20	50.00%	14.28	269.92	12 in	0.48%	1110.87	24.30%
SUBTOTAL	**SAS PIPE A5**	**N/A**	**0.00**	**269.92**	**15 in**	**0.30%**	**1592.31**	**16.95%**
A6	PARCEL NO 7	100.00%	21.92	21.92	15 in	0.48%	2014.14	1.09%
A6	PARCEL NO 23	100.00%	8.74	30.66	15 in	0.48%	2014.14	1.52%
A6	PARCEL NO 22	50.00%	8.80	39.46	15 in	0.48%	2014.14	1.96%
SUBTOTAL	**SAS PIPE A6**	**100.00%**	**0.00**	**39.46**	15 in	0.48%	2014.14	1.96%
A7	PARCEL NO 19	100.00%	25.93	25.93	12 in	0.48%	1110.87	2.33%
SUBTOTAL	**SAS PIPE A7**	**100.00%**	**0.00**	**25.93**	8 in	0.48%	376.78	6.88%
A8	SAS PIPE A5	100.00%	269.92	269.92	8 in	0.48%	376.78	71.64%
A8	SAS PIPE A7	100.00%	25.93	295.85	8 in	0.48%	376.78	78.52%
SUBTOTAL	**SAS PIPE A8**	**100.00%**	**0.00**	**295.85**	8 in	2.12%	791.83	37.36%

A9	SAS PIPE A7	100.00%	295.85	295.85	15 in	0.48%	2014.14	14.69%
A9	SAS PIPE A6	100.00%	39.46	335.31	15 in	0.48%	2014.14	16.65%
A9	PARCEL NO 24	100.00%	4.20	339.51	15 in	0.48%	2014.14	16.86%
A9	PARCEL NO 32	100.00%	43.05	382.55	15 in	2.12%	4232.88	9.04%
A9	PARCEL NO 42	66.00%	18.53	401.08	15 in	0.48%	2014.14	19.91%
A9	PARCEL NO 43	100.00%	28.54	429.62	15 in	0.48%	2014.14	21.33%
SUBTOTAL	**SAS PIPE A9**	**100.00%**	**0.00**	**429.62**	15 in	0.48%	2014.14	21.33%
END OF SECTION A				**429.62**				

CUMULATIVE FLOWS FOR BRANCH B

PIPE SEG	INFLOWS	INFLOW PERCENT	ADTL FLOW (GPM)	TOTAL FLOW (GPM)	DIA.	PIPE SLOPE	FULL PIPE FLOW (GPM)	PERCENT FULL
B0	PARCEL NO 72	100.00%	23.51	23.51	8 in	2.00%	769.09	3.06%
B0	PARCEL NO 71	100.00%	12.50	36.01	8 in	2.00%	769.09	4.68%
SUBTOTAL	**SAS PIPE B0**	**100.00%**	**0.00**	**36.01**	**8 in**	**2.00%**	**769.09**	**4.68%**
B1	PARCEL NO 10	100.00%	16.85	16.85	8 in	2.00%	769.09	2.19%
B1	PARCEL NO 14	50.00%	19.14	36.00	8 in	2.00%	769.09	4.68%
B1	SAS PIPE B0	100.00%	36.01	72.01	8 in	2.00%	769.09	9.36%
B1	PARCEL NO 15	100.00%	16.04	88.05	8 in	2.00%	769.09	11.45%
B1	PARCEL NO 16	66.67%	19.25	107.30	8 in	2.00%	769.09	13.95%
B1	PARCEL NO 25	33.30%	5.49	112.79	8 in	0.48%	376.78	29.94%
B1	PARCEL NO 17	33.30%	13.56	126.35	8 in	0.48%	376.78	33.54%
B1	PARCEL NO 69	100.00%	0.87	127.23	8 in	0.48%	376.78	33.77%
SUBTOTAL	**SAS PIPE B1**	**100.00%**	**0.00**	**126.35**	**8 in**	**0.48%**	**376.78**	**33.54%**
B2	PARCEL NO 17	66.67%	27.15	27.15	8 in	0.48%	376.78	7.21%
B2	PARCEL NO 18	50.00%	13.23	40.39	8 in	0.48%	376.78	10.72%
SUBTOTAL	**SAS PIPE B2**	**100.00%**	**0.00**	**40.39**	**8 in**	**0.48%**	**376.78**	**10.72%**
B3	SAS PIPE B1	100.00%	126.35	126.35	8 in	0.48%	376.78	33.54%
B3	SAS PIPE B2	100.00%	40.39	166.74	8 in	0.48%	376.78	44.25%
B3	PARCEL NO 18	50.00%	13.23	179.97	8 in	0.48%	376.78	47.77%
B3	PARCEL NO 27	50.00%	8.49	188.46	8 in	0.48%	376.78	50.02%
B3	PARCEL NO 28	50.00%	5.49	193.95	8 in	0.48%	376.78	51.48%
B3	PARCEL NO 29	100.00%	19.39	213.35	8 in	0.48%	376.78	56.62%
B3	PARCEL NO 34	100.00%	13.56	226.91	8 in	0.48%	376.78	60.22%
B3	PARCEL NO 30	50.00%	10.79	237.70	8 in	0.48%	376.78	63.09%
SUBTOTAL	**SAS PIPE B3**	**100.00%**	**0.00**	**237.70**	**8 in**	**1.45%**	**654.86**	**36.30%**
B4	PARCEL NO 31	100.00%	21.67	21.67	8 in	0.48%	376.78	5.75%
B4	PARCEL NO 30	50.00%	10.79	32.46	8 in	0.48%	376.78	8.61%
B4	PARCEL NO 33	66.67%	9.95	42.41	8 in	0.48%	376.78	11.25%
SUBTOTAL	**SAS PIPE B4**	**100.00%**	**0.00**	**42.41**	**8 in**	**1.45%**	**654.86**	**6.48%**
B5	SAS PIPE B3	100.00%	237.70	237.70	10 in	0.48%	683.14	34.79%

B5	SAS PIPE B4	100.00%	42.41	280.11	10 in	0.48%	683.14	41.00%
B5	PARCEL NO 33	33.33%	4.97	285.08	10 in	0.48%	683.14	41.73%
B5	PARCEL NO 39	100.00%	14.27	299.35	10 in	0.48%	683.14	43.82%
B5	PARCEL NO 40	100.00%	14.47	313.81	10 in	0.48%	683.14	45.94%
B5	PARCEL NO 47	100.00%	8.69	322.50	10 in	0.48%	683.14	47.21%
B5	PARCEL NO 46	100.00%	8.88	331.38	10 in	0.48%	683.14	48.51%
B5	PARCEL NO 55	50.00%	3.81	335.19	10 in	0.48%	683.14	49.07%
B5	PARCEL NO 56	50.00%	4.02	339.21	10 in	0.48%	683.14	49.65%
SUBTOTAL	**SAS PIPE B5**	**100.00%**	**0.00**	**339.21**	**10 in**	**0.48%**	**683.14**	**49.65%**
B6	PARCEL NO 26	50.00%	3.64	3.64	8 in	0.48%	376.78	0.97%
B6	PARCEL NO 35	50.00%	6.77	10.40	8 in	0.48%	376.78	2.76%
SUBTOTAL	**SAS PIPE B6**	**100.00%**	**0.00**	**10.40**	**8 in**	**0.48%**	**376.78**	**2.76%**
B7	PARCEL NO 16	33.30%	9.62	9.62	8 in	0.48%	376.78	2.55%
B7	PARCEL NO 25	33.30%	5.49	15.11	8 in	0.48%	376.78	4.01%
B7	PARCEL NO 26	50.00%	3.64	18.74	8 in	0.48%	376.78	4.97%
SUBTOTAL	**SAS PIPE B7**	**100.00%**	**0.00**	**18.74**	**8 in**	**0.48%**	**376.78**	**4.97%**
B8	SAS PIPE B6	100.00%	10.40	10.40	8 in	0.48%	376.78	2.76%
B8	SAS PIPE B7	100.00%	18.74	29.15	8 in	0.48%	376.78	7.74%
SUBTOTAL	**SAS PIPE B8**	**100.00%**	**0.00**	**29.15**	**8 in**	**0.48%**	**376.78**	**7.74%**
B9	PARCEL NO 35	50.00%	6.77	6.77	8 in	0.48%	376.78	1.80%
SUBTOTAL	**SAS PIPE B9**	**100.00%**	**0.00**	**6.77**	**8 in**	**0.48%**	**376.78**	**1.80%**
B10	PARCEL NO 25	33.30%	5.49	5.49	8 in	0.48%	376.78	1.46%
SUBTOTAL	**SAS PIPE B10**	**100.00%**	**0.00**	**5.49**	**8 in**	**0.48%**	**376.78**	**1.46%**
B11	SAS PIPE B8	100.00%	29.15	29.15	8 in	0.48%	376.78	7.74%
B11	SAS PIPE B9	100.00%	6.77	35.92	8 in	0.48%	376.78	9.53%
B11	SAS PIPE B10	100.00%	5.49	41.41	8 in	0.48%	376.78	10.99%
B11	PARCEL NO 27	50.00%	8.49	49.90	8 in	0.48%	376.78	13.24%
B11	PARCEL NO 28	50.00%	5.49	55.39	8 in	0.48%	376.78	14.70%
B11	PARCEL NO 36	100.00%	18.23	73.62	8 in	0.48%	376.78	19.54%
B11	PARCEL NO 37	100.00%	9.56	83.18	8 in	0.48%	376.78	22.08%
B11	PARCEL NO 38	100.00%	14.63	97.82	8 in	0.48%	376.78	25.96%
B11	PARCEL NO 48	100.00%	8.66	106.48	8 in	0.48%	376.78	28.26%
B11	PARCEL NO 49	100.00%	13.98	120.47	8 in	0.48%	376.78	31.97%
SUBTOTAL	**SAS PIPE B11**	**100.00%**	**0.00**	**120.47**	**8 in**	**0.48%**	**376.78**	**31.97%**
B12	PARCEL NO 50	100.00%	13.79	13.79	8 in	0.48%	376.78	3.66%
B12	PARCEL NO 51	100.00%	8.39	22.17	8 in	0.48%	376.78	5.89%
B12	PARCEL NO 52	50.00%	8.10	30.27	8 in	0.48%	376.78	8.03%
SUBTOTAL	**SAS PIPE B12**	**100.00%**	**0.00**	**30.27**	**8 in**	**0.48%**	**376.78**	**8.03%**
B13	SAS PIPE B11	100.00%	120.47	120.47	8 in	0.48%	376.78	31.97%
B13	SAS PIPE B12	100.00%	30.27	150.74	8 in	0.48%	376.78	40.01%
B13	PARCEL NO 54	100.00%	7.62	158.36	8 in	0.48%	376.78	42.03%
B13	PARCEL NO 53	100.00%	12.82	171.17	8 in	0.48%	376.78	45.43%
B13	PARCEL NO 55	50.00%	3.81	174.98	8 in	0.48%	376.78	46.44%
SUBTOTAL	**SAS PIPE B13**	**100.00%**	**0.00**	**174.98**	**8 in**	**0.48%**	**376.78**	**46.44%**
B14	SAS PIPE B5	100.00%	339.21	339.21	12 in	0.48%	1110.87	30.54%
B14	SAS PIPE B13	100.00%	174.98	514.19	12 in	0.48%	1110.87	46.29%
B14	PARCEL NO 56	50.00%	4.02	518.21	12 in	0.48%	1110.87	46.65%
SUBTOTAL	**SAS PIPE B14**	**100.00%**	**0.00**	**518.21**	**12 in**	**0.48%**	**1110.87**	**46.65%**

B15	PARCEL NO 41	100.00%	14.34	14.34	8 in	0.48%	376.78	3.81%
B15	PARCEL NO 45	100.00%	8.84	23.17	8 in	0.48%	376.78	6.15%
B15	PARCEL NO 57	100.00%	8.07	31.24	8 in	0.48%	376.78	8.29%
B15	PARCEL NO 44	100.00%	13.51	44.76	8 in	0.48%	376.78	11.88%
SUBTOTAL	**SAS PIPE B15**	**100.00%**	**0.00**	**44.76**	**12 in**	**0.48%**	**1110.87**	**4.03%**
B16	SAS PIPE 14	100.00%	518.21	518.21	12 in	0.48%	1110.87	46.65%
B16	SAS PIPE 15	100.00%	44.76	562.96	12 in	0.48%	1110.87	50.68%
SUBTOTAL	**SAS PIPE B16**	**100.00%**	**0.00**	**562.96**	**12 in**	**0.48%**	**1110.87**	**50.68%**
END OF SECTION B				**562.96**				

CUMULATIVE FLOWS FOR BRANCH C

PIPE SEG	INFLOWS	INFLOW PERCENT	ADTL FLOW (GPM)	TOTAL FLOW (GPM)	DIA.	PIPE SLOPE	FULL PIPE FLOW (GPM)	PERCENT FULL
C1	PARCEL NO 68	50.00%	19.15	19.15	8 in	0.48%	376.78	5.08%
SUBTOTAL	**SAS PIPE C1**	**100.00%**	**0.00**	**19.15**	**8 in**	**0.48%**	**376.78**	**5.08%**
C2	PARCEL NO 52	50.00%	8.10	8.10	8 in	0.48%	376.78	2.15%
C2	PARCEL NO 64	50.00%	3.95	12.05	8 in	0.48%	376.78	3.20%
SUBTOTAL	**SAS PIPE C2**	**100.00%**	**0.00**	**12.05**	**8 in**	**0.48%**	**376.78**	**3.20%**
C3	SAS PIPE C1	100.00%	19.15	19.15	8 in	0.48%	376.78	5.08%
C3	SAS PIPE C2	100.00%	12.05	31.20	8 in	0.48%	376.78	8.28%
SUBTOTAL	**SAS PIPE C3**	**100.00%**	**0.00**	**31.20**	**8 in**	**0.48%**	**376.78**	**8.28%**
C4	PARCEL NO 64	50.00%	3.95	23.10	8 in	0.48%	376.78	6.13%
SUBTOTAL	**SAS PIPE C4**	**100.00%**	**0.00**	**23.10**	**8 in**	**0.48%**	**376.78**	**6.13%**
C5	SAS PIPE C4	100.00%	23.10	23.10	8 in	0.48%	376.78	6.13%
C5	SAS PIPE C3	100.00%	31.20	54.29	8 in	0.48%	376.78	14.41%
C5	PARCEL NO 63	100.00%	7.31	61.60	8 in	0.48%	376.78	16.35%
C5	PARCEL NO 65	100.00%	3.76	65.36	8 in	0.48%	376.78	17.35%
C5	PARCEL NO 62	100.00%	7.22	72.58	8 in	0.48%	376.78	19.26%
C5	PARCEL NO 66	100.00%	13.72	86.30	8 in	0.48%	376.78	22.90%
C5	PARCEL NO 61	100.00%	7.82	94.12	8 in	0.48%	376.78	24.98%
C5	PARCEL NO 60	66.70%	5.18	99.30	8 in	0.48%	376.78	26.35%
SUBTOTAL	**SAS PIPE C5**	**100.00%**	**0.00**	**99.30**	**8 in**	**0.48%**	**376.78**	**26.35%**
C6	PARCEL NO 60	33.30%	2.59	2.59	8 in	0.48%	376.78	0.69%
C6	PARCEL NO 59	100.00%	9.60	12.19	8 in	0.48%	376.78	3.23%
SUBTOTAL	**SAS PIPE C6**	**100.00%**	**0.00**	**12.19**	**8 in**	**0.48%**	**376.78**	**3.23%**
C7	SAS PIPE C5	100.00%	99.30	99.30	8 in	0.48%	376.78	26.35%
C7	SAS PIPE C6	100.00%	12.19	111.49	8 in	0.48%	376.78	29.59%
SUBTOTAL	**SAS PIPE C7**	**100.00%**	**0.00**	**111.49**	**8 in**	**0.48%**	**376.78**	**29.59%**
C8	PARCEL NO 58	33.30%	9.84	9.84	8 in	0.48%	376.78	2.61%
SUBTOTAL	**SAS PIPE C8**	**100.00%**	**0.00**	**9.84**	**8 in**	**0.48%**	**376.78**	**2.61%**
C9	SAS PIPE C7	100.00%	111.49	111.49	10 in	0.48%	683.14	16.32%
C9	SAS PIPE C8	100.00%	9.84	121.33	10 in	0.48%	683.14	17.76%

C9	PARCEL NO 58	33.30%	9.84	131.17	10 in	0.48%	683.14	19.20%
C9	PARCEL NO 67	100.00%	9.02	140.19	10 in	0.48%	683.14	20.52%
SUBTOTAL	**SAS PIPE C9**	**100.00%**	**0.00**	**140.19**	**10 in**	**0.48%**	**683.14**	**20.52%**
C10	SAS PIPE A9	100.00%	429.62	429.62	15 in	0.48%	2014.14	21.33%
C10	SAS PIPE B16	100.00%	562.96	992.59	15 in	0.48%	2014.14	49.28%
C10	PARCEL NO 58	66.70%	19.71	1012.30	15 in	0.48%	2014.14	50.26%
C10	PARCEL NO 67	100.00%	9.02	1021.32	15 in	0.48%	2014.14	50.71%
SUBTOTAL	**SAS PIPE C10**	**100.00%**	**0.00**	**1021.32**	**15 in**	**0.48%**	**2014.14**	**50.71%**
C11	SAS PIPE C9	100.00%	140.19	140.19	15 in	0.48%	2014.14	6.96%
C11	SAS PIPE C10	100.00%	1021.32	1161.52	15 in	0.48%	2014.14	57.67%
SUBTOTAL	**SAS PIPE C11**	**100.00%**	**0.00**	**1161.52**	**15 in**	**0.48%**	**2014.14**	**57.67%**

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