



TECHNICAL APPENDICES

LEVEL B PLAN : OCTOBER 2006

REVISED SEPTEMBER 2012

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MESA DEL SOL
ALBUQUERQUE SOUTH MESA

Level B Technical Appendices

Table of Contents

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Pages 39, 40, 41, 96, 106, and
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Level B Plan.

APPENDIX 1: ABBREVIATIONS

APPENDIX 2: SIGNAGE AND LANDSCAPE

2A	Art and Wayfinding Signage Master Plan	4
2B	Naming Convention Summary	16
2C	Landscape Plant Palette	18

APPENDIX 3: TRANSPORTATION

3A	Level A Update—Travel Demand Modeling Results for Build-Out	24
3B	Level B Street Network	34
3C	Level B Travel Demand Modeling Results for 2015 and 2025	38
3D	Intersection Laneage and Capacity for 2015, 2020, and 2025	58
3E	Off-Site Roadway Effects	67
3F	Typical Cross Sections	85

APPENDIX 4: ENVIRONMENT

4A	Stormwater Management	94
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APPENDIX 5: UTILITIES

5A	Water Supply	124
5B	Sanitary Sewer	147
5C	Dry Utilities	172
5D	Allowable Lighting Fixtures and Light Levels	179



MESA DEL SOL

ac.	acres	kV	kilovolt
ADAAG	Americans with Disabilities Act Accessibility Guidelines	LED	light emitting diode
AMAFCA	Albuquerque Metropolitan Arroyo Flood Control Authority	LEED	Leadership in Energy and Environmental Design
APE	Area of Potential Effect	max.	maximum
APS	Albuquerque Public Schools	MGD	million gallons per day
AQIA	Air Quality Impact Assessment	MCL	maximum concentration level
ARC	Architectural Review Committee	min.	minimum
CIE	Commission International de l'Éclairage	MLP	Master Lighting Plan
CO	carbon monoxide	MRCOG	Mid-Region Council of Governments
COA	City of Albuquerque	MTP	Metropolitan Transportation Plan
DRB	Design Review Board	MUCTD	Manual on Uniform Traffic Control Devices
DRIP	Distributive Retention and Infiltration Ponding	NAAQS	National Ambient Air Quality Standards
du	dwelling unit	NEC	National Electric Code
DPM	Development Process Manual	NMDOT	New Mexico Department of Transportation
EPA	U.S. Environmental Protection Agency	PAR	parabolic aluminumized reflector
EPC	Environmental Planning Commission	PCC	Planned Communities Criteria
ETC	Employee Transportation Coordinator	psi	pounds per square inch
FAA	Federal Aviation Administration	PUE	public utility eastment
FAR	floor area ratio	ROW	right of way
fc	foot-candle	R&D	research and development
FCC	Forest City Covington NM, LLC	RT	remote terminal
FHWA	Federal Highway Administration	SEO	State Engineer's Office
gpcd	gallons per capita day	SIP	site improvement plan
gpm	gallons per minute	SJC	San Juan Chama
GR	glare rating	SOV	single-occupant vehicle
HID	high intensity discharge	sq. ft.	square feet
HOA	Homeowners Association	TDM	Transportation Demand Management
HVAC	heating, ventilating and air conditioning	TMA	Transportation Management Association
ICI	industrial/commercial/institutional	UNM	University of New Mexico
IESNA	Illuminating Engineering Society of North America	VHT	vehicle hours traveled
IO	isolated occurrence	VMT	vehicle miles traveled
ITE	Institute of Transportation Engineers	WUA	Albuquerque Bernalillo County Water Utility Authority
KAFB	Kirtland Air Force Base		

Appendix 1: Abbreviations





SIGNAGE AND LANDSCAPE

LEVEL B PLAN : OCTOBER 2006

APPENDIX **2**



MESA DEL SOL

Reinforcing a Sense of Place

Signage and Landscape

2A Art and Wayfinding Signage Master Plan

2A.1 Master Plan Concept Approach

Develop an efficient, well-planned system of art, wayfinding signage and information graphics that appropriately enhances and provides relevant information to the users of Mesa del Sol. The system supports the community's overall objective of live, work, learn, play and connect, with an emphasis on the learning component, by providing valuable information on the natural resources, and sustainable qualities for the community.

2A.2 Master Plan Function

The program was developed consistent with Mesa del Sol's growth plan providing:

- a) flexibility, designed with the ability to easily modify information;
- b) durability, fabricated with sturdy, venerable materials;
- c) expandability, via an overall master plan, the system can be expanded as the community develops over time;
- d) efficiency, designed with the ability to manufacture standard components within the current City of Albuquerque Traffic Department, and its suppliers, minimizing the per unit cost.

2A.3 Master Plan Design

The approach incorporates the overall vision, "history and tradition meet the 21st century," adopting design criteria for a sustainable, 'pedestrian first' community:

- a) honoring the vistas and landscape, by reducing visual clutter;
- b) integrating with the built and natural environment; providing meaningful information about conservation, the land, history and heritage;
- c) establishing a highly defined 'sense of place'.

The program distinguishes the commercial, employment, urban, community and village centers with a conceptual thematic overlay upon which all art and wayfinding components are placed. This conceptual mosaic will create the overall graphic and thematic identity of the Mesa del Sol community.

2A.4 Master Plan Methodology

Hierarchy of Information

The program establishes a comprehensive information and theming plan which acts as an umbrella, under which the naming and identity of the individual districts and centers. Within the theming of these centers is the further naming for plazas, parks, streets, shopping areas, neighborhoods, public amenities, public destinations and schools.

This approach, of establishing a well-organized network of information, not only reinforces the unique sense of place, but also provides continuity, predictability, clarity and ultimately ease of use.

Hierarchy of Components

The items within this section are including, but not limited to the following types:

a) Art

Components which identify individual areas, centers and/or districts, as well as identifying the overall site.

A.1: Hwy Site Marker

B.1: Urban Center Markers - Retail Identification

C.1: MdS Entry Markers

D.1: District/Area Identification (Centers):

b) Wayfinding Signage

1. Vehicular - Signage components geared toward vehicular traffic, including but not limited to: directional signs, traffic safety signs, regulatory signs, parking, streetname signs and transit signs.

E.1: Vehicular Directional.

F.1: Destination Identification.

G.1: Traffic Regulatory and Safety

-
2. Pedestrian – Signage components geared toward pedestrian, bicycle and “off-road” traffic, along pedestrian corridors, public open space, parks, and view corridors, including but not limited to: directional signs, street name signs, inlaid pedestrian markers and trail information, safety and traffic signs, accessibility signs, regulatory information, transit signs, bicycle racks, and public amenities.

H.1: Orientation Maps and Kiosks

I.1: Trail Markers. (ped and bike)

J.1: Street Name Signs.

K.1: Park Identification.

L.1 Pedestrian Directional

L.2: Pedestrian Safety

M.1: Numeric Address Markers. (Commercial and Residential)

c) Information/Education

Any and all Art, Environmental Graphics, Signage and Exhibit Displays developed for the purpose of providing pertinent information to the community, including but not limited to: orientation maps, information kiosks, banners, trail information and displays, point of interest displays, inlaid trail markers, and look-out point platforms.

N.1: Information Signs

O.1: Banner Program.

P.1: Man-hole cover design

Q.1: Bicycle Rack signage

d) Other Components

Additional components including but not limited to: inlaid, individual numeric address identification; man-hole covers; fence and gate enclosures; landscape furniture; fire hydrants, street lighting, public mail-boxes, gutter and drain graphics, water tower design, transit stops, and trash receptacles.

2A.5 Master Plan Fabrication Materials

Any and all materials required for the fabrication of the Art, Wayfinding and Information components, including but not limited to:

a) Fabrication.

Brass, bronze, steel, aluminum, galvanized steel, ceramic, stacked stone, metal, stucco, tile, terra-cotta, wood, porcelain enamel, cast concrete, bricks, glass, acrylic, fiberglass, canvas, high pressure laminate, LED, neon, vinyl.

b) Lighting.

For all requirements, see Section 5.4, Lighting, and Appendix 5D, Allowable Lighting Fixtures and Lighting Levels.

c) Colors.

Red, blue, green, orange, yellow, purple, brown, black, white, and any variation of color within the entire color spectrum listed above. All color combinations to be compliance with all ADA regulations for contrast, where applicable.

2A.6 Sign Code Standards

General

The sign code is developed to prevent visual clutter that distracts or otherwise inhibits safety of commercial and business entities signage. The sign code does not apply to the established Mesa del Sol Wayfinding and Signage. The intent of this code is to encourage the use of signs that reinforce the character of the Mesa del Sol Community, and its centers, or the premises and its architectural elements. These standards are divided into sections by Centers/Districts as referenced in the 2.2 Development Standards.

These sign code standards incorporate all existing codes, and are more restrictive than the current City of Albuquerque Sign Code Regulations. Any and all signage implemented within the Mesa del Sol Community are subject to compliance by the Mesa del Sol Architectural Review Committee.

Sign Design: Signs shall be designed in a manner complimentary and compatible with the building architecture and/or the designated theme of the district and shall be clearly readable.

All signage, intended to be viewed by vehicular traffic, and/or adjacent to the roadway must be readable from a distance of 50', with a 4" character height, and provide 70% contrast between its text and background, per ADAAG.



1. *Employment Center*

The intent of these standards is to establish a consistent and clear regulation that defines a standard which informs and directs users to their destinations, provides safe and clear circulation within the center, with established guidelines and restrictions, while maintaining the thematic overlay, and character of the center.

No sign, of any kind, shall exceed a height of 10’.

All permanent freestanding or monument signs shall be a minimum height of 24”.

One wall mounted sign per street frontage. (includes wall mounted, canopy and marquee signs).

All freestanding signs and monument signs shall have a base area equal in length to the overall length of the sign, and a depth of no less than 12”.

a) Permitted Signs – On Premise

1. Wall mounted signs

- i. 1 sign per street frontage
- ii. size not to exceed 1 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
- iii. may not project more than 1’ from wall
- iv. sign must be mounted above public right-of-way.

2. Freestanding Monument Signs

- i. 1 sign per street frontage
- ii. height not to exceed 10’
- iii. sign face area not to exceed 100 sq ft

3. Canopy Signs (canopy is defined as a permanent architectural structure attached to the building façade)

- i. 1 sign per street frontage
- ii. size not to exceed 1 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
- iii. sign must be mounted above public right-of-way.

4. Marquee Signs

- i. 1 sign per street frontage
- ii. size not to exceed 1 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
- iii. sign must be mounted above public right-of-way.

5. Projecting Signs – (flag mounted)

- i. 1 sign per street frontage
- ii. size not to exceed 8 sq ft.
- iii. sign must be mounted above public right-of-way.

6. Permanent Directory Listing – Freestanding

- i. 1 sign per entrance and/or street frontage
- ii. size not to exceed 100 sq ft
- iii. must comply with Americans with Disabilities Act for contrast of type to background 70% contrast required.
- iv. must have minimum 4” character cap height if intended to be viewed by vehicular traffic, or located along roadway.
- v. must be legible from a distance of 50’

7. Joint Premise Signs

- i. 1 sign per street frontage
- ii. size not to exceed 1 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
- iii. may not project more than 1’ from wall
- iv. sign must be mounted above public right-of-way.

8. Flags

- i. only official national, state or city flags

b) Prohibited Signs

- 1. private directional signs located along public right of way
- 2. roof mounted signage
- 3. lighting signage as prohibited in lighting guidelines.
- 4. single-post, freestanding signs (popsicle signs)
- 5. off-site advertising or billboards
- 6. signs with any obscene or indecent content
- 7. signs with audible devices
- 8. political signs and placards located outside premises
- 9. flags or banners used for commercial purposes
- 10. portable signs, sandwich boards, remote signs
- 11. trailers or trailer signs
- 12. inflatable signs
- 13. signs located within site triangle
- 14. signs with “STOP”, “LOOK”, “DANGER” that are intended to attract attention, or are designed to emulate any and all MUTCD traffic and safety signage.
- 15. signs that prevent entering and exiting any door or are attached to any public utility pole or stand pipe.

c) Restricted Signs (requiring Architectural Review Committee approval)

1. Off Premise Signs

2. Temporary Signage

i. Construction and Contractor Signs

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- signs must be removed within 7 days of completion, or complete leasing.

ii. Real Estate Signs – Commercial

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 7 days of completion of sale or lease.

iii. Movie/Film Production

Any and all signs used to direct movie and film production crews to locations.

- size not to exceed 9 sq ft
- signs to be mounted to existing poles
- signs to be removed within 24 hours of completion of shoot
- signs must not obstruct traffic safety signs or impede the safe flow of traffic

iv. Subdivision Identification

- 1 sign per subdivision entrance or along street frontage if there is no entrance
- size not to exceed 16 sq ft
- height not to exceed 8'

v. Political Signage – Off Premise

- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 24 hours of official election results

vi. Event Signage

- off premise, civic, religious and public event signs containing pertinent name, direction and information.
- size not to exceed 3 sq ft.

vii. Street/Event Banners

- only banners advertising a public event and applicant must provide ARC with specific locations for review
- installation 21 days prior to event and removal within 24 hours of event closure

viii. Private Traffic Directional Signs

- signs which are necessary for the safe circulation of traffic, only.
- size not to exceed 6 sq ft
- signs shall not contain any commercial advertising
- signs must provide 70% contrast between text and background
- signs must have 4" character cap height if viewed from roadway

ix. Clocks and Thermometers

- height not to exceed 16'
- no commercial advertising unless fabricated as a part of the mechanism of the device.
- device must be fully functioning and accurate at all times

d) Exempt Signage

1. Traffic, Municipal and Safety Signage
2. Legal Information and Warnings

Any and all legal information and warning which are required for the safety of the public.



2. Highway Commercial (Corridor)

The intent of these standards is to establish a consistent and clear regulation that defines a standard which informs and directs users to their destinations, provides safe and clear circulation within the center, with established guidelines and restrictions, while maintaining the thematic overlay, and character of the center.

No sign, of any kind, shall exceed a height of 26’.

All permanent freestanding or monument signs shall be a minimum height of 24”.

One wall mounted sign per street frontage. (includes wall mounted, canopy and marquee signs).

All freestanding signs and monument signs shall have a minimum base area equal in length to one-third the overall height of the sign, and a depth of no less than 24”.

a) Permitted Signs – On Premise

1. Wall mounted signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 1.5 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
 - iii. may not project more than 1’ from wall
 - iv. sign must be mounted above public right-of-way.
2. Freestanding Monument Signs
 - i. 1 sign per street frontage
 - ii. height not to exceed 26’
 - iii. sign face area not to exceed 500 sq ft
3. Canopy Signs (canopy is defined as a permanent architectural structure attached to the building façade)
 - i. 1 sign per street frontage
 - ii. size not to exceed 1.5 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
 - iii. sign must be mounted above public right-of-way.
4. Marquee Signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 1.5 sq ft per linear foot of building façade along street frontage or 100 sq ft whichever is less
 - iii. sign must be mounted above public right-of-way.
5. Projecting Signs – (flag mounted)
 - i. 1 sign per street frontage
 - ii. size not to exceed 8 sq ft.
 - iii. sign must be mounted above public right-of-way.

6. Permanent Directory Listing – Freestanding

- 1 sign per entrance and/or street frontage
- size not to exceed 200 sq ft
- must comply with Americans with Disabilities Act for contrast of type to background 70% contrast required.
- must have minimum 4” character cap height if intended to be viewed by vehicular traffic, or located along roadway.
- must be legible from a distance of 50’

7. Joint Premise Signs

- 1 sign per street frontage
- size not to exceed 1.5 sq ft per linear foot of building façade along street frontage or 300 sq ft whichever is less
- may not project more than 1’ from wall
- sign must be mounted above public right-of-way.

8. Flags

- only official national, state or city flags

b) Prohibited Signs

1. private directional signs located along public right of way
2. roof mounted signage
3. lighting signage as prohibited in lighting guidelines.
4. single-post, freestanding signs (popsicle signs)
5. off-site advertising or billboards
6. signs with any obscene or indecent content
7. signs with audible devices
8. political signs and placards located outside premises
9. flags or banners used for commercial purposes
10. portable signs, sandwich boards, remote signs
11. trailers or trailer signs
12. inflatable signs
13. signs located within site triangle
14. signs with “STOP”, “LOOK”, “DANGER” that are intended to attract attention, or are designed to emulate any and all MUTCD traffic and safety signage.
15. signs that prevent entering and exiting any door or are attached to any public utility pole or stand pipe.

c) Restricted Signs (requiring Architectural Review Committee approval)

1. Off Premise Signs

2. Temporary Signage

i. Construction and Contractor Signs

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- signs must be removed within 7 days of completion, or complete leasing.

ii. Real Estate Signs – Commercial

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 7 days of completion of sale or lease.

iii. Movie/Film Production

Any and all signs used to direct movie and film production crews to locations.

- size not to exceed 9 sq ft
- signs to be mounted to existing poles
- signs to be removed within 24 hours of completion of shoot
- signs must not obstruct traffic safety signs or impede the safe flow of traffic

iv. Subdivision Identification

- 1 sign per subdivision entrance or along street frontage if there is no entrance
- size not to exceed 16 sq ft
- height not to exceed 8'

v. Political Signage – Off Premise

- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 24 hours of official election results

vi. Event Signage

- off premise, civic, religious and public event signs containing pertinent name, direction and information.
- size not to exceed 3 sq ft.

vii. Street/Event Banners

- only banners advertising a public event and applicant must provide ARC with specific locations for review
- installation 21 days prior to event and removal within 24 hours of event closure

viii. Private Traffic Directional Signs

- signs which are necessary for the safe circulation of traffic, only.
- size not to exceed 6 sq ft
- signs shall not contain any commercial advertising
- signs must provide 70% contrast between text and background
- signs must have 4" character cap height if viewed from roadway

ix. Clocks and Thermometers

- height not to exceed 16'
- no commercial advertising unless fabricated as a part of the mechanism of the device.
- device must be fully functioning and accurate at all times

d. Exempt Signage

1. Traffic, Municipal and Safety Signage

2. Legal Information and Warnings

Any and all legal information and warning which are required for the safety of the public.



3. Urban Center

The intent of these standards is to establish a consistent and clear regulation that defines a standard which informs and directs users to their destinations, provides safe and clear circulation within the center, with established guidelines and restrictions, while maintaining the thematic overlay, and character of the center.

No sign, of any kind, shall exceed a height of 10'.

All permanent freestanding or monument signs shall be a minimum height of 24".

One wall mounted sign per street frontage. (includes wall mounted, canopy and marquee).

All freestanding signs and monument signs shall have a base area equal in length to the signs length along its longest side, and not less than 24".

a) Permitted Signs – On Premise

1. Wall mounted signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. may not project more than 1' from wall
 - iv. sign must be mounted above public right-of-way.
2. Freestanding Monument Signs
 - i. 1 sign per street frontage
 - ii. height not to exceed 10'
 - iii. sign face area not to exceed 50 sq ft
3. Canopy Signs (canopy is defined as a permanent architectural structure attached to the building façade)
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
4. Marquee Signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
5. Projecting Signs – (flag mounted)
 - i. 1 sign per street frontage
 - ii. size not to exceed 8 sq ft.
 - iii. sign must be mounted above public right-of-way.

6. Permanent Directory Listing – Freestanding

- i. 1 sign per entrance and/or street frontage
- ii. size not to exceed 50 sq ft
- iii. 70% contrast of type to background required.
- iv. must have minimum 4" character cap height if intended to be viewed by vehicular traffic, or located along roadway.
- v. must be legible from a distance of 50'

7. Joint Premise Signs

- i. 1 sign per street frontage
- ii. size not to exceed 3% of the total building façade along street frontage
- iii. may not project more than 1' from wall
- iv. sign must be mounted above public right-of-way.

8. Flags

- i. only official national, state or city flags

b) Prohibited Signs

1. any signs or component part located within 660' of nearest edge of right-of-way of Interstate 25.
2. private directional signs located along public right of way
3. roof mounted signage
4. lighting signage as prohibited in lighting guidelines.
5. single-post, freestanding signs (popsicle signs)
6. off-site advertising or billboards
7. signs with any obscene or indecent content
8. signs with audible devices
9. political signs and placards located outside premises
10. flags or banners used for commercial purposes
11. portable signs, sandwich boards, remote signs
12. trailers or trailer signs
13. inflatable signs
14. signs located within site triangle
15. signs with "STOP", "LOOK", "DANGER" that are intended to attract attention, or are designed to emulate any and all MUTCD traffic and safety signage.
16. signs that prevent entering and exiting any door or are attached to any public utility pole or stand pipe.

c) Restricted Signs (requiring Architectural Review Committee approval)

1. Off Premise Signs

2. Temporary Signage

i. Construction and Contractor Signs

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- signs must be removed within 7 days of completion, or complete leasing.

ii. Real Estate Signs – Commercial

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 7 days of completion of sale or lease.

iii. Movie/Film Production

Any and all signs used to direct movie and film production crews to locations.

- size not to exceed 9 sq ft
- signs to be mounted to existing poles
- signs to be removed within 24 hours of completion of shoot
- signs must not obstruct traffic safety signs or impede the safe flow of traffic

iv. Subdivision Identification

- 1 sign per subdivision entrance or along street frontage if there is no entrance
- size not to exceed 16 sq ft
- height not to exceed 8'

v. Political Signage – Off Premise

- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 24 hours of official election results

vi. Event Signage

- off premise, civic, religious and public event signs containing pertinent name, direction and information.
- size not to exceed 3 sq ft.

vii. Street/Event Banners

- only banners advertising a public event and applicant must provide ARC with specific locations for review
- installation 21 days prior to event and removal within 24 hours of event closure

viii. Private Traffic Directional Signs

- signs which are necessary for the safe circulation of traffic, only.
- size not to exceed 6 sq ft
- signs shall not contain any commercial advertising
- signs must provide 70% contrast between text and background
- signs must have 4" character cap height if viewed from roadway

ix. Clocks and Thermometers

- height not to exceed 16'
- no commercial advertising unless fabricated as a part of the mechanism of the device.
- device must be fully functioning and accurate at all times

d) Exempt Signage

1. Traffic, Municipal and Safety Signage

2. Legal Information and Warnings

Any and all legal information and warning which are required for the safety of the public.



4. Community Center

The intent of these standards is to establish a consistent and clear regulation that defines a standard which informs and directs users to their destinations, provides safe and clear circulation within the center, with established guidelines and restrictions, while maintaining the thematic overlay, and character of the center.

No sign, of any kind, shall exceed a height of 8'.

All permanent freestanding or monument signs shall be a minimum height of 24".

One wall mounted sign per street frontage. (includes wall mounted, canopy and marquee).

All freestanding signs and monument signs shall have a base area equal in length to the signs length along its longest side, and not less than 24".

a) Permitted Signs – On Premise

1. Wall mounted signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. may not project more than 1' from wall
 - iv. sign must be mounted above public right-of-way.
2. Freestanding Monument Signs
 - i. 1 sign per street frontage
 - ii. height not to exceed 8'
 - iii. sign face area not to exceed 50 sq ft
3. Canopy Signs (canopy is defined as a permanent architectural structure attached to the building façade)
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
4. Marquee Signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
5. Projecting Signs – (flag mounted)
 - i. 1 sign per street frontage
 - ii. size not to exceed 8 sq ft.
 - iii. sign must be mounted above public right-of-way.

6. Permanent Directory Listing – Freestanding

- i. 1 sign per entrance and/or street frontage
- ii. size not to exceed 50 sq ft
- iii. 70% contrast of type to background required.
- iv. must have minimum 4" character cap height if intended to be viewed by vehicular traffic, or located along roadway.
- v. must be legible from a distance of 50'

7. Joint Premise Signs

- i. 1 sign per street frontage
- ii. size not to exceed 3% of the total building façade along street frontage
- iii. may not project more than 1' from wall
- iv. sign must be mounted above public right-of-way.

8. Flags

- i. only official national, state or city flags

b) Prohibited Signs

1. private directional signs located along public right of way
2. roof mounted signage
3. lighting signage as prohibited in lighting guidelines.
4. single-post, freestanding signs (popsicle signs)
5. off-site advertising or billboards
6. signs with any obscene or indecent content
7. signs with audible devices
8. political signs and placards located outside premises
9. flags or banners used for commercial purposes
10. portable signs, sandwich boards, remote signs
11. trailers or trailer signs
12. inflatable signs
13. signs located within site triangle
14. signs with "STOP", "LOOK", "DANGER" that are intended to attract attention, or are designed to emulate any and all MUTCD traffic and safety signage.
15. signs that prevent entering and exiting any door or are attached to any public utility pole or stand pipe.

c) Restricted Signs (requiring Architectural Review Committee approval)

1. Off Premise Signs

2. Temporary Signage

i. Construction and Contractor Signs

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- signs must be removed within 7 days of completion, or complete leasing.

ii. Real Estate Signs – Commercial

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 7 days of completion of sale or lease.

iii. Movie/Film Production

Any and all signs used to direct movie and film production crews to locations.

- size not to exceed 9 sq ft
- signs to be mounted to existing poles
- signs to be removed within 24 hours of completion of shoot
- signs must not obstruct traffic safety signs or impede the safe flow of traffic

iv. Subdivision Identification

- 1 sign per subdivision entrance or along street frontage if there is no entrance
- size not to exceed 16 sq ft
- height not to exceed 8'

v. Political Signage – Off Premise

- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 24 hours of official election results

vi. Event Signage

- off premise, civic, religious and public event signs containing pertinent name, direction and information.
- size not to exceed 3 sq ft.

vii. Street/Event Banners

- only banners advertising a public event and applicant must provide ARC with specific locations for review
- installation 21 days prior to event and removal within 24 hours of event closure

viii. Private Traffic Directional Signs

- signs which are necessary for the safe circulation of traffic, only.
- size not to exceed 6 sq ft
- signs shall not contain any commercial advertising
- signs must provide 70% contrast between text and background
- signs must have 4" character cap height if viewed from roadway

ix. Clocks and Thermometers

- height not to exceed 16'
- no commercial advertising unless fabricated as a part of the mechanism of the device.
- device must be fully functioning and accurate at all times

d) Exempt Signage

1. Traffic, Municipal and Safety Signage

2. Legal Information and Warnings

Any and all legal information and warning which are required for the safety of the public.



5. Village Centers

The intent of these standards is to establish a consistent and clear regulation that defines a standard which informs and directs users to their destinations, provides safe and clear circulation within the center, with established guidelines and restrictions, while maintaining the thematic overlay, and character of the individual village centers.

No sign, of any kind, shall exceed a height of 8’.

All permanent freestanding or monument signs shall be a minimum height of 24”.

One wall mounted sign per street frontage. (includes wall mounted, canopy and marquee).

All freestanding signs and monument signs shall have a base area equal in length to the signs length along its longest side, and not less than 18”.

a) Permitted Signs – On Premise

1. Wall mounted signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 2% of the total building façade along street frontage
 - iii. may not project more than 4’ from wall
 - iv. sign must be mounted above public right-of-way.
2. Freestanding Monument Signs
 - i. 1 sign per street frontage
 - ii. height not to exceed 8’
 - iii. sign face area not to exceed 25 sq ft
3. Canopy Signs (canopy is defined as a permanent architectural structure attached to the building façade)
 - i. 1 sign per street frontage
 - ii. size not to exceed 2% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
4. Marquee Signs
 - i. 1 sign per street frontage
 - ii. size not to exceed 3% of the total building façade along street frontage
 - iii. sign must be mounted above public right-of-way.
5. Projecting Signs – (flag mounted)
 - i. 1 sign per street frontage
 - ii. size not to exceed 8 sq ft.
 - iii. sign must be mounted above public right-of-way.

6. Permanent Directory Listing – Freestanding

- i. 1 sign per entrance and/or street frontage
- ii. size not to exceed 25 sq ft
- iii. 70% contrast of type to background required.
- iv. must have minimum 4” character cap height if intended to be viewed by vehicular traffic, or located along roadway.
- v. must be legible from a distance of 50’

7. Joint Premise Signs

- i. 1 sign per street frontage
- ii. size not to exceed 2% of the total building façade along street frontage
- iii. may not project more than 4’ from wall
- iv. sign must be mounted above public right-of-way.

8. Flags

- i. only official national, state or city flags

b) Prohibited Signs

1. private directional signs located along public right of way
2. roof mounted signage
3. lighting signage as prohibited in lighting guidelines.
4. single-post, freestanding signs (popsicle signs)
5. off-site advertising or billboards
6. signs with any obscene or indecent content
7. signs with audible devices
8. political signs and placards located outside premises
9. flags or banners used for commercial purposes
10. portable signs, sandwich boards, remote signs
11. trailers or trailer signs
12. inflatable signs
13. signs located within site triangle
14. signs with “STOP”, “LOOK”, “DANGER” that are intended to attract attention, or are designed to emulate any and all MUTCD traffic and safety signage.
15. signs that prevent entering and exiting any door or are attached to any public utility pole or stand pipe.

c) Restricted Signs (requiring Architectural Review Committee approval)

1. Off Premise Signs

2. Temporary Signage

i. Construction and Contractor Signs

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- signs must be removed within 7 days of completion, or complete leasing.

ii. Real Estate Signs – Commercial

- 1 sign per street frontage of developed premises
- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 7 days of completion of sale or lease.

iii. Movie/Film Production

Any and all signs used to direct movie and film production crews to locations.

- size not to exceed 9 sq ft
- signs to be mounted to existing poles
- signs to be removed within 24 hours of completion of shoot
- signs must not obstruct traffic safety signs or impede the safe flow of traffic

iv. Subdivision Identification

- 1 sign per subdivision entrance or along street frontage if there is no entrance
- size not to exceed 16 sq ft
- height not to exceed 8'

v. Political Signage – Off Premise

- size not to exceed 16 sq ft
- height not to exceed 8'
- sign must be removed within 24 hours of official election results

vi. Event Signage

- off premise, civic, religious and public event signs containing pertinent name, direction and information.
- size not to exceed 3 sq ft.

vii. Street/Event Banners

- only banners advertising a public event and applicant must provide ARC with specific locations for review
- installation 21 days prior to event and removal within 24 hours of event closure

viii. Private Traffic Directional Signs

- signs which are necessary for the safe circulation of traffic, only.
- size not to exceed 6 sq ft
- signs shall not contain any commercial advertising
- signs must provide 70% contrast between text and background
- signs must have 4" character cap height if viewed from roadway

ix. Clocks and Thermometers

- height not to exceed 16'
- no commercial advertising unless fabricated as a part of the mechanism of the device.
- device must be fully functioning and accurate at all times

d) Exempt Signage

1. Traffic, Municipal and Safety Signage

2. Legal Information and Warnings

Any and all legal information and warning which are required for the safety of the public.



2B Naming Convention Summary

2B.1 Guiding Principles for Naming

Following is a list of guiding principles for the development of the naming convention recommendations:

Consistency – logic and flow in programming/sequencing

User-First – focus on people perception and use

Authenticity – reinforce sense of place, history and heritage

Relevance – appropriate and supportive of overall theme of project

Voice – consistency in language, expression

Flow – mellifluous – easy to say and pronounce (rolls off tongue)

Specifics – full proper names should be avoided, except in special cases

Brevity – short names (less than 20 characters) are preferable

Cohesion – cohesive naming by “areas”, sections within major arterials, etc.

Continuity – maintain street name for entire length of street

Thematics – easy to identify name groups where appropriate

Framework – employ a sound, logical and easy to implement system throughout area(s)

Recall – use all guidelines to maximize ease of recognition and recall

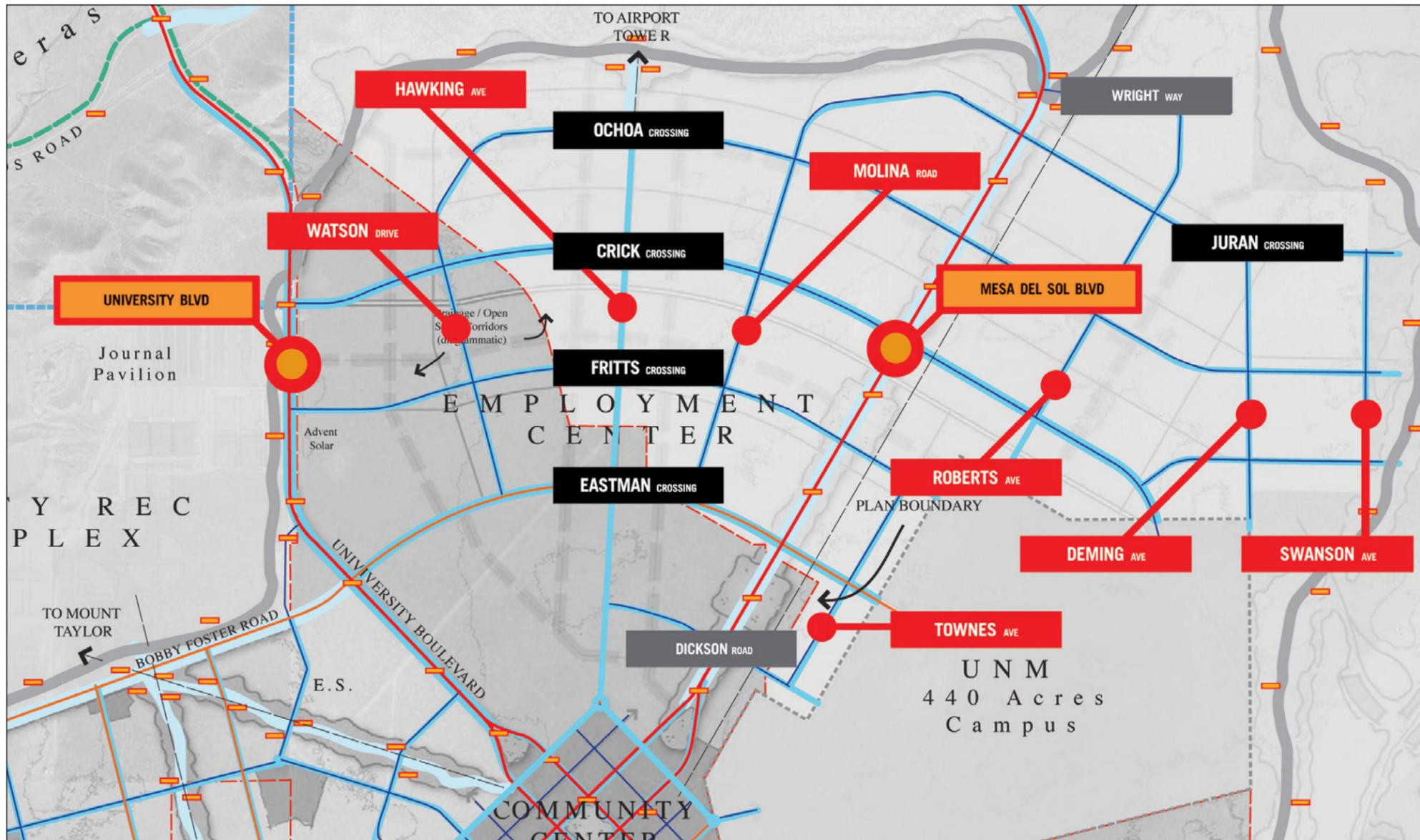
The program establishes a comprehensive information and theming plan which acts as an umbrella, under which the naming and identity of the individual districts and centers are referenced. The naming convention distinguishes the Commercial, Employment, Urban, Community and Village Centers with a conceptual thematic overlay and within the theming of these centers, is the further naming for plazas, parks, streets, shopping areas, neighborhoods, public amenities, public destinations and schools.

2B.2 Street Name Designation

1. Boulevards will remain as designated.
2. East/West streets will be called Crossings.
3. North/South streets will be called Pasillos.
4. All other roads will be named to support area thematics.

2B.3 Employment Center Street Naming – Specific

See Figure 2B-1.



**EMPLOYMENT CENTER
STREET NAMING**

Figure 2B-1



2C Plant Palette

The plant palette at Mesa del Sol is comprised primarily of regionally native plants that will be used to reinforce the sense of place, re-establish plant and animal habitat, and create beautiful, comfortable places. Using native grasses will help celebrate the high desert grassland location, and using other plants native to the region will serve the interests of sustainability by reducing requirements for water, soil amendments and fertilizer.

The list of plants is large and includes both native and non-native plants. This broad listing of plants reflects the wide variety of project types that might be developed within the limits of the Level B Plan and a willingness to broaden the immediate plant palette on the site to include plants from other elevations and settings. In order to emphasize the use of regionally native plants in Mesa del Sol landscapes, the listing of plants is divided into two categories—Regionally Native Plants and Non-native-/Ornamental Plants. While the distinctions will be debated and the listings will change over time, the intent is to initially distinguish the two groups of plants so that at Level C design parameters may be set that will mandate the primary use of regionally native plants.



Why use ornamental plants at all? Non-natives or ornamental plants have been included in the plant palette for several reasons.

- a) *Availability and Plant Sizes:* The development of Mesa del Sol will require large amounts of landscape and irrigation materials including native plant material, seeding, mulch and organic soil amendments. There may be a period of time at the beginning of infrastructure development, where native plant materials may not be immediately available in the volumes necessary. Mesa del Sol is working with local and regional green industry representatives to prepare for the impending demands. Ideally, within 10 years, the New Mexico green industry will have made the capital improvements necessary to become the primary suppliers and installers of plant materials and landscape products for Mesa del Sol. In the interim, plant sizes will vary by genus and species and availability. In general, the plant sizes will be larger in high visibility areas where specified plants are available and will do better when planted in larger sizes.
- b) *Market and Aesthetics:* A 100% native plant landscape at Mesa del Sol would be a very large departure from an aesthetic that most people are accustomed to. Some of the plants that people love, are familiar with and value are not native to this area. However, these plants (fruit trees, hollyhocks, lilacs, roses, iris...) are part of New Mexico's history, and should have a place in the development of Mesa del Sol. The limited use of these types of non-native plants will bring a familiarity and intimacy to the developed landscape at Mesa del Sol.
- c) *Landscape Types:* The configuration and types of plants applied in each landscape design will vary by project type creating a rich level of diversity. For example, the material that a new resident may wish to plant in their yard may vary greatly from the plants used in large commercial installations or public parks. Personal creative expression in Mesa del Sol's residential landscapes is encouraged. A larger palette will help achieve a rich level of diversity and complexity in the residential streetscape. Non-native landscapes also have their place – multi-purpose fields located in neighborhood parks and comprised of durable turf serve as community gathering places and recreation centers. Water is a precious resource, and when applied to these high water use oasis zones, every drop benefits the community.

In addition, the organization and content of the plants lists address the following:

- a) *Street Trees*: Street trees have been listed separately from the general tree listing to ensure that we may use species of trees that are not often used as street trees in our area. Using multi-trunk and shorter desert trees in street situations is relatively common in other areas of the Southwest. In order to reinforce the horizontality and desert image of Mesa del Sol, they will also be used here.

Requirements for street trees shall be per the Albuquerque Street Tree Ordinance with the following exceptions:

1. Street trees shall be required along Boulevards, Avenues and Connector streets except where adjacent to or across the street from open space.
2. Where high levels of pedestrian activity are anticipated, paving and trees in grates may be substituted for larger landscape areas.
3. Tree grate and tree planter areas must be at least 36 SF in area.
4. Street trees may include native and non-traditional species.
5. To create cohesive streetscapes, a single species of street tree is encouraged within each block or series of blocks.
6. To avoid monocultures that may be susceptible to disease, a variety of street trees shall be used across the entire development.

- b) *Invasive Plants*: The proposed plant palette avoids the use of plants that are invasive in the area. Broom Snakeweed, Russian Thistle and Fireweed can be found over large areas of Mesa del Sol. Reestablishing native grasslands in areas of open space and new development will require the creation of a removal program for these non-native plants. The plant palette for new development is dominated by regionally native plant materials, and the ornamental (non-native) plants that have been included are not considered invasive here.

- c) *Native Junipers*: One-seed Juniper is perhaps the only tree that currently exists on the project site. Rocky Mountain Juniper and Alligator Juniper are native to this area, and Arizona Cypress is a regionally native tree. Understanding that there is concern about the allergenic potential of these trees and they have been informally or formally regulated in the past, their use, in moderation, is requested at Mesa del Sol because they are well suited to the site conditions and will look and feel appropriate in the desert grassland setting.

- d) *Turf*: Turf blends in the form of sod, plugs or seed, are allowed at Mesa del Sol. However, the ability to use turf will depend on several factors:

1. Grass type: High or medium-water use turf is not allowed anywhere other than parks and developed open space areas unless irrigated with a reliable source of non-potable water. Low-water use turf is allowed in all Districts.
2. Irrigation: All turf irrigation must be designed to accommodate non-potable water, with a goal of using only non-potable water for turf irrigation within five years. Development of irrigation methods other than spray, shall be investigated in an effort to reduce the potential for water waste.



Regionally Native Plants

Street Trees

Acacia greggii / Catclaw Acacia
Cercis sp. / Redbud
Chilopsis linearis var. / Desert Willow
Forestiera neomexicana / New Mexico Olive
Prosopis glandulosa / Honey Mesquite
Prosopis pubescens / Screwbean Mesquite
Quercus fusiformis / Escarpment Live Oak
Quercus macrocarpa / Bur Oak
Quercus muhlenbergii / Chinquapin Oak
Quercus texana / Texas Red Oak
Rhus lanceolata / Prairie Flameleaf Sumac
Robina pseudoacacia / Black Locust
Robinia x ambigua / Idaho Locust
Sambucus mexicanus / Mexican Elder
Sapindus drummondii / Soapberry
Sophora secundiflora / Texas Mountain Laurel

Other Trees (not for use as Street Trees)

Juglans major / Arizona Walnut
Platanus wrightii / Arizona Sycamore
Populus acuminata / Lanceleaf Cottonwood
Populus fremontii wislizenii "Rio Grande"
Quercus arizonica / Arizona White Oak
Quercus gambelii / Gambel Oak
Quercus turbinella / Shrub Live Oak
Robina neomexicana / New Mexico Locust
Salix exigua / Coyote Willow

Evergreen Trees

Cupressus arizonica var. / Arizona Cypress
Juniperus deppeana / Alligator Juniper
Juniperus monosperma / One-seed Juniper
Juniperus scopulorum / Rocky Mountain Juniper
Pinus ponderosa / Ponderosa Pine
Pinus edulis / Piñon

Deciduous Shrubs

Amelanchier utahensis / Utah Serviceberry
Anisacanthus thuberii / Desert Honeysuckle
Caesalpinia gilliesii / Bird of Paradise
Chamaebatiaria millefolium / Fernbush
Chrysothamnus nauseosus var. *nauseosus* / Dwarf Chamisa
Chrysothamnus nauseosus / Chamisa
Dalea capitata / Sierra Gold Dalea
Dalea formosa / Feather Dalea
Fallugia paradoxa / Apache Plume
Fendlera rupicola / Cliff Fendlerbush
Leucophyllum sp. / Leucophyllum
Potentilla frusticosa / Shrubby Cinquefoil
Prunus besseyi / Western Sand Cherry
Psoralea scoparius / Broom Dalea
Rhus glabra / Scarlet Sumac
Rhus microphylla / Little Leaf Sumac
Rhus trilobata / Three Leaf Sumac
Rosa sp. / Rose
Salvia chamaedryoides / Mexican Blue Sage
Salvia greggii / Cherry Sage

Evergreen/Ever-gray Shrubs

Arctostaphylos pungens / Pointleaf Manzanita
Artemisia filifolia / Threadleaf Sage
Artemisia frigida / Fringed Sage
Artemisia ludoviciana / Prairie Sage
Artemisia tridentata / Bigleaf Sage
Atriplex canescens / Fourwing Saltbush
Baccharis sp. / Broom
Berberis haematocarpa / Algerita
Ceratoides lanata / Winterfat
Cercocarpus montanus / Mountain Mahogany
Ericameria larcifolia / Turpentine Bush
Larrea tridentata / Creosotebush
Purshia mexicana / Cliffrose
Vauquelinia californica / Arizona Rosewood

Accents/Succulents

Agave sp. / Agave
Dasyllirion wheeleri / Sotol
Dasyllirion texanum / Green Desert Spoon
Ephedra viridis / Mormon Tea
Hesperaloe parviflora var. / Hesperaloe
Nolina microcarpa / Beargrass
Nolina texana / Beargrass
Opuntia engelmannii / Engelmann Prickly Pear
Opuntia imbricata / Cholla
Opuntia linguiformis / Cow Tongue Prickly Pear
Opuntia macrocentra / Purple Prickly Pear
Opuntia Phaeacantha / Prickly Pear
Yucca sp. / Yucca



Grasses

Andropogon barbinodis / Cane Bluestem
Andropogon gerardii / Big Bluestem
Andropogon saccharoides / Silver Beardgrass
Andropogon smithii / Western Wheat
Aristida purpurea / Purple Three Awn
Bouteloua gracilis / Blue Grama Grass
Bouteloua curtipendula / Sideoats Grama
Buchloe dactyloides / Buffalograss
Deschampsia caespitosa / Tufted Hair Grass
Distichlis stricta / Saltgrass
Hilaria jamesii / Galleta
Muhlenbergia emersleyi El Toro / Bull Grass
Muhlenbergia capillaries "Regal Mist"
Muhlenbergia dubia / Pine Muhley
Muhlenbergia linheimeri Autumn Glow
Muhlenbergia rigens / Deer Grass
Muhlenbergia rigida / Nashville
Nassella tenuissima / Threadgrass
Oryzopsis hymenoides / Indian Ricegrass
Panicum virgatum var. / Switch Grass
Schizachrium scoparium / Little Bluestem
Sorastrum nutans / Indiangrass
Sporobolus airoides / Alkali Sacaton
Sporobolus crytandrus / Sand Dropseed
Sporobolus wrightii / Giant Sacaton
Stipa comata / Needle-and-thread Grass

Perennials

Abronia fragrans / Sand Verbena
Achillea sp. / Yarrow
Agastache sp. / Hyssop
Anemopsis californica / Yerba Mansa
Aquilegia sp. / Columbine
Argemone pleiacantha / Prickly Poppy
Baileya multiradiata / Desert Marigold
Berlandiera lyrata / Chocolate Flower
Callirhoe involucrate / Poppy Mallow
Calylophus hartwegii / Sundrops
Castilleja integra / Indian Paintbrush
Dyssodia sp. / Dyssodia
Echinacea purpurea / Purple Coneflower
Euphorbia sp. / Spurge
Gaillardia aristata / Blanket Flower
Gaura lindheimeri var. / Gaura
Helianthus maximiliani / Maximilian Sunflower
Hymenoxys acaulis / Angelita Daisy
Ipomoea leptophylla / Bush Morningglory
Iris var. / Iris
Liatris punctata / Gayfeather
Linum lewisii / Blue Flax
Machaeranthera bigelovii / Purple Aster
Melampodium leucanthum / Blackfoot Daisy
Mirabilis multiflora / Giant Four O'Clock

Monarda sp. / Beebalm

Oenothera sp. / Primrose

Penstemon sp. / Penstemon

Petalostemum purpureum / Purple Prairie Clover

Poliomintha incana / Mexican Oregano

Poliomintha maderensis / Lavender Spice

Psilostrophe tagetina / Paperflower

Ratibida columnifera / Coneflower

Rudbeckia sp. / Rudbeckia

Salvia sp. / Sage

Sedum sp. / Sedum

Senecio longilobus / Silver Groundsel

Sphaeralcea sp. / Globemallow

Thelesperma ambigua / Hopi Tea

Verbena sp. / Verbena

Viguiera sp. / Goldeneye

Wyethia scabra / Desert Mule's Ear

Zauschneria sp. / Hummingbird Bush

Zinnia grandiflora / Desert Zinnia

Vines

Clematis ligusticifolius / Virgin's Bower





Non-native / Ornamental Plants

Street Trees

- Albizia julibrissin* Rosea / Mimosa
- Chitalpa tashkentensis* / Chitalpa
- Fraxinus angustifolia* “Raywood” / Raywood Ash
- Fraxinus velutina* “Modesto” / Modesto Ash
- Gleditsia triacanthos inermis* var. / Honeylocust
- Koelreuteria paniculata* / Golden Rain Tree
- Liquidambar styraciflua* / Sweet Gum
- Pistacia chinensis* / Chinese Pistache
- Quercus schumardii* / Schumard Oak
- Sophora japonica* / Japanese Pagoda Tree
- Vitex agnus-castus* / Chaste Tree
- Zizyphus jujuba* / Jujube

Other Trees (not for use as Street Trees)

- Carya illinoensis* / Pecan
- Catalpa speciosa* / Catalpa

Fruit Trees

- Lagerstroemia* sp. / Crape Myrtle

Evergreen Trees

- Cedrus* sp. / Cedar
- Cupressocyparis leylandii* / Leyland Cypress
- Juniperus virginiana* var. / Juniper
- Pinus aristata* / Bristlecone Pine
- Pinus nigra* / Austrian Pine
- Pinus pinea* / Italian Stone Pine
- Pinus eldarica* / Afghan Pine
- Thuja* sp. / Arborvitae

Deciduous Shrubs

- Buddleia* sp. / Butterfly Bush
- Caryopteris clandonensis* var. / Blue Mist Spirea
- Cytisus* sp. / Broom
- Genista* sp. / Broom
- Hibiscus* ‘Moy Grande’ / Moy Grande Hibiscus
- Syringa* sp. / Lilac

Evergreen/Ever-gray Shrubs

- Artemisia caucasica* / Silver Spreader
- Artemisia pontica* / Roman Wormwood
- Artemisa* Powis Castle / Powis Castle Sage
- Atriplex gardneri* / Gardner Saltbush
- Juniperus* sp. / Juniper
- Pinus mugo mugo* / Dwarf Mugo Pine
- Rhus ovata* / Sugar Bush
- Rosmarinus* sp. / Rosemary
- Santolina* sp. / Santolina

Accents/Succulents

Grasses

- Calamagrotis x acutiflora* “Karl Foerster”
- Cynodon dactylon* / Bermuda Grass
- Festuca* sp. / Fescue
- Helictotrichon sempervirens* / Blue Avena Grass
- Miscanthus sinensis* var. / Maiden Hair Grass
- Pennisetum* sp. / Fountain Grass

Perennials

- Alcea rosea* var. / Hollyhock
- Bulb Flowers
- Centhranthus ruber* / Jupiter’s Beard
- Cerastigma plumbaginoides* / Dwarf Plumbago
- Coreopsis* sp. / Coreopsis
- Delosperma* sp. / Iceplant
- Hemerocallis* sp. / Daylily
- Lavendula* sp. / Lavender
- Nepeta* sp. / Catmint
- Teucrium* sp. / Germander
- Thymus* sp. / Thyme
- Veronica* sp. / Speedwell
- Viola* sp. /Violet

Vines

- Campsis radicans* / Trumpet Vine
- Gelsemium sempervirens* / Carolina Jessamine
- Hedera helix* / English Ivy
- Lonicera* sp. / Honeysuckle
- Parthenocissus quinquefolia* / Virginia Creeper
- Parthenocissus tricuspidata* / Boston Ivy
- Rosa Banksiae* var. / Lady Bank’s Rose
- Vitis* sp. / Grape
- Wisteria sinensis* / Chinese Wisteria



TRANSPORTATION

LEVEL B PLAN : OCTOBER 2006

APPENDIX **3**



MESA DEL SOL

A Multi-Modal System

Transportation

3A Level A Update

3A.1 Correlation with Level A Transportation Plan

In accordance with the Planned Communities Criteria, the first step in the Level B planning process is to review the correlation with the Level A Plan. Relative to Transportation, fairly significant changes have taken place in land use, street network layout, and connections with off-site roadways since the Level A Community Master Plan was issued in June 2005, and since an Amendment to Technical Appendix F—Transportation was issued in January 2006. The following summarizes the major changes that have occurred in the continued development of Mesa del Sol planning, in reaction to market conditions and opportunities, and in response to comments received during reviews of the Level A document.

3A.1.1 Land Use Modifications from Level A

The following changes to Land Use have occurred and been incorporated into the Level B Plan:

- Designation of an Active Adult Community, with the effect of converting 500 acres of higher density (approximately 7 DU's/acre) residential use to lower density (approximately 4 DU's/acre) "active adult" or retirement community use.
- Moving of Village Center One from the former location along the north boundary of the site adjacent to Bobby Foster Road to a new location centered on Mesa del Sol Boulevard, located at the edge of the escarpment, just east of the Urban Center.
- Revisions to the proposed location of schools in reaction to other changes in land use and street configuration.

3A.1.2 Street Network Modifications from Level A

The following changes to the Street Network have occurred and been incorporated into the Level B Plan. All of these streets are shown in Figure 3-1, Auto and Transit Circulation, in the Level B Plan.

- University Boulevard, as the primary north-south roadway entering the Community Center, has been shifted from a location within the Employment Center to a new location on the westerly boundary of the site and edge of the Employment Center, adjacent to the Bernalillo County Recreation Complex. (This change was made due to legal concerns and commitments made in previous agreements.)

- With the shift to the location of University Blvd., the orientation of the Community Center was changed to a more northwest-southeast orientation in accordance with the new alignment of University Blvd.
- With the shift to University Blvd. and the orientation of the Community Center, the alignment of Mesa del Sol Blvd. east of the Community Center has been changed to a route that parallels a previously planned open space corridor. Mesa del Sol Blvd. will continue directly to Los Picaros Road, thus providing somewhat better continuity and circulation than the Level A alignment.
- Various connector roadways have been realigned in response to the major changes to the overall street grid described above.

3A.1.3 Connections to Off-Site Roadway Network

The Mesa del Sol circulation system will connect to I-25 at the four locations previously shown in the Level A Master Plan: (1) at the existing Broadway / NM 47 interchange, (2) at a new interchange proposed for Mesa del Sol Boulevard, (3) at a new interchange proposed for Bobby Foster Road, and (4) at the existing interchange with Rio Bravo Boulevard. The connection to Broadway / NM 47 has been modified from that previously shown in the Level A Plan to add direct access to I-25 / Broadway / NM 47 via added ramps connecting internal boulevards and avenues directly with the interchange.

The Mesa del Sol circulation system will also connect to the off-site transportation network at three new locations that have been added since the release of the Level A Master Plan, two of which were previously described in the Amendment to Technical Appendix F—Transportation. These locations are as follows:

- The westerly extension of an east-west avenue from the portion of the site south of Mesa del Sol Blvd. crossing I-25, via a new underpass or overpass, terminating at Broadway (labeled as Avenue "A") shown on Figure 3-1 in the Level B Plan.
- The addition of a connecting roadway from Bobby Foster Road over I-25 via a new overpass structure terminating at Broadway, directly opposite existing Desert Road / NM 500 (labeled as Avenue "D") shown on Figure 3-1 in the Level B Plan.
- The northerly extension of a north-south roadway from the Employment Center, directly intersecting with Los Picaros Road and Ira Sprecher Road, providing a more direct link to KAFB and providing alternate access to the University Blvd. corridor, also shown on Figure 3-1 in the Level B Plan.

3A.1.4 Comparisons of Traffic Generation and Distribution

Overall traffic volumes at Build-Out were modeled and shown in the Level A Plan, and included in Appendix F-3 of the Level A Plan dated June 2005. Figure F-3-8 of Appendix F-3 illustrated the forecast Average Daily Traffic Volumes (ADT) associated with each of the planned streets within Mesa del Sol and existing or proposed roadways surrounding Mesa del Sol. These volumes were based on the street network as proposed at that time. As described above, the street network has been modified with significant new additions made to the network that have had the beneficial effect of distributing traffic volumes onto additional roadways, generally reducing the projected traffic on the roadways connecting the Mesa del Sol street network with off-site roadways. (One exception to these reductions is Bobby Foster Road, as it leaves the development and escarpment. At this location, traffic on Bobby Foster Road is predicted to increase from 47,800 vehicles/day to 52,700 vehicles/day, an increase of 4,900 vehicles/day, or 10%. This increase is likely due to the inclusion of "Avenue D" as an additional off-site connection, accessed from Bobby Foster Road.)

The following Table 3A-1 shows the forecast Average Daily Traffic comparison between the Level A Plan and this Level B Plan. This comparison is made at a theoretical "screen-line" that represents traffic entering and exiting the development just below the edge of the escarpment. Overall traffic volume at the time of the Level A Plan was 199,600 vehicles/day; 197,500 vehicles/day are now forecast with this Level B Plan. This overall number is within 1% of the original forecast—no significant changes have taken place to the overall forecasts for land use and traffic at build-out.

3A.1.5 Travel Demand Modeling at Build-Out

The following figures, Figures 3A-1 to 3A-8, represent an update to the overall Travel Demand Modeling done for Mesa del Sol at Build-Out. The Methodology employed here is the same as that used in Level A analysis, and as described in Technical Appendix F—Transportation. We have included a forecast of the Average Daily Traffic at Build-Out, along with forecasts of the AM and PM peak hour traffic volumes. With the assumptions for laneage and these traffic forecasts, level of service deficiencies for the AM and PM peak hours were also analyzed and identified. Off-site capacity deficiencies are addressed in Appendix 3E. The few on-site capacity deficiencies within Mesa del Sol (Bobby Foster Road and various streets within the Community Center area) are primarily a function of the assumptions for street laneage as modeled. These will be addressed in greater detail through more site specific intersection capacity analyses that will be performed for Level C Plans and for site planning.

Table 3A-1 Screenline Comparison of Build-Out Traffic Volumes and Distribution

Location At Escarpment	Average Daily Traffic (ADT) – Vehicles/Day	
	Build-Out Scenario Level A Plan	Build-Out Scenario Level B Plan (Net "E")
University Blvd..... east of Urban Center	14,300	16,100
Avenue "A"	0	11,700
Mesa del Sol Blvd.....	58,000	45,400
Bobby Foster Road	47,800	52,700
University Blvd..... South of Los Picaros	62,900	39,200
"Avenue 32" / Tower Road	0	18,000
Los Picaros North of Mesa del Sol Blvd.....	16,600	14,400
Totals	199,600	197,500

Note: Total Level B volume forecast is within 1% of forecast Level A volume

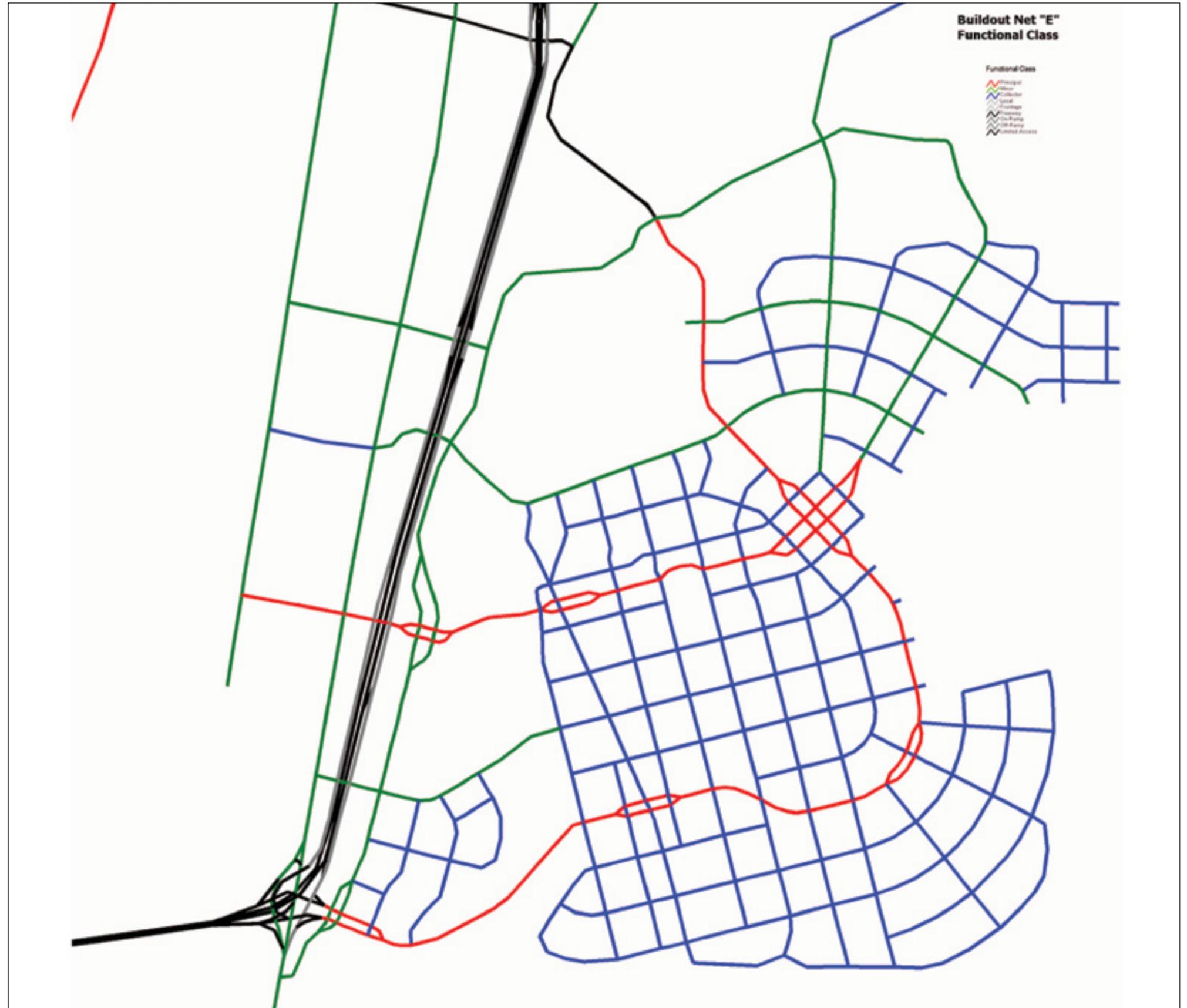


**FUNCTIONAL
CLASSIFICATION
BUILDOUT**

Figure 3A-1

Legend

-  Principal
-  Minor
-  Collector
-  Local
-  Frontage
-  Freeway
-  On-Ramp
-  Off-Ramp
-  Limited Access

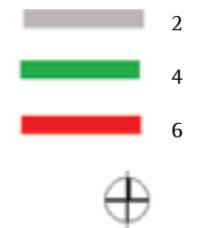




**NUMBER OF LANES
BUILDOUT**

Figure 3A-2

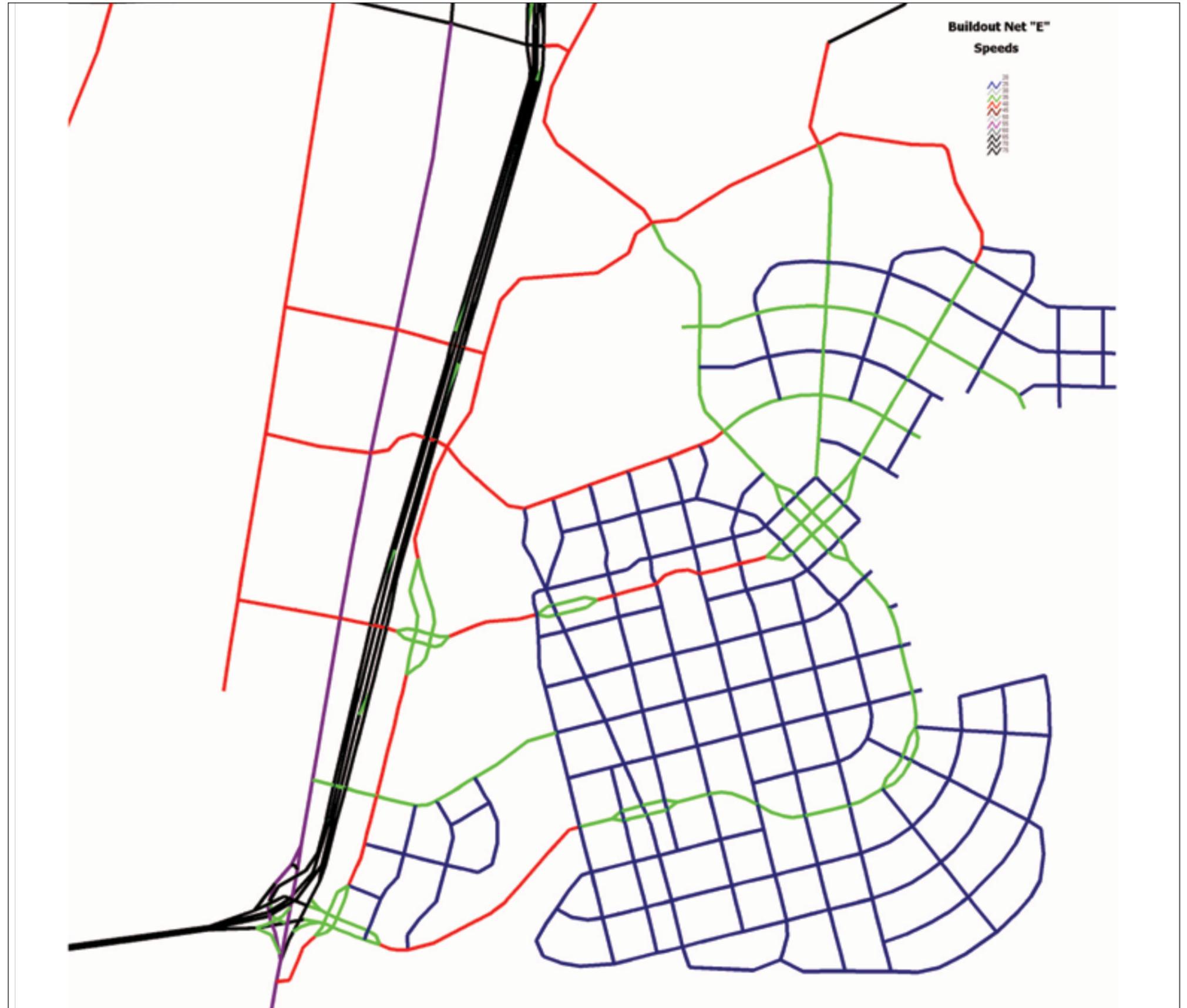
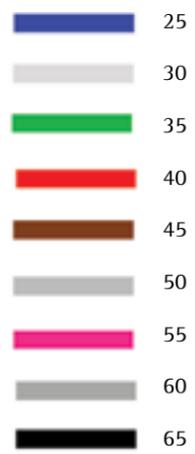
Legend

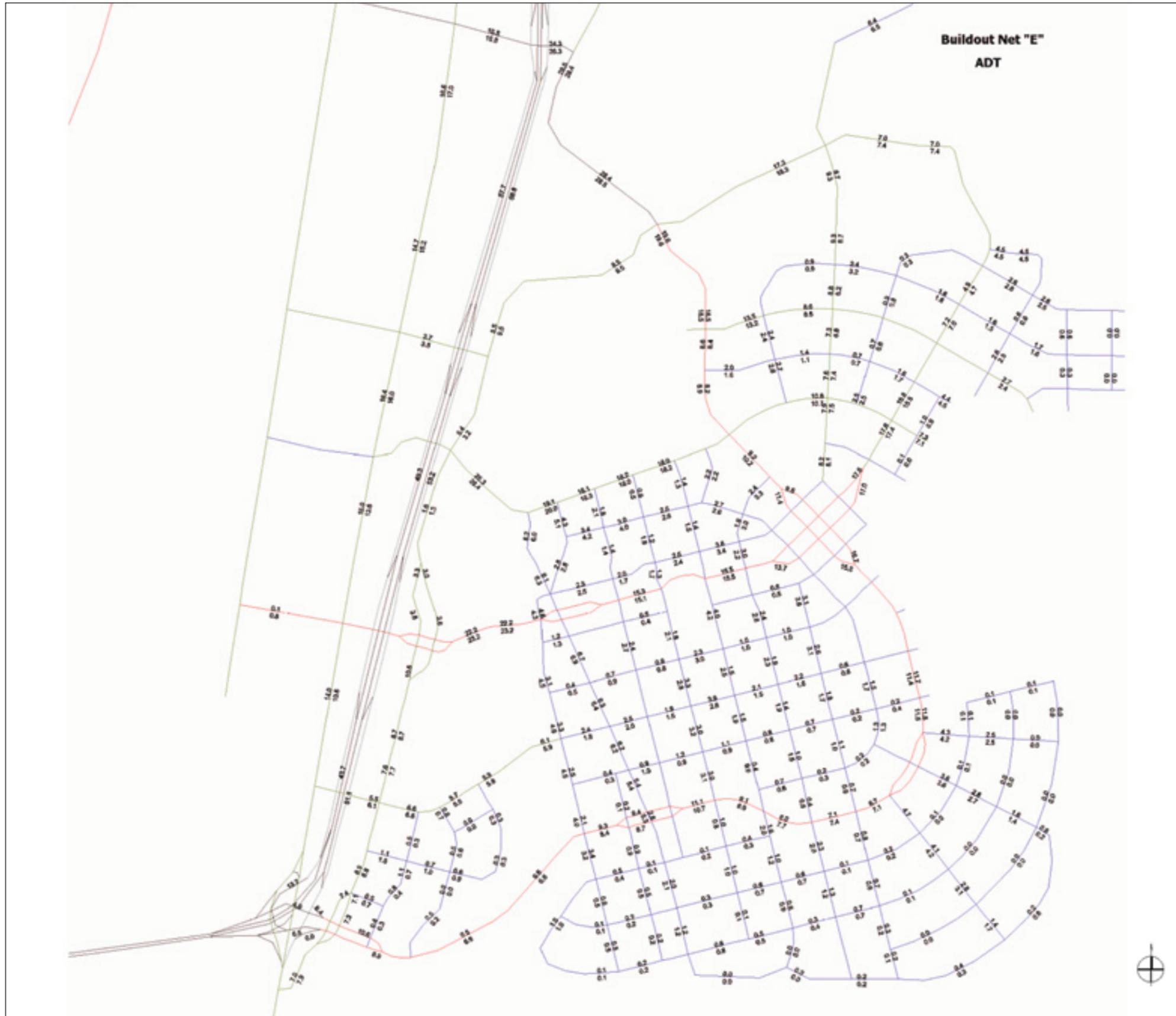


**MODELED
TRAVEL SPEED
BUILDOUT**

Figure 3A-3

Legend





**AVERAGE DAILY TRAFFIC
(DIRECTIONAL)
BUILDOUT**

Figure 3A-4

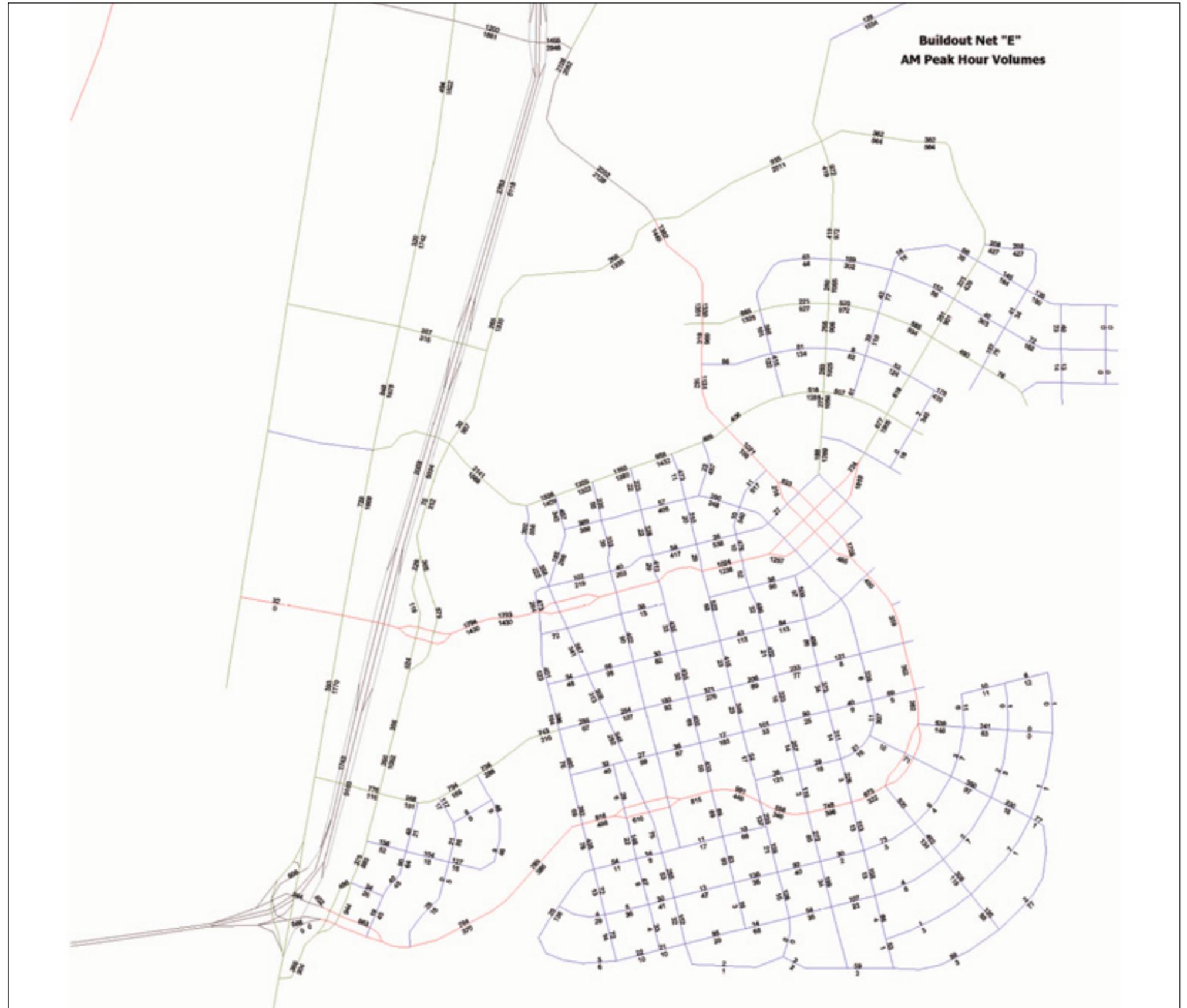


**TRAFFIC VOLUME
AM PEAK HOUR
BUILDOUT**

Figure 3A-5

Legend

Volume shown x1000



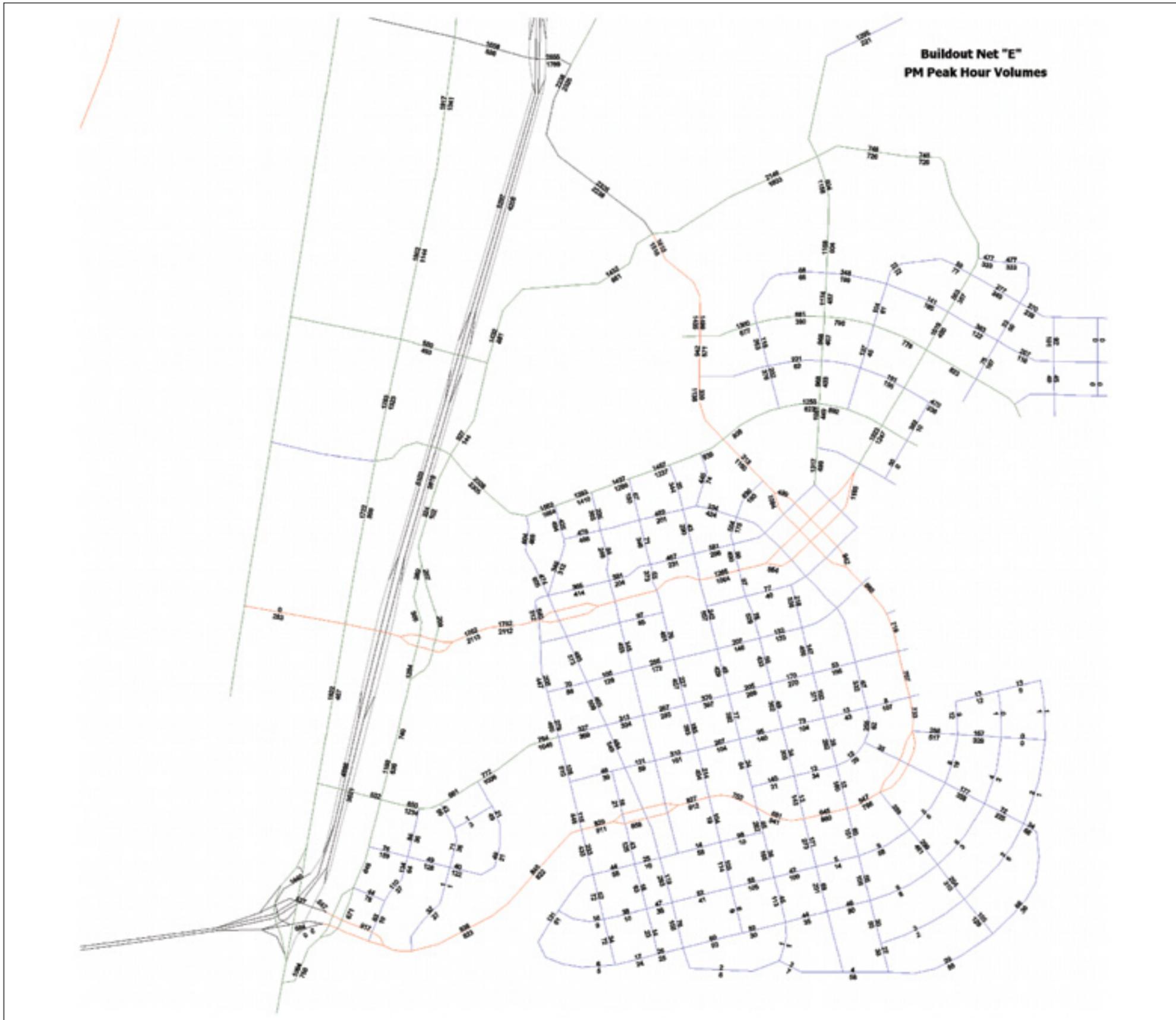
**Buildout Net "E"
PM Peak Hour Volumes**

**TRAFFIC VOLUME
PM PEAK HOUR
BUILDOUT**

Figure 3A-6

Legend

Volume shown x1000



**LEVEL OF SERVICE
DEFICIENCIES -
AM PEAK HOUR
BUILDOUT**

Figure 3A-7

Legend

-  LOS E
-  LOS F
-  Rio Grande





**LEVEL OF SERVICE
 DEFICIENCIES -
 PM PEAK HOUR
 BUILDOUT**

Figure 3A-8

Legend

-  LOS E
-  LOS F
-  Rio Grande



3B Level B Street Network

3B.1 Level B Street Characteristics

A Street Naming Convention has been temporarily adopted for the streets within the Level B Planning area, for identification purposes within the Level B Plan. Figure 3B-1 on the following page contains the Street Naming Convention, which correlates with details of these streets provided in Table 3B-1. The table of Street Characteristics includes the length and limits of each street, with the total projected number of lanes to be constructed by 2025, along with the modeled travel speeds and projected traffic volumes (Average Daily Traffic). A comparison is made between 2025 and Build-Out for the traffic volumes, many of which increase by Build-Out, but others that decrease due to the opening of other roadways that provide alternatives to travel and therefore reduce volumes on the fewer original roadways available in 2025.

3B.2 Intersection Traffic Control Requirements (Traffic Signals, Stop Control)

For planning purposes, it is anticipated that intersection traffic signals will be required at each intersection of two multi-lane facilities (e.g. intersection of two four-lane Avenues, or the intersection of a four lane avenue and six or four lane boulevard). Signals may also be warranted at intersections of Avenues (or Boulevards) and Connector streets. The overall roadway plan provides for signalized intersections on approximately half-mile spacing, with the exception of University Boulevard entering Mesa del Sol from the north. In the case of University Blvd., signals are anticipated on approximately quarter-mile spacing to serve the needs of the Employment Center traffic. Figure 3B-2 depicts the overall roadway laneage and the intersection laneage for the Level B planning area, including planned locations for intersection traffic signals and roundabouts.

There are several locations within the Mesa del Sol development where special intersections are proposed. Of note are the junctions of two sets of one-way couplets. These intersections operate as a set of four signalized intersections with precisely coordinated signal timing and phasing. With each intersection operating with only two one-way

approaches, each individual intersection operates with simple two-phase signal timing. However, due to the close proximity of the adjacent signals, the phasing of each intersection must be precisely coordinated with each of the other intersections. A primary objective of this signal coordination plan is to clear queues of vehicles that are internal to the square formed by the couplets, to reduce the likelihood that developing queues will block other traffic movements. Because of the importance of queue clearance to the operation, arterial signal progression through the couplet intersections is not typically maintained.

In addition to the couplets, other special intersection configurations proposed in the Level B planning area are Roundabout intersections. Roundabout intersections are circular intersections that operate with one-way flow around the circle. Traffic entering the roundabout yields to traffic that is already circulating within the roundabout. The entry approaches and the roundabout geometry are designed to encourage low-speed, but essentially continuous traffic movement. Specially designed traffic signing and pavement markings are used to guide motorists and pedestrians through the roundabout. Roundabouts have been used in this country at many arterial-arterial intersections, in Mesa del Sol, their use will be confined to selected Boulevard-Avenue, Avenue-Avenue and Avenue-Connector intersections.

Minor intersections will generally operate with two-way stop control, with four-way stop control used at higher volume intersections that do not meet traffic signal warrants.

Typically, traffic signals will be installed as a part of the construction of major intersections (intersection of two multi-lane facilities). At other locations, such as the intersection of Avenues and Connector streets, signal conduits will be installed during construction to allow for the future construction of traffic signals when warrants are met. At roundabouts, specialized traffic control is required to ensure the efficient operation of the intersection. Entrances to the roundabouts are yield controlled. Professional practice for signing and pavement marking in advance of and within the roundabout are continuing to evolve and the proposed traffic control will be coordinated with City of Albuquerque traffic engineering staff.

Roadway Name/ Interim Designation	Length (ft)	Length (mi)	Limits		Number of Lanes 2025	Modeled Travel Speed (mph)	2025 ADT (veh/day)	Buildout ADT (veh/day)
University Blvd....	900	0.17	B Boundary	Bobby Foster	4	35	25,000	17,100
University Blvd....	2,200	0.42	Bobby Foster	Couplet 1	4	35	16,900	19,400
University-Couplet	6,700	1.27	Couplet 1		4	35	9,900-20,100	21,200-32,500
University Blvd-Parkside	4,700	0.89	Couplet 1	B Boundary	4	35	7,100	23,300
Mesa del Sol Blvd....	1,300	0.25	Broadway	Interchange	6	40	-	900
MdS-North1	1,600	0.30	Couplet 1		6	35	-	22,200
MdS-South1	1,800	0.34	Couplet 1		6	35	-	23,200
Mesa del Sol Blvd....	2,600	0.49	Couplet 1	Con-44	4	40	30,800	45,400
MdS-North2	1,900	0.36	Couplet 2		4	35	12,300	-
MdS-South2	1,900	0.36	Couplet 2		4	35	-	-
Mesa del Sol Blvd....	5,100	0.97	Couplet 2	Couplet 3	4	40	22,000	31,000
MdS-North3	3,900	0.74	Couplet 3		4	35	8,400	17,600
MdS-South3	4,300	0.81	Couplet 3		4	35	5,800	17,000
Mesa del Sol Blvd....	1,600	0.30	Couplet 3	B Boundary	4	35	0	35,000
Avenue 1	2,200	0.42	University Blvd....	B Boundary	4	35	5,500	17,100-26,700
Avenue 2	3,600	0.68	University Blvd....	B Boundary	4	35	17,800	21,300
Avenue 3	1,000	0.19	MDS Blvd....	B Boundary	2	25	-	13,600
Avenue 4	1,500	0.28	B Boundary	Couplet 1	4	40	8,400	14,900
Bobby Foster	6,300	1.19	B Boundary	University Blvd....	4	40	17,400	36,400
Avenue A	1,000	0.19	Avenue 4	B Boundary	-	35	-	11,600
Avenue 4-East1	2,000	0.38	Couplet 1		4	35	4,200	7,300
Avenue 4-West1	1,900	0.36	Couplet 1		4	35	4,200	7,400
Avenue 4	6,300	1.19	Couplet 1	Couplet 2	4	40	10,500	17,400
Avenue 4-East2	1,600	0.30	Couplet 2		4	35	7,100	3,600
Avenue 4-West2	1,400	0.27	Couplet 2		4	35	7,100	10,600
Avenue 4-East3	2,400	0.45	Couplet 2		4	35	4,100	3,600
Avenue 4-West3	2,200	0.42	Couplet 2		4	35	6,600	3,800
Avenue 4	500	0.09	Couplet 2	B Boundary	4	40	6,300	2,900
Connector 5	2,900	0.55	University Blvd....	B Boundary	2	25	0-4,900	3,600
Connector 6	3,200	0.61	B Boundary	Avenue 2	2	25	7,100	5,300
Connector 7	6,400	1.21	Con-41	Con-8	2	25	700	7,600
Connector 8	8,900	1.69	Con-43	Con-31	2	25	600	3,700-7,200
Connector 9	3,800	0.72	Con-44	Con-38	2	25	-	2,500
Connector 10	5,200	0.98	Con-37	Con-31	2	25	1,200	1,100
Connector 11	6,000	1.14	B Boundary	End	2	25	1,000	5,300
Connector 12	400	0.08	University Blvd....	End	2	25	-	-
Connector 13	6,500	1.23	B Boundary	End	2	25	200	1,200-6,700
Connector 14	600	0.11	B Boundary	End	2	25	0	-
Connector 28	2,000	0.38	Con-32	B Boundary	2	25	-	-
Connector 31	1,800	0.34	Con-32	Con-10	2	25	-	-
Connector 32	3,100	0.59	Con-31	B Boundary	4	25	2,200	16,300
Connector 33	5,000	0.95	Con-8	B Boundary	2	25	-	-
Connector 35	2,800	0.53	Con-10	B Boundary	2	25	800	6,700
Connector 36	6,700	1.27	University Blvd....	B Boundary	2	25	3,900	5,700
Connector 37	7,200	1.36	Bobby Foster	B Boundary	2	25	2,400	2,700-8,200
Connector 38	5,000	0.95	Bobby Foster	B Boundary	2	25	1,000	3,000
Connector 39	4,200	0.80	Bobby Foster	B Boundary	2	25	1,500	3,900
Connector 41	2,800	0.53	Bobby Foster	Con-43	2	25	4,100	5,600-9,400
Connector 43	1,800	0.34	MDS Blvd....	B Boundary	2	25	1,700	12,400
Connector 44	1,900	0.36	Con-43	B Boundary	2	25	4,700	8,900
Connector 45	1,600	0.30	Bobby Foster	Con-7	2	25	1,800	4,400
Totals	164,200 ft	31.10 mi						

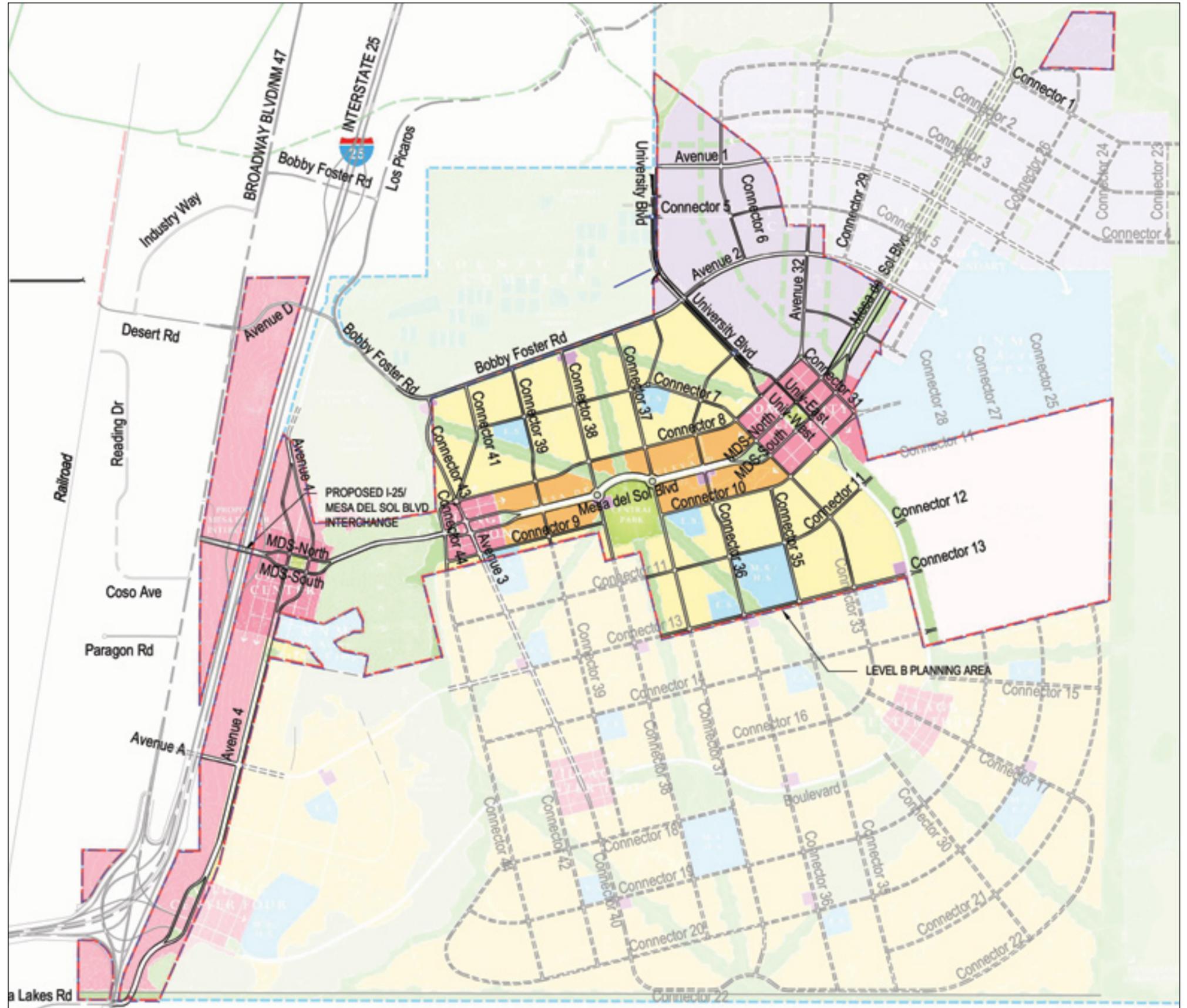
**Table 3B-1
Street Characteristics**

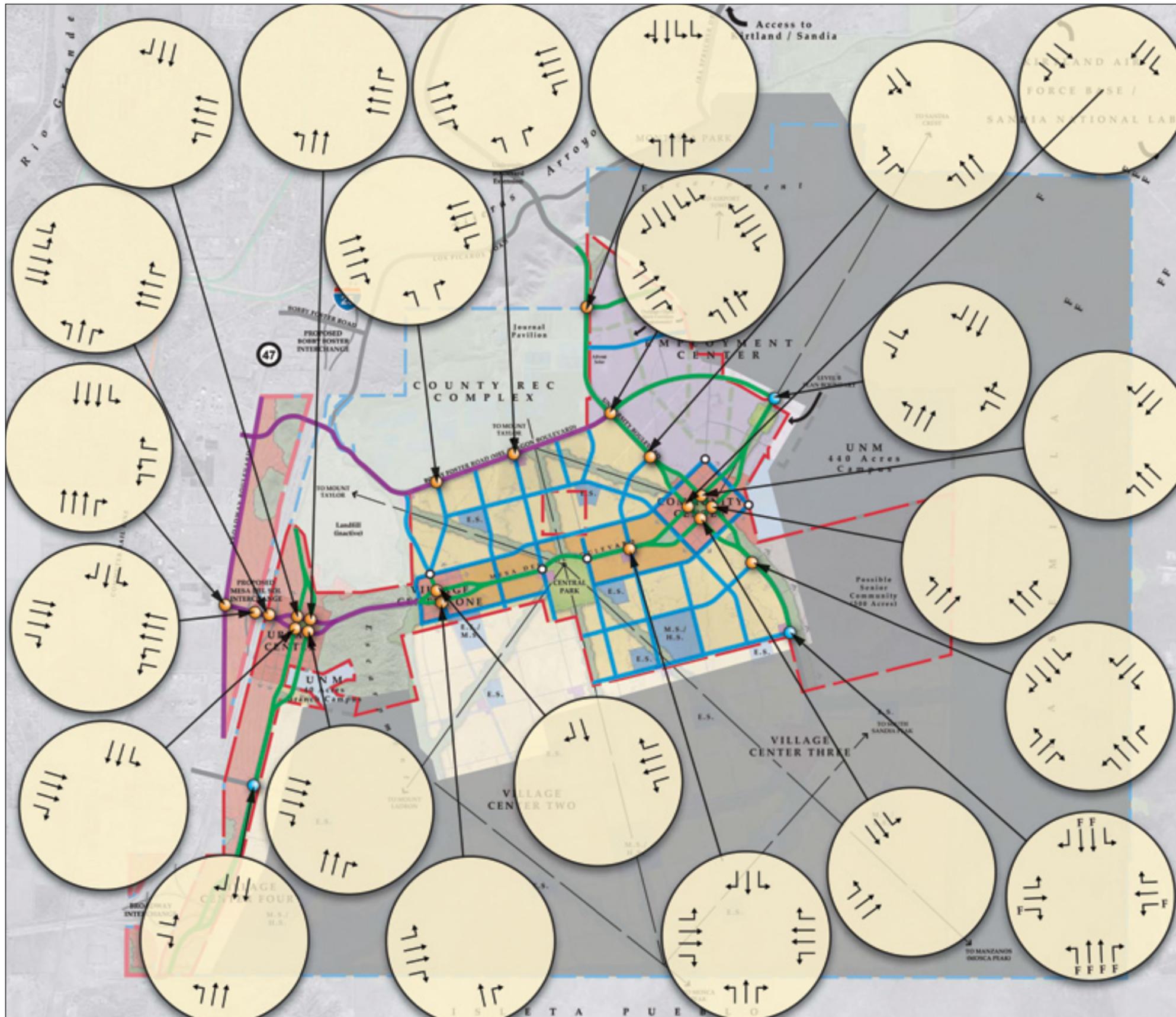


STREET NAMING CONVENTION

Figure 3B-1

Legend





INTERSECTION LANEAGE AND TRAFFIC CONTROL

Figure 3B-2

Legend

- - - Level B Boundary
- Build-out Laneage:
 - 6 lanes
 - 4 lanes
 - 2 lanes
- Level B Signalized Intersection
- Future Signalized Intersection
- Future Lane (not a part of level B)
- F** Roundabout



3C Travel Demand Modeling Results for 2015 and 2025

3C.1 Absorption Schedule / Projected Land Use

A land use absorption schedule has been prepared for the Level B planning area that generates information on the status of proposed development in 2015, 2020, and 2025. Growth in the Mixed Use Centers, Commercial areas, Office / R&D, Corridor Residential, and Residential neighborhoods are all shown in the following figures, Figures 3C-1, 3C-2 and 3C-3. With this information, traffic volumes have been predicted for each of these future years. Different methods have been employed for these predictions as described below. Table 3C-1 presents a summation of the land use data used in traffic modeling, with square footage of employment, acreage, and floor area ratio, as well as numbers of dwelling units and acreage occupied for the site in 2015, 2020 and 2025.

3C.2 Traffic Volume Projections

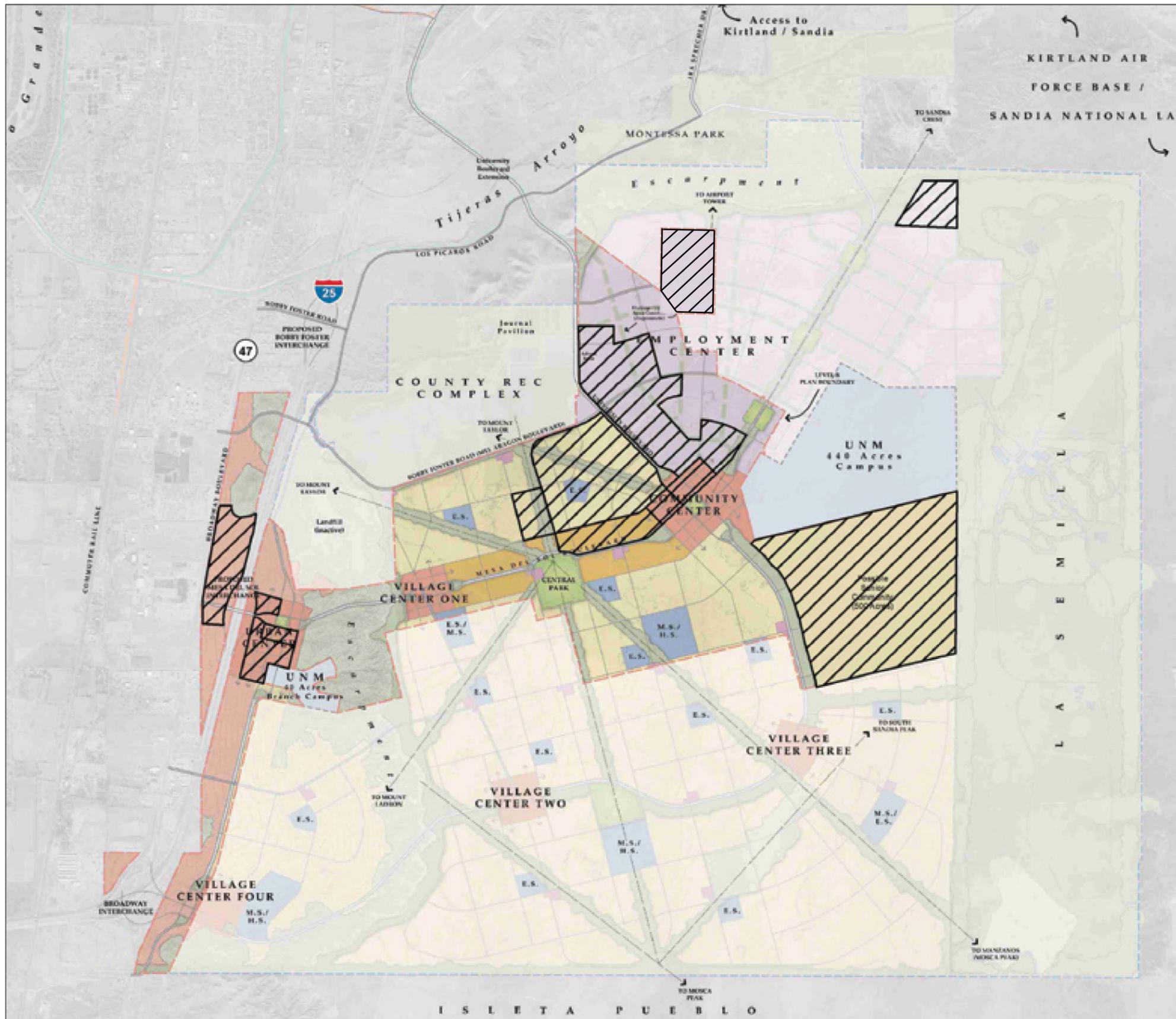
Travel Demand Modeling has been developed for the years 2015 and 2025, using MRCOG's Emme2 model as was done for the Build-Out scenario as presented in Appendix 3A. Results of this modeling is shown in Figures 3C-4 through 3C-19. This includes traffic volume projections for Average Daily Traffic, and AM and PM Peak Hour traffic for both 2015 and 2025, along with Level of Service deficiencies that are noted with the projection of this traffic.

Based on the multi-modal transportation system planned for Mesa del Sol, and the overall reduction of vehicle trips in favor of trips by walking, bicycling, and use of future transit service, the number of trips and resulting traffic volumes shown through the modeling process likely represents the worst case maximum traffic volume scenario for the future. Lower traffic volumes should actually be the result of the mixed-use development planned, with fewer vehicular trips taking place due to on-site trip capture, the result of the heavy use of the planned pedestrian and bicycle facilities, and the result of a choice to use future transit rather than single occupant vehicles.

Traffic volumes for 2020 have also been forecast, using the sub-area traffic model, Traffix. Use of Traffix consists of the assignment of Traffix (Traffic Analysis) Zones similar to those applied with the Emme2 model, and the assignment of land use characteristics to each zone, with trip generation data resulting for peak hour and daily traffic. Appendix 3D contains the results of the Traffix modeling projections. Traffix modeling projections can be applied to small scale areas with opportunity for specific site input relative to assignment of traffic numbers to the roadways in question. Turning movements can be generated for intersection design purposes. Figure 3D-2 included in Appendix 3D provides the laneage requirements and level of service for each major intersection planned in the Level B Planning area. Major intersections are those that are expected to be signalized by 2025 or beyond. The intersection configurations planned for Mesa del Sol by 2025 are thus summarized in Figure 3D-2.

Table 3C-1 Land Use and Absorption

Year	Employment Center						High Density Residential			Residential			Urban Center		
	sf x 1000	acres	FAR (gross)	sf x 1000	acres	FAR (gross)	DU's	acres	DU / ac	DU's	acres	DU / ac	sf x 1000	acres	FAR (gross)
2015	1125.0	184	0.14	437.5	42	0.24	220	9	25.0	2000	500	4.0	700.0	67	0.14
							1000	49	20.4	1270	165	7.7	1100.0	68	0.37
							240	10	25.0						
Subtotals	1125.0	184		437.5	42		1460	68		3270	665		1800.0	135	
2020	2061.0	338	0.14	710.0	68	0.24	460	19	24.2	2000	500	4.0	1464.0	140	0.24
							2150	105	20.4	1792	256	7.0	1650.0	102	0.37
							828	33	25.0	885	124	7.1	177.7	17	0.24
Subtotals	2061.0	338		710.0	68		3738	169		4677	880		3291.7	259	
2025	3136.0	514	0.14	710.0	68	0.24	819	33	25.0	2000	500	4.0	1464.0	140	0.24
							3597	176	20.4	2730	390	7.0	1650.0	102	0.37
							828	33	25.0	1988	280	7.1	1045.5	100	0.24
						300	12	25.0				209.1	20		
						192	8	24.0				218.0	40		
Subtotals	3136.0	514		710.0	68		5736	262		6718	1170		4586.6	402	
				Subtotal – Acreage (net)	2416										
				Subtotal – Sq. Ft. x 1000 Com.	8432.6										
				Subtotal – DU's	12454										



LAND USE AND ABSORPTION PHASE I

Figure 3C-1

Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.

Legend

Land Use

- Mixed Use Centers
- Commercial
- Office / R and D
- Corridor Residential
- Residential
- Phased Mixed Use Centers
- Phased Commercial
- Phased Office / R and D
- Phased Corridor Residential
- Phased Residential
- Constructed by 2015
- Previously Constructed



LAND USE AND ABSORPTION PHASE II

Figure 3C-2

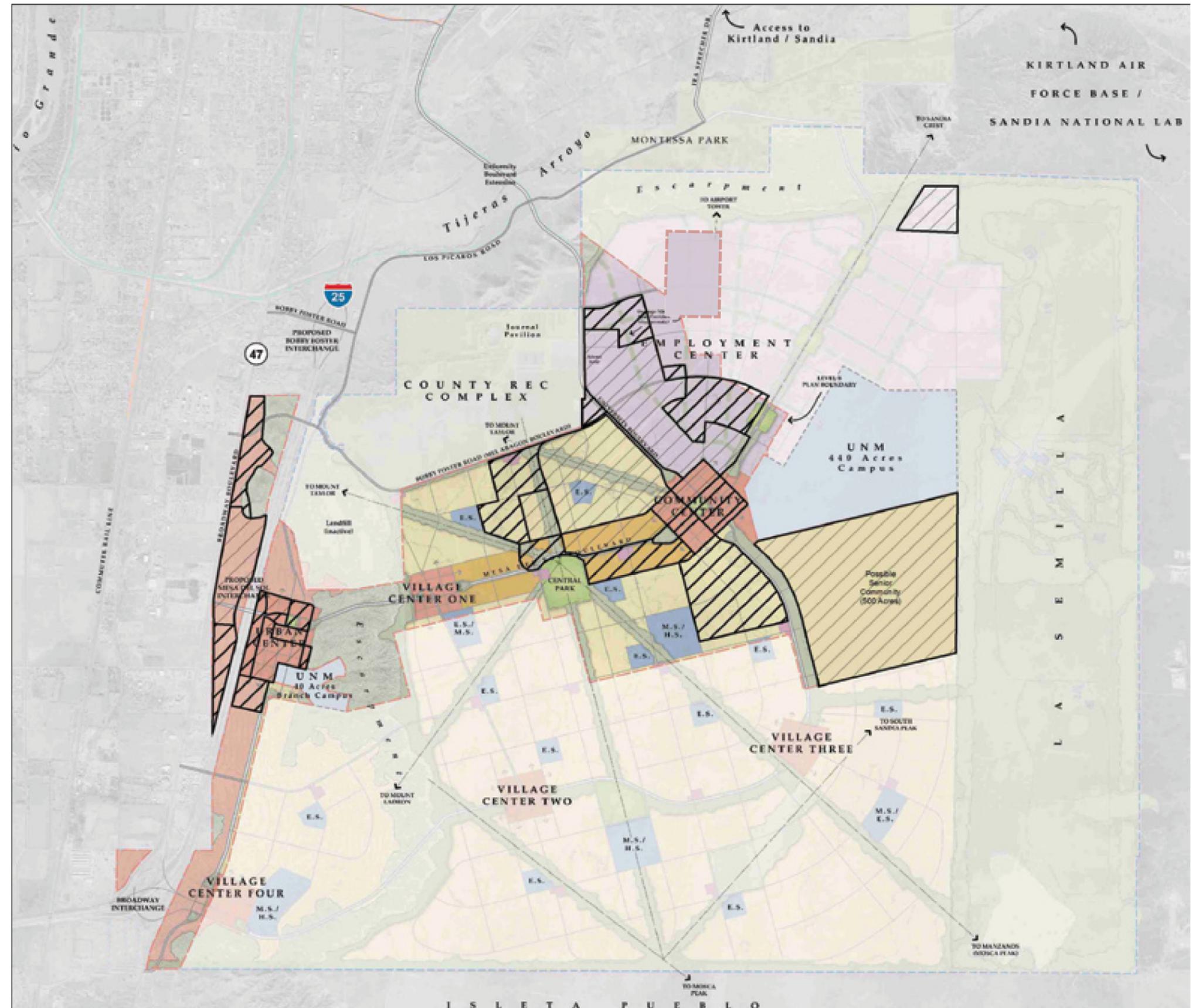
Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.

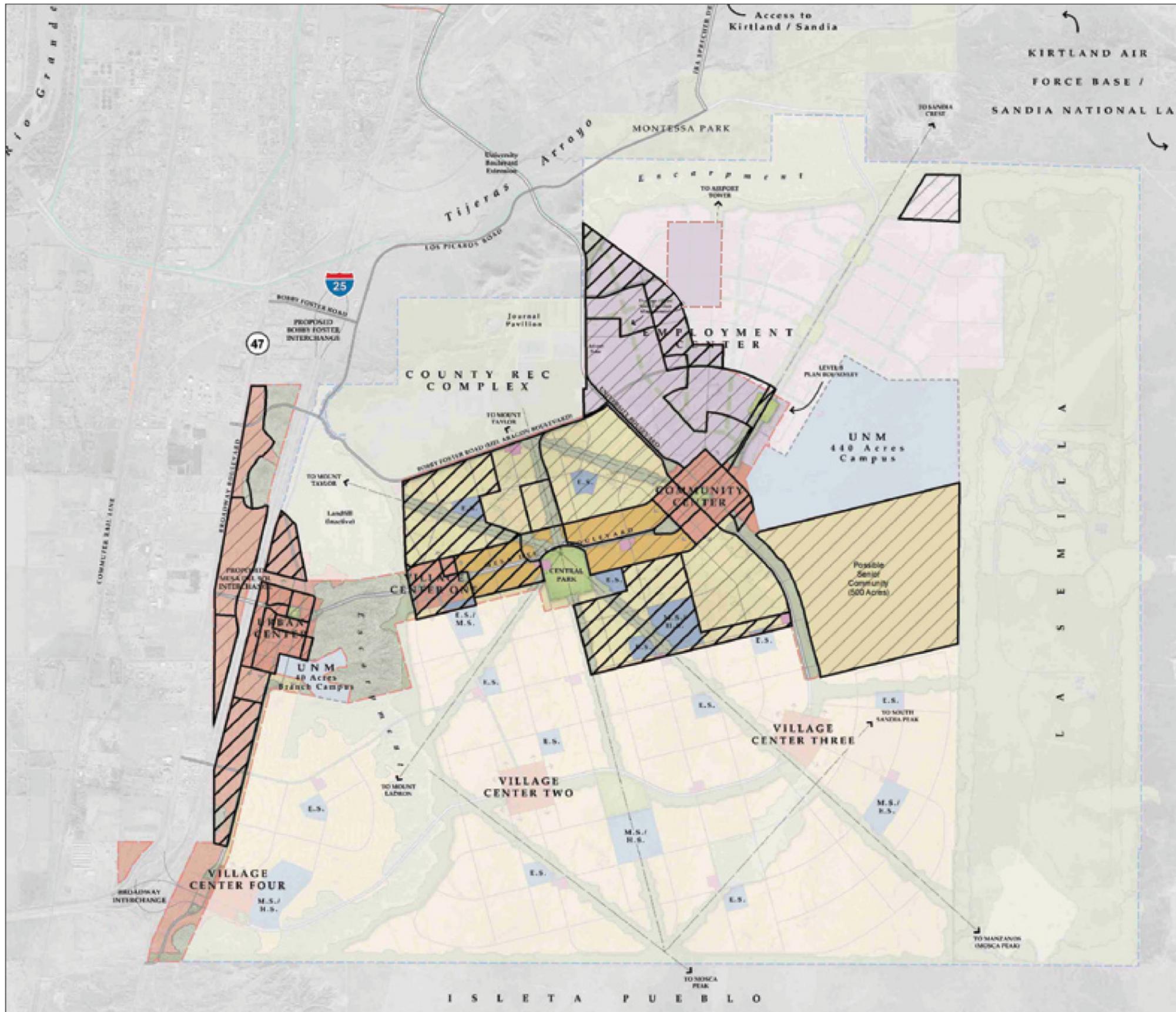
Legend

Land Use

- Mixed Use Centers
- Commercial
- Office / R and D
- Corridor Residential
- Residential

- Phased Mixed Use Centers
- Phased Commercial
- Phased Office / R and D
- Phased Corridor Residential
- Phased Residential
- Constructed 2020 to 2015
- Previously Constructed





LAND USE AND ABSORPTION PHASE III
Figure 3C-3

Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.

Legend

Land Use

- Mixed Use Centers
- Commercial
- Office / R and D
- Corridor Residential
- Residential
- Phased Mixed Use Centers
- Phased Commercial
- Phased Office / R and D
- Phased Corridor Residential
- Phased Residential
- Constructed 2020 to 2025
- Previously Constructed



**ROADWAY
FUNCTIONAL
CLASSIFICATION 2015**

Figure 3C-4

Legend

-  Principal
-  Minor
-  Collector
-  Local
-  Frontage
-  Freeway
-  On-Ramp
-  Off-Ramp
-  Limited Access





**MODELED NUMBER
OF LANES 2015**

Figure 3C-5

Legend

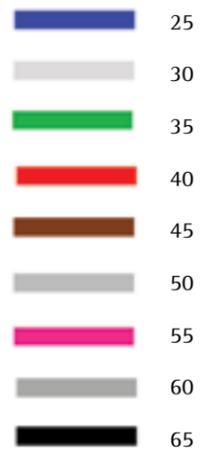
-  2
-  4
-  6



**MODELED
TRAVEL SPEED 2015**

Figure 3C-6

Legend





**AVERAGE
DAILY TRAFFIC
(DIRECTIONAL)
2015**
Figure 3C-7

Legend

Volume shown x1000

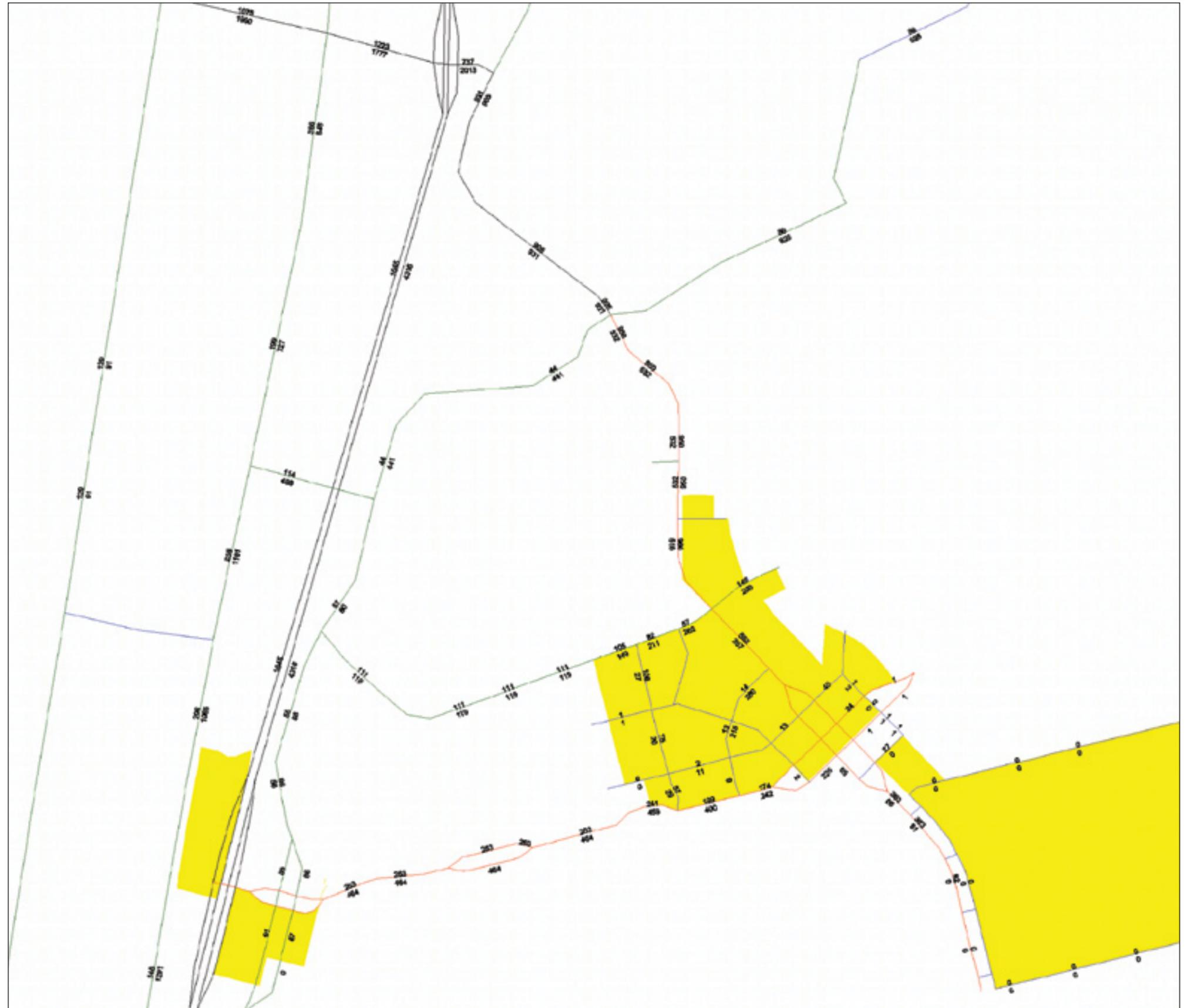


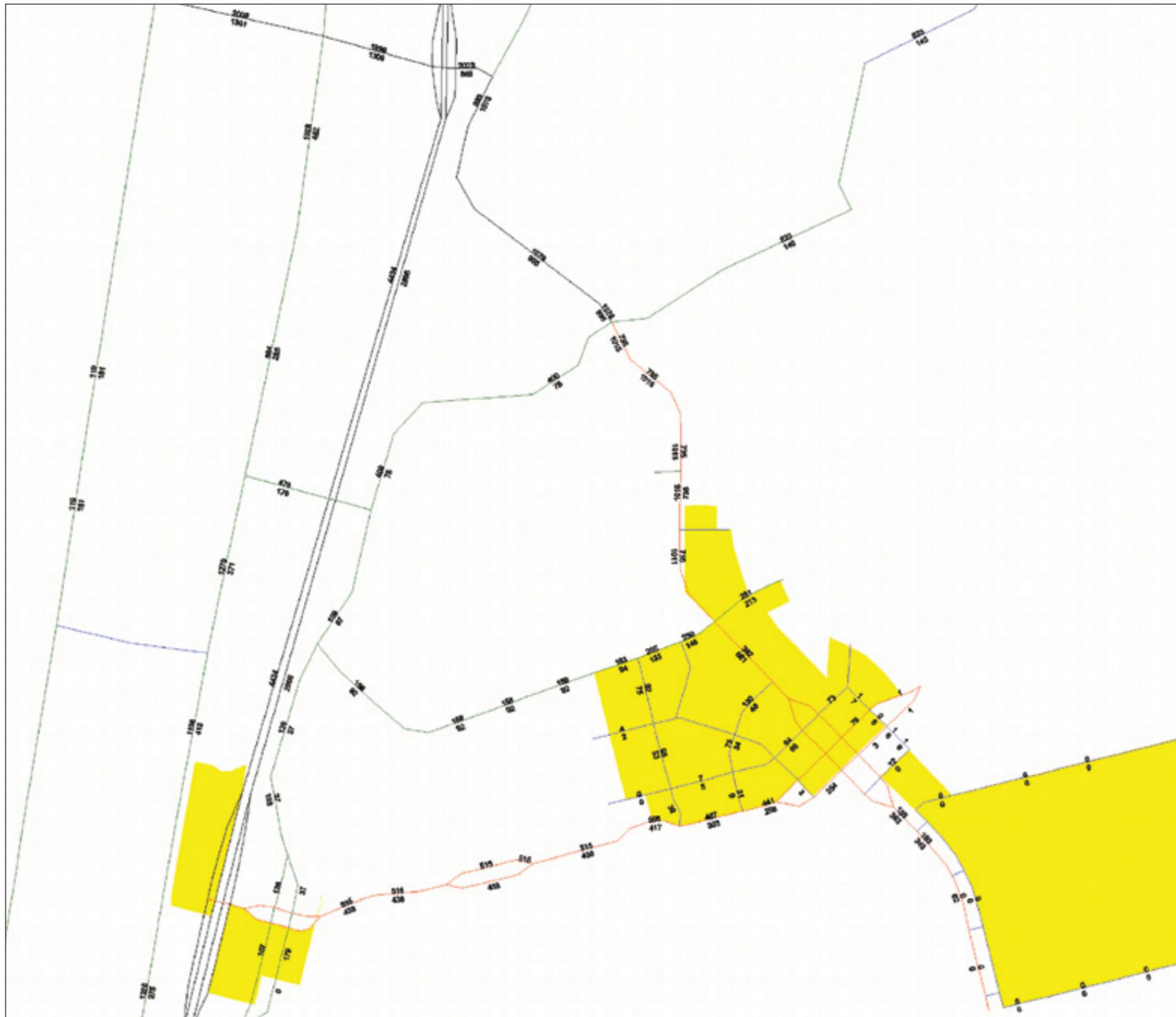
**TRAFFIC VOLUME
AM PEAK HOUR 2015**

Figure 3C-8

Legend

Volume shown x1000





**TRAFFIC VOLUME
PM PEAK HOUR 2015**

Figure 3C-9

Legend

Volume shown x1000

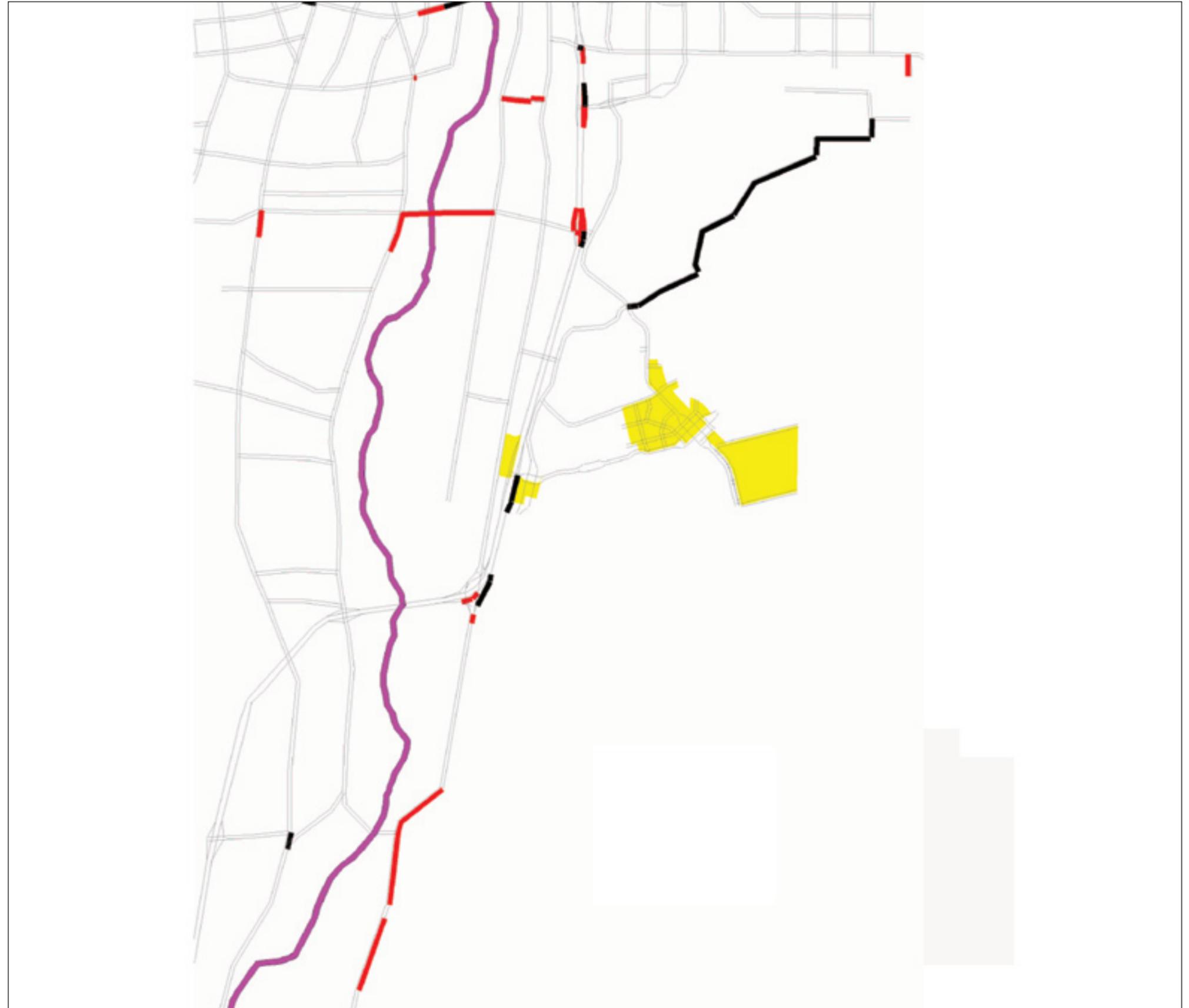


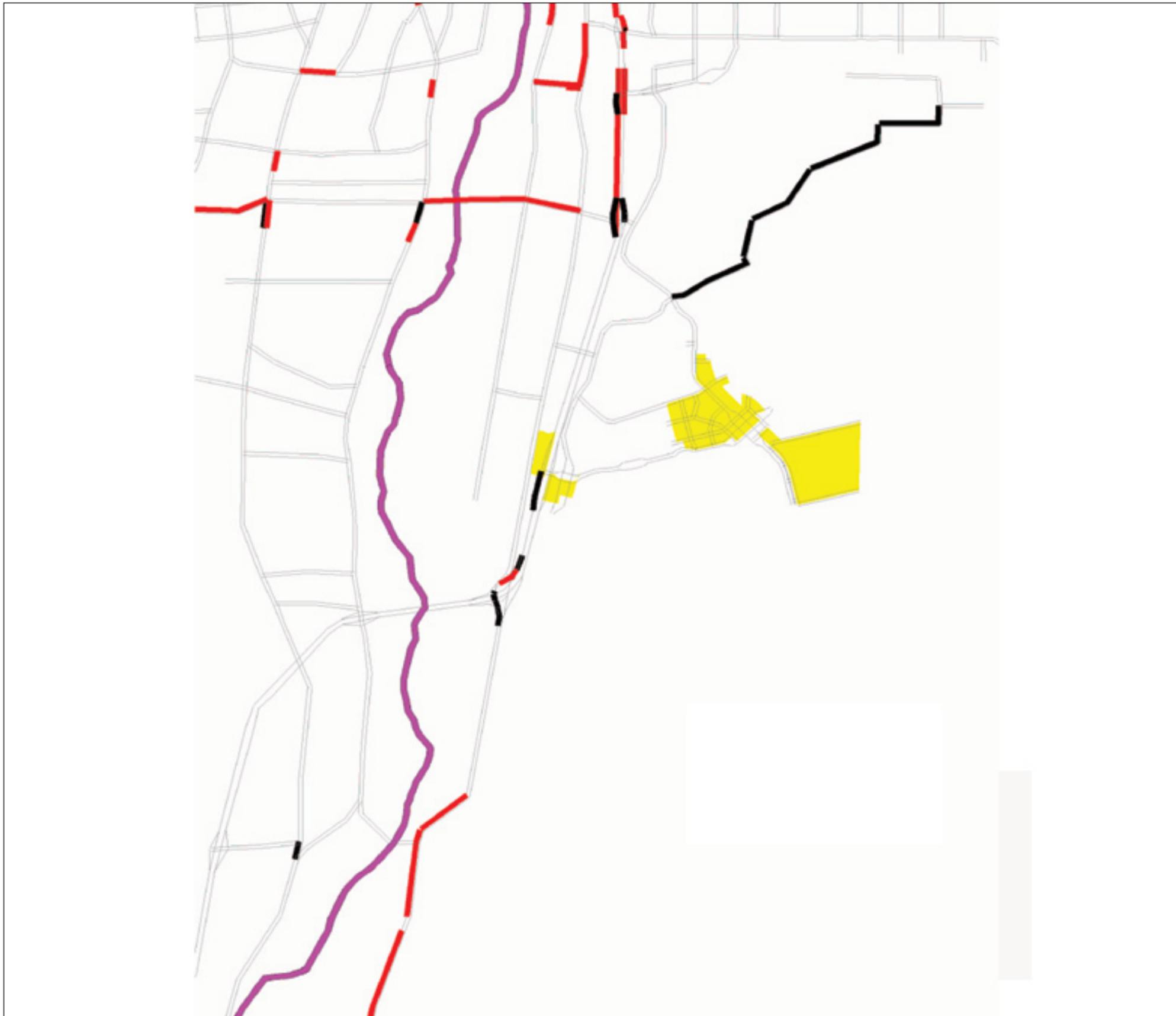
**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2015**

Figure 3C-10

Legend

-  LOS E
-  LOS F
-  Rio Grande
-  Mesa del Sol





**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2015**

Figure 3C-11

Legend

- LOS E
- LOS F
- Rio Grande
- Mesa del Sol



**FUNCTIONAL
CLASSIFICATION 2025**

Figure 3C-12

Legend

-  Principal
-  Minor
-  Collector
-  Local
-  Frontage
-  Freeway
-  On-Ramp
-  Off-Ramp
-  Limited Access





**MODELED NUMBER OF
LANES 2025**

Figure 3C-13

Legend

-  2
-  4
-  6



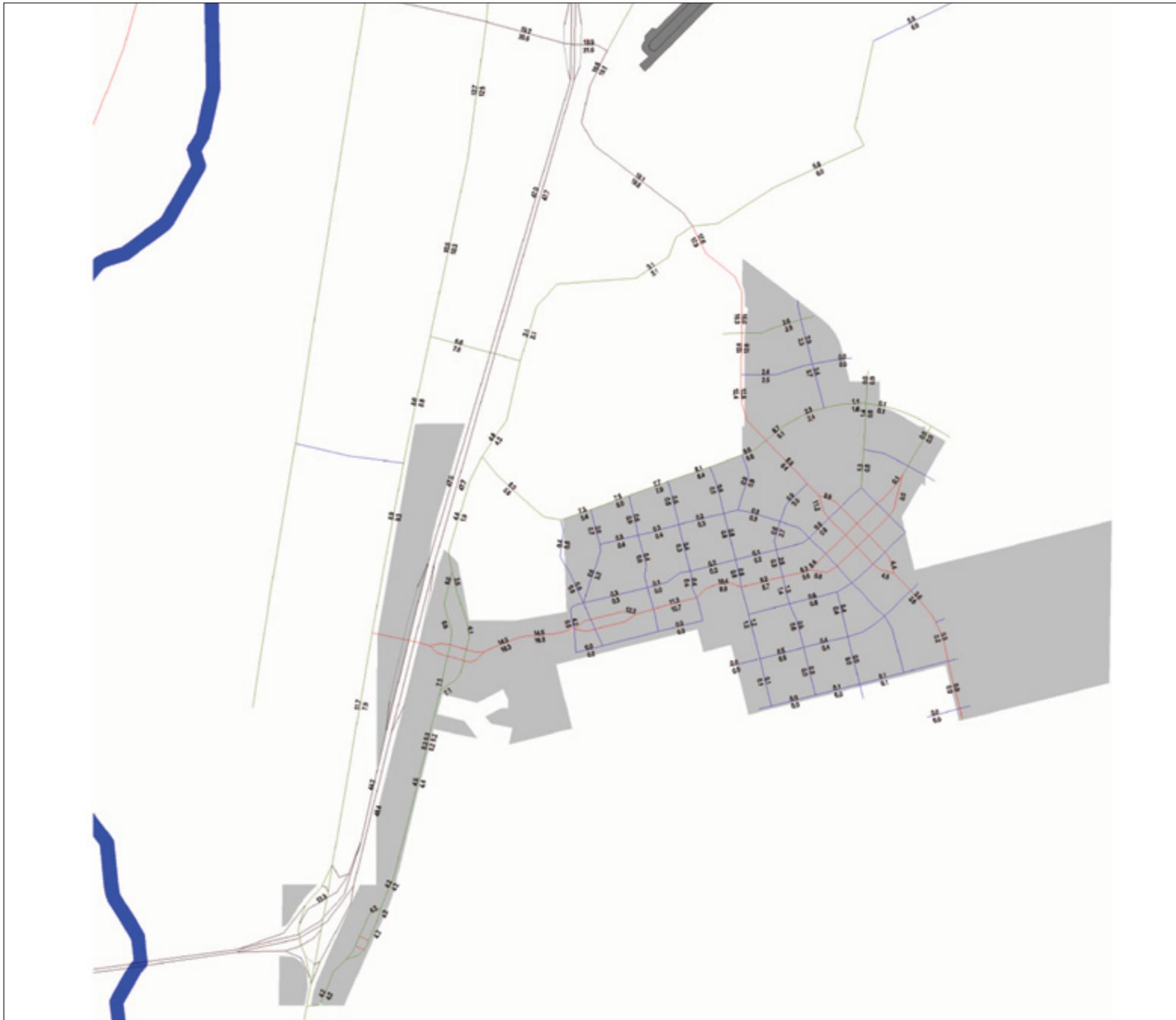
**MODELED
TRAVEL SPEED 2025**

Figure 3C-14

Legend

	25
	30
	35
	40
	45
	50
	55
	60
	65





**AVERAGE
DAILY TRAFFIC
(DIRECTIONAL) 2025**
Figure 3C-15

Legend

Volume shown x1000

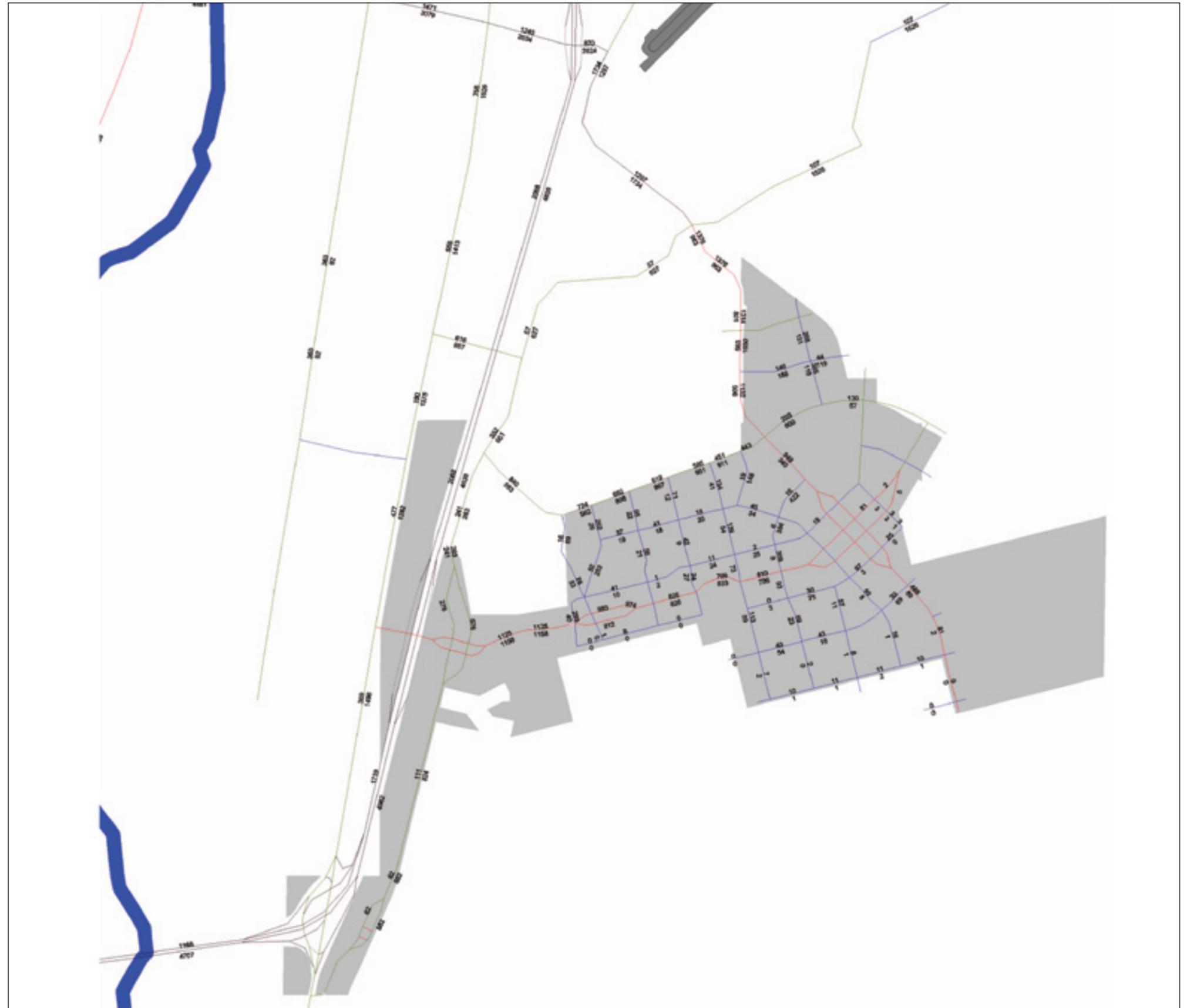


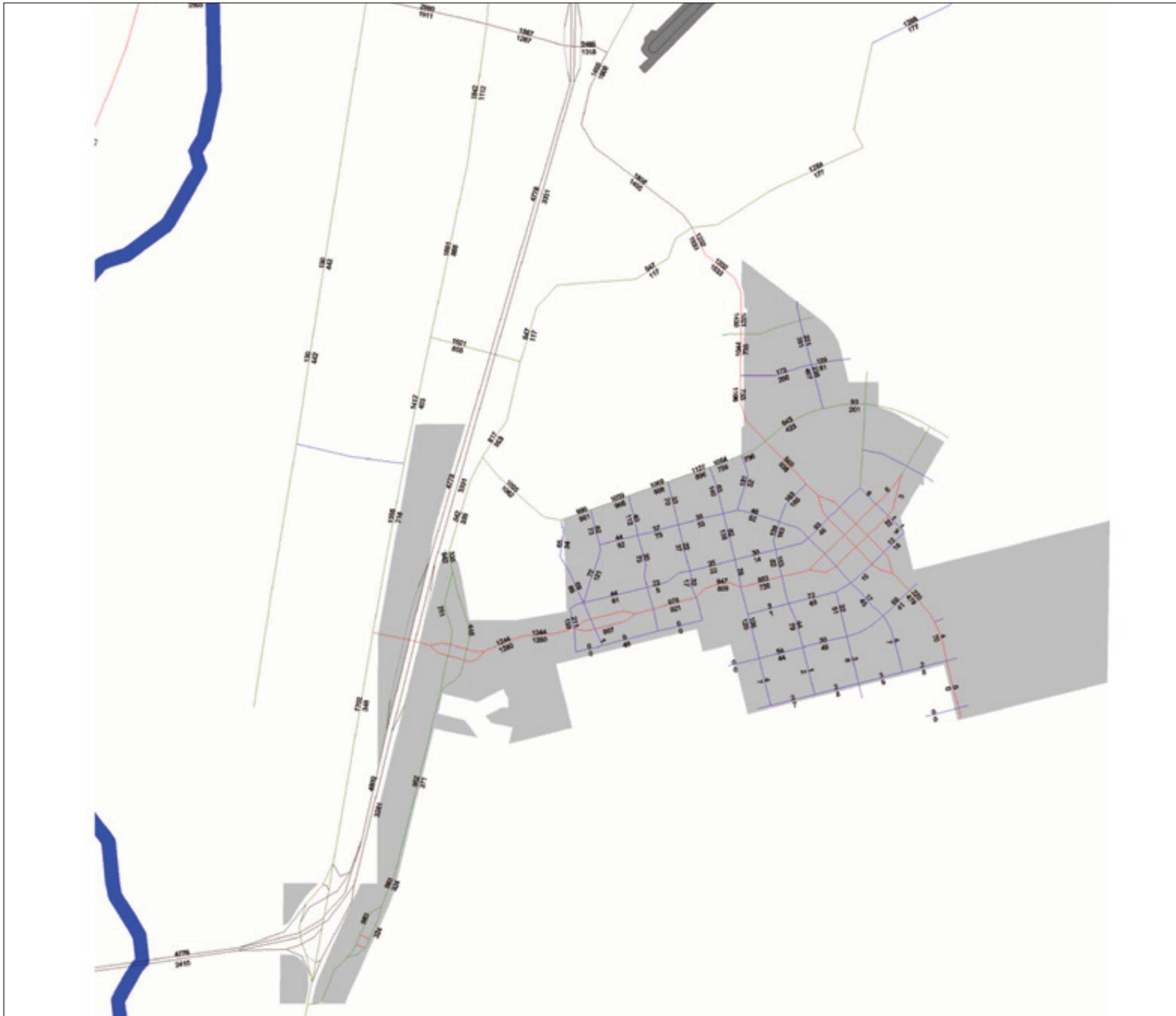
**TRAFFIC VOLUME
AM PEAK HOUR 2025**

Figure 3C-16

Legend

Volume shown x1000





**TRAFFIC VOLUME
PM PEAK HOUR 2025**

Figure 3C-17

Legend

Volume shown x1000

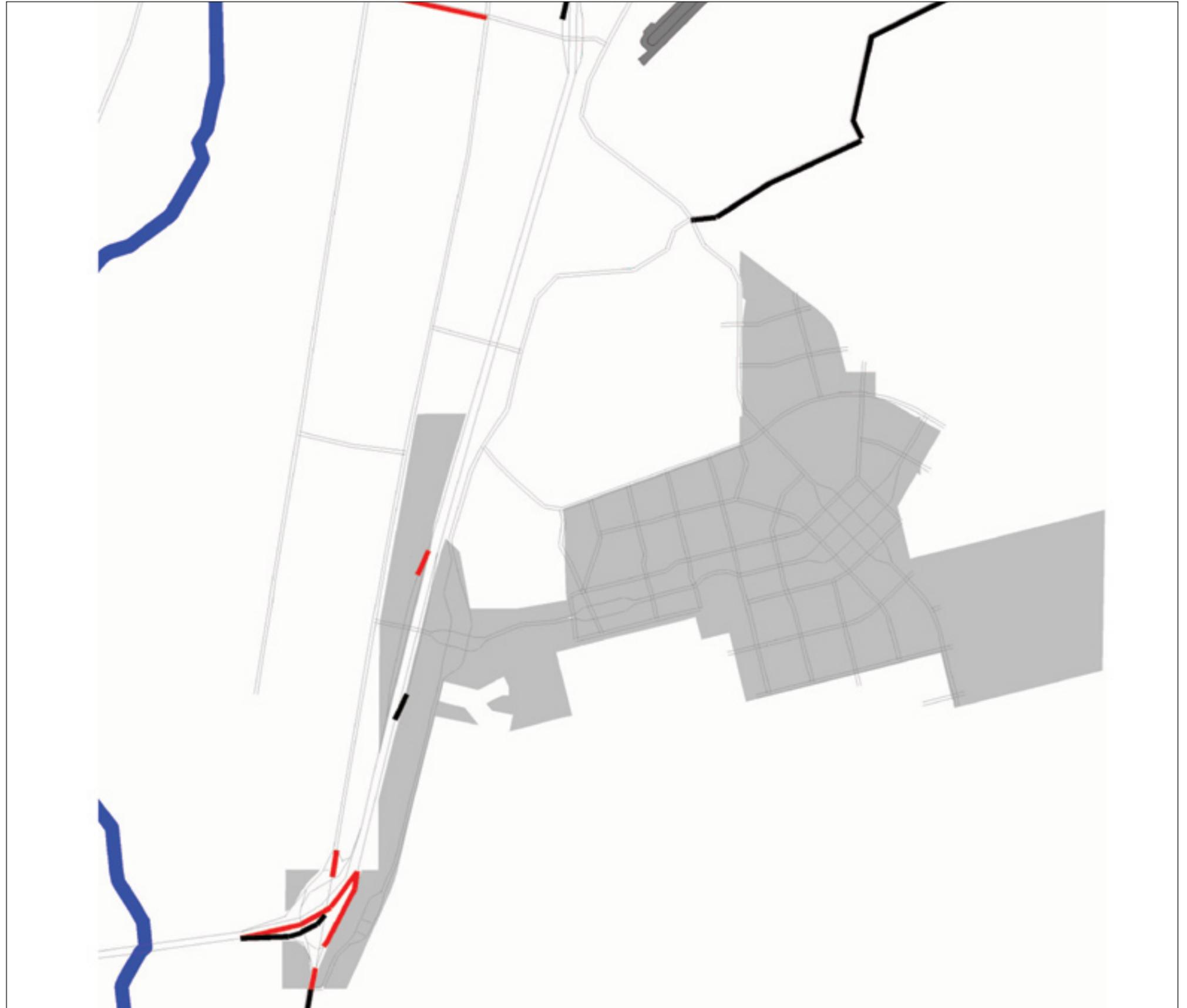


**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2025**

Figure 3C-18

Legend

-  LOS E
-  LOS F
-  Rio Grande





**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2025**

Figure 3C-19

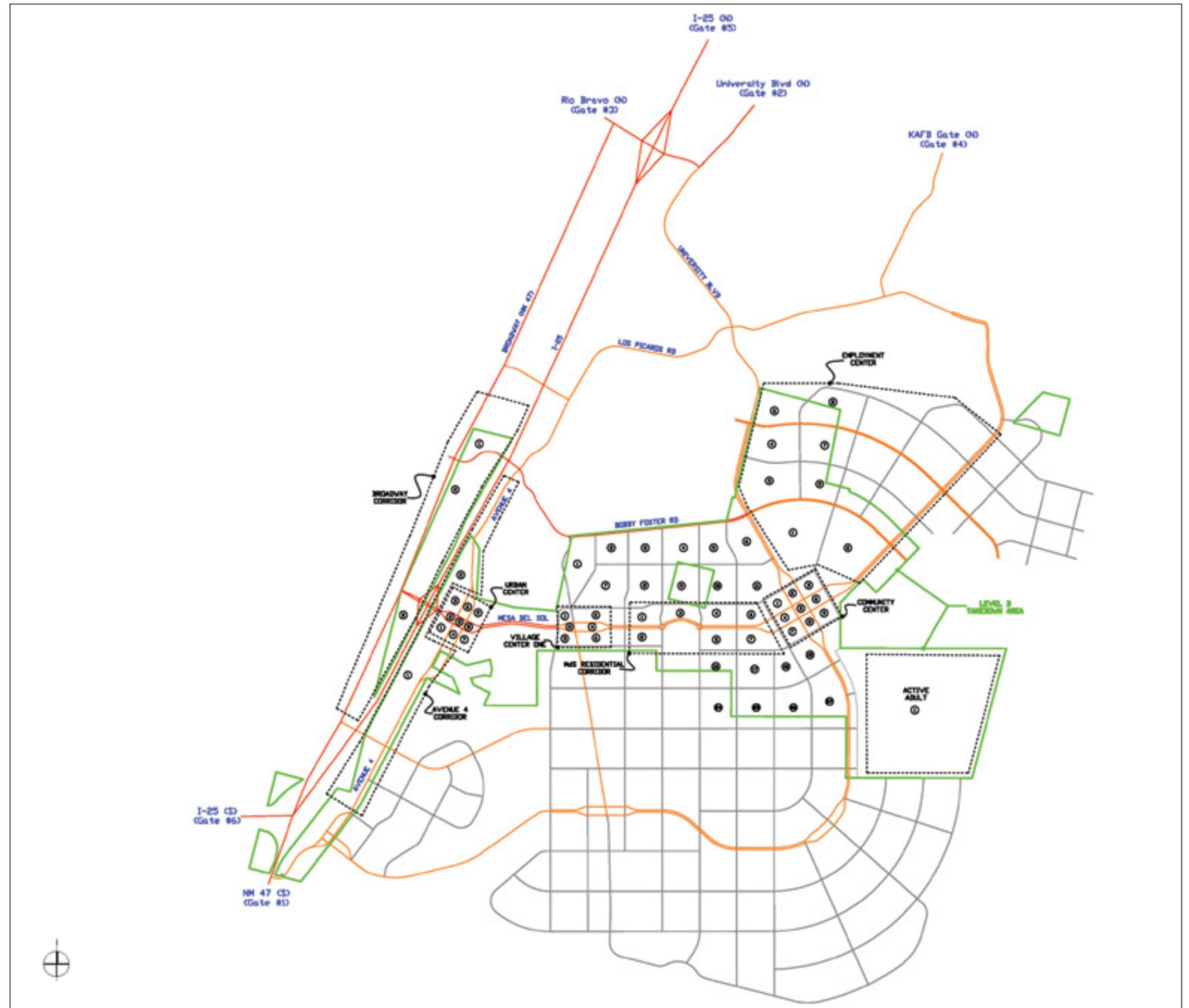
Legend

- LOS E
- LOS F
- Rio Grande



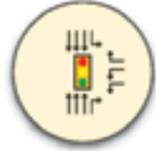
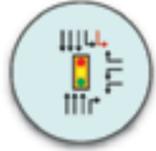
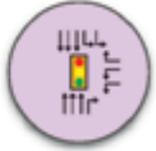
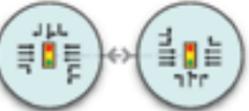
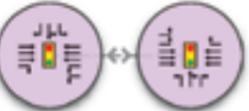
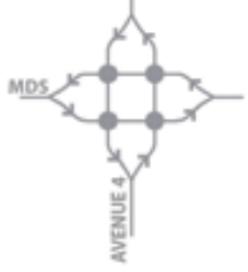
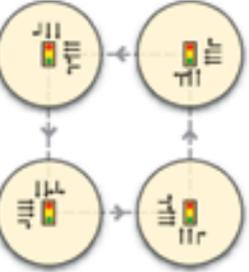
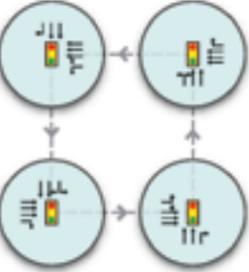
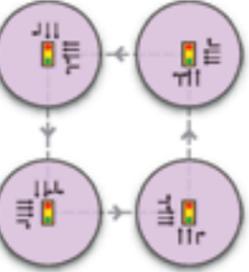
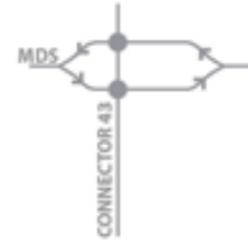
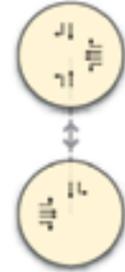
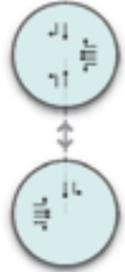
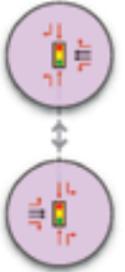
**MESA DEL SOL
TRAFFIX MODEL
LAYOUT**

Figure 3D-1



INTERSECTION
LANEAGE AND CAPACITY

Figure 3D-2

Signalized Intersections (Through 2025)	2015			2020			2025		
	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak
Mesa del Sol / Broadway 		C	C		C	C		D	D
Mesa del Sol / I-25 (west / east) 		CC	BB		CC	CC		CD	DD
Urban Center Squareabout 		AA	BB		BB	BB		BB	CC
Mesa del Sol / Connector 43 		UNSIGNALIZED			UNSIGNALIZED			C	C
		UNSIGNALIZED			UNSIGNALIZED			A	A

Legend

-  - 2015
-  - 2020
-  - 2025
-  Future Movement
-  Movement Added

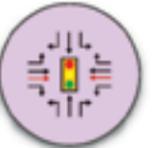
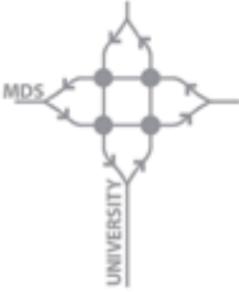
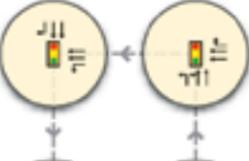
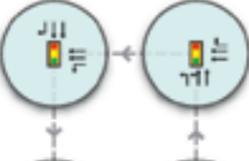
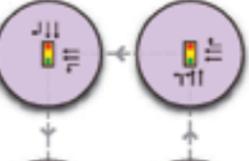
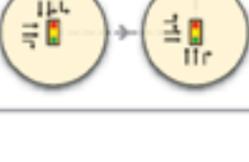
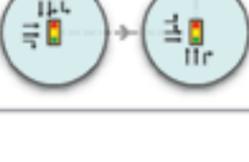
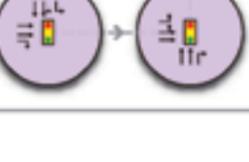
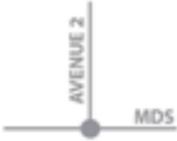
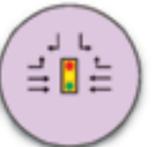
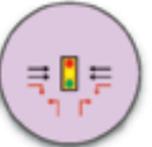


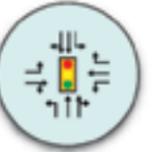
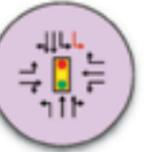
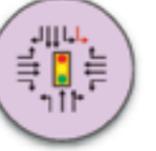
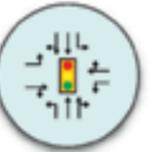
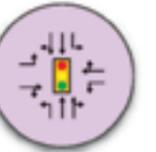
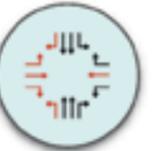
**INTERSECTION
LANEAGE AND CAPACITY**

Figure 3D-2 (continued)

Legend

-  - 2015
-  - 2020
-  - 2025
-  Future Movement
-  Movement Added

Signalized Intersections (Through 2025)	2015			2020			2025		
Mesa del Sol/ Connector 36 	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak
		UNSIGNALIZED			B	B		C	C
Community Center Squareabout 	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak
		BB	BB		BB	BB		BB	BB
		AB	AA		BB	BB		BB	BB
Mesa del Sol/ Avenue 2 	Laneage*	AM Peak	PM Peak	Laneage*	AM Peak	PM Peak	Laneage*	AM Peak	PM Peak
		UNSIGNALIZED			UNSIGNALIZED			A	A
		<small>* If included in Level B Planning Area</small>			<small>* If included in Level B Planning Area</small>			<small>* If included in Level B Planning Area</small>	
Bobby Foster / Connector 41 	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak
		UNSIGNALIZED			UNSIGNALIZED			C	B

Signalized Intersections (Through 2025)	2015			2020			2025		
	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak	Laneage	AM Peak	PM Peak
Bobby Foster/ Connector 38 		UNSIGNALIZED			UNSIGNALIZED			A	A
University/ Avenue 1 		UNSIGNALIZED			A	B		C	C
University/ Bobby Foster 		C	C		C	C		C	D
University/ Connector 36 		UNSIGNALIZED			B	A		B	A
University/ Connector 11 		UNSIGNALIZED			UNSIGNALIZED			C	B

**INTERSECTION
LANEAGE AND CAPACITY**
Figure 3D-2 (continued)

Legend

-  - 2015
-  - 2020
-  - 2025
-  Future Movement
-  Movement Added
- 



Table 3D-1 Trip Generation Calculations for MDS Traffix Model

Traffix Zone ID	Zones	Land Use (DU - Dwelling Units; KSF - 1000 Square Feet)	2015					2020					2025							
			Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily
				In	Out	In	Out			In	Out	In	Out			In	Out			
1	Community Center 1	Condo/Townhouse (ITE 230) - DU	220	8	47	57	21	679	300	11	64	77	29	967	330	12	70	84	32	1064
		Total Trips	-	8	47	57	21	679	-	11	64	77	29	967	-	12	70	84	32	1064
2	Community Center 2	Specialty Retail Center (ITE B14) - KSF	131.25	101	138	116	109	3063	131.25	105	136	115	111	3201	131.25	105	136	115	111	3201
		Total Trips	-	101	138	116	109	3063	-	105	136	115	111	3201	-	105	136	115	111	3201
3	Community Center 3	Specialty Retail Center (ITE B14) - KSF	175	134	184	154	146	4085	175	140	181	153	149	4268	175	140	181	153	149	4268
		Total Trips	-	134	184	154	146	4085	-	140	181	153	149	4268	-	140	181	153	149	4268
4	Community Center 4	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	160	6	34	41	15	516	160	6	34	41	15	516
		Total Trips	-	0	0	0	0	0	-	6	34	41	15	516	-	6	34	41	15	516
5	Community Center 5	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
6	Community Center 6	Specialty Retail Center (ITE B14) - KSF	131.25	101	138	116	109	3063	131.25	105	136	115	111	3201	131.25	105	136	115	111	3201
		Total Trips	-	101	138	116	109	3063	-	105	136	115	111	3201	-	105	136	115	111	3201
7	Community Center 7	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	-	-	-	-	-	-	330	12	70	84	32	1064
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	12	70	84	32	1064
8	Community Center 8	Specialty Retail Center (ITE B14) - KSF	-	-	-	-	-	-	109	87	113	95	93	2659	109	87	113	95	93	2659
		Total Trips	-	0	0	0	0	0	-	87	113	95	93	2659	-	87	113	95	93	2659
9	Community Center 9	Specialty Retail Center (ITE B14) - KSF	-	-	-	-	-	-	163.5	130	170	143	139	3988	163.5	130	170	143	139	3988
		Total Trips	-	0	0	0	0	0	-	130	170	143	139	3988	-	130	170	143	139	3988
10	Active Adult 1	Senior Adult Housing Attached (ITE 252) - DU	2000	34	52	99	47	3665	2000	35	51	98	48	3830	2000	35	51	98	48	3830
		Total Trips	-	34	52	99	47	3665	-	35	51	98	48	3830	-	35	51	98	48	3830
11	Broadway Retail 1	Free-Standing Discount Superstore (ITE B13) - KSF	-	-	-	-	-	-	295	135	155	410	326	7989	295	135	155	410	326	7989
		Total Trips	-	0	0	0	0	0	-	135	155	410	326	7989	-	135	155	410	326	7989
12	Broadway Retail 2	Free-Standing Discount Superstore (ITE B13) - KSF	595	260	317	834	644	15420	874	399	460	1214	965	23670	874	399	460	1214	965	23670
		Total Trips	-	260	317	834	644	15420	-	399	460	1214	965	23670	-	399	460	1214	965	23670
13	Broadway Retail 3	Free-Standing Discount Superstore (ITE B13) - KSF	105	46	56	147	114	2721	295	135	155	410	326	7989	295	135	155	410	326	7989
		Total Trips	-	46	56	147	114	2721	-	135	155	410	326	7989	-	135	155	410	326	7989
17	Urban Center 1	Specialty Retail Center (ITE B14) - KSF	440	337	462	388	366	10270	440	351	456	384	374	10732	440	351	456	384	374	10732
		Condo/Townhouse (ITE 230) - DU	50	2	11	13	5	154	50	2	11	13	5	161	50	2	11	13	5	161
18	Urban Center 2	Specialty Retail Center (ITE B14) - KSF	-	-	-	-	-	-	220	176	228	192	187	5366	220	176	228	192	187	5366
		Total Trips	-	0	0	0	0	0	-	176	228	192	187	5366	-	176	228	192	187	5366

Table 3D-1 (continued) Trip Generation Calculations for MDS Traffic Model

Traffic Zone ID	Zones	Land Use (DU - Dwelling Units, KSF - 1000 Square Feet)	2015					2020					2025							
			Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily
				In	Out	In	Out			In	Out	In	Out							
19	Urban Center 3	Specialty Retail Center (ITE 814) - KSF	110	84	115	97	92	2567	440	351	456	384	374	10732	440	351	456	384	374	10732
		Total Trips	-	84	115	97	92	2567	-	351	456	384	374	10732	-	351	456	384	374	10732
20	Urban Center 4	Specialty Retail Center (ITE 814) - KSF	220	168	231	194	183	5135	220	176	228	192	187	5366	220	176	228	192	187	5366
		Condo/Townhouse (ITE 230) - DU	95	3	20	24	9	293	130	5	28	33	12	419	130	5	28	33	12	419
		Total Trips	-	172	251	218	192	5428	-	180	256	225	199	5785	-	180	256	225	199	5785
21	Urban Center 5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
22	Urban Center 6	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	150	5	32	38	14	484	150	5	32	38	14	484
		Total Trips	-	0	0	0	0	0	-	5	32	38	14	484	-	5	32	38	14	484
23	Urban Center 7	Specialty Retail Center (ITE 814) - KSF	330	253	346	291	275	7702	330	263	342	288	280	8049	330	263	342	288	280	8049
		Condo/Townhouse (ITE 230) - DU	95	3	20	24	9	293	200	7	43	51	19	645	200	7	43	51	19	645
		Total Trips	-	256	367	315	284	7996	-	271	385	339	299	8694	-	271	385	339	299	8694
24	Urban Center 8	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	100	4	21	26	10	322	100	4	21	26	10	322
		Total Trips	-	0	0	0	0	0	-	4	21	26	10	322	-	4	21	26	10	322
25	Urban Center 9	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	200	7	43	51	19	645	200	7	43	51	19	645
		Total Trips	-	0	0	0	0	0	-	7	43	51	19	645	-	7	43	51	19	645
26	Mesa del Sol Res Corridor 1	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	350	13	75	89	34	1129	450	16	96	115	43	1451
		Total Trips	-	0	0	0	0	0	-	13	75	89	34	1129	-	16	96	115	43	1451
27	Mesa del Sol Res Corridor 2	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	-	-	-	-	-	-	450	16	96	115	43	1451
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	16	96	115	43	1451
28	Mesa del Sol Res Corridor 3	Condo/Townhouse (ITE 230) - DU	200	7	43	52	19	617	200	7	43	51	19	645	500	18	106	128	48	1612
		Total Trips	-	7	43	52	19	617	-	7	43	51	19	645	-	18	106	128	48	1612
29	Mesa del Sol Res Corridor 4	Condo/Townhouse (ITE 230) - DU	400	14	86	103	38	1234	400	15	85	102	38	1290	500	18	106	128	48	1612
		Total Trips	-	14	86	103	38	1234	-	15	85	102	38	1290	-	18	106	128	48	1612
30	Mesa del Sol Res Corridor 5	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	400	15	85	102	38	1290	500	18	106	128	48	1612
		Total Trips	-	0	0	0	0	0	-	15	85	102	38	1290	-	18	106	128	48	1612
31	Mesa del Sol Res Corridor 6	Condo/Townhouse (ITE 230) - DU	400	14	86	103	38	1234	400	15	85	102	38	1290	500	18	106	128	48	1612
		Total Trips	-	14	86	103	38	1234	-	15	85	102	38	1290	-	18	106	128	48	1612
32	Mesa del Sol Res Corridor 7	Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	400	15	85	102	38	1290	500	18	106	128	48	1612
		Total Trips	-	0	0	0	0	0	-	15	85	102	38	1290	-	18	106	128	48	1612
33	Residential 1	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	-	350	32	115	163	73	1843
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	32	115	163	73	1843



Table 3D-1 (continued) Trip Generation Calculations for MDS Traffic Model

Traffic Zone ID	Zones	Land Use (DU - Dwelling Units; KSF - 1000 Square Feet)	2015					2020					2025							
			Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily
				In	Out	In	Out			In	Out	In	Out			In	Out			
34	Residential 2	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	200	18	66	93	42	1053	
		Total Trips	-	0	0	0	0	-	0	0	0	0	-	18	66	93	42	1053		
35	Residential 3	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	160	15	52	75	33	843	200	18	66	93	42	1053	
		Total Trips	-	0	0	0	0	-	15	52	75	33	843	-	18	66	93	42	1053	
36	Residential 4	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	160	15	52	75	33	843	200	18	66	93	42	1053	
		Total Trips	-	0	0	0	0	-	15	52	75	33	843	-	18	66	93	42	1053	
37	Residential 5	Single Family Detached Housing (ITE 210) - DU	190	17	63	89	39	958	190	17	62	89	40	1001	190	17	62	89	40	1001
		Total Trips	-	17	63	89	39	958	-	17	62	89	40	1001	-	17	62	89	40	1001
38	Residential 6	Single Family Detached Housing (ITE 210) - DU	255	22	85	120	52	1285	255	23	84	119	53	1343	255	23	84	119	53	1343
		Total Trips	-	22	85	120	52	1285	-	23	84	119	53	1343	-	23	84	119	53	1343
39	Residential 7	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	250	23	82	116	52	1317	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	-	23	82	116	52	1317	
40	Residential 8	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	200	18	66	93	42	1053	200	18	66	93	42	1053
		Total Trips	-	0	0	0	0	0	-	18	66	93	42	1053	-	18	66	93	42	1053
41	Residential 9	Single Family Detached Housing (ITE 210) - DU	125	11	42	59	26	630	125	11	41	58	26	658	185	17	61	86	39	974
		Total Trips	-	11	42	59	26	630	-	11	41	58	26	658	-	17	61	86	39	974
42	Residential 10	Single Family Detached Housing (ITE 210) - DU	320	28	106	151	66	1613	320	29	105	149	67	1685	320	29	105	149	67	1685
		Total Trips	-	28	106	151	66	1613	-	29	105	149	67	1685	-	29	105	149	67	1685
43	Residential 11	Single Family Detached Housing (ITE 210) - DU	380	33	126	179	78	1915	380	35	125	177	79	2001	380	35	125	177	79	2001
		Total Trips	-	33	126	179	78	1915	-	35	125	177	79	2001	-	35	125	177	79	2001
44	Residential 12		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
45	Residential 13		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
46	Residential 14		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
47	Residential 15		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0
48	Residential 16	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	300	27	98	140	63	1580	
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	-	27	98	140	63	1580	

Table 3D-1 (continued) Trip Generation Calculations for MDS Traffix Model

Traffix Zone ID	Zones	Land Use (DU - Dwelling Units; KSF - 1000 Square Feet)	2015					2020					2025							
			Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily
				In	Out	In	Out			In	Out	In	Out			In	Out			
49	Residential 17	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	300	27	98	140	63	1580	
		Total Trips	-	0	0	0	0	0	0	0	0	0	0	-	27	98	140	63	1580	
50	Residential 18	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	150	14	49	70	31	790	200	18	66	93	42	1053	
		Total Trips	-	0	0	0	0	-	14	49	70	31	790	-	18	66	93	42	1053	
51	Residential 19	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	150	14	49	70	31	790	200	18	66	93	42	1053	
		Total Trips	-	0	0	0	0	-	14	49	70	31	790	-	18	66	93	42	1053	
56	Residential 24	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	300	27	98	140	63	1580	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	27	98	140	63	1580	
57	Residential 25	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	-	-	-	-	-	-	105	10	34	49	22	553	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	10	34	49	22	553	
58	Residential 26	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	235	21	77	109	49	1238	235	21	77	109	49	1238	
		Total Trips	-	0	0	0	0	-	21	77	109	49	1238	-	21	77	109	49	1238	
59	Residential 27	Single Family Detached Housing (ITE 210) - DU	-	-	-	-	-	350	32	115	163	73	1843	350	32	115	163	73	1843	
		Total Trips	-	0	0	0	0	-	32	115	163	73	1843	-	32	115	163	73	1843	
116	Employment Center 1	Office Park (ITE 750) - KSF	450	325	51	70	318	2706	620	467	69	95	448	3897	620	467	69	95	448	3897
		Total Trips	-	325	51	70	318	2706	-	467	69	95	448	3897	-	467	69	95	448	3897
117	Employment Center 2	Office Park (ITE 750) - KSF	168.75	122	19	26	119	1015	570	429	64	88	412	3582	570	429	64	88	412	3582
		Total Trips	-	122	19	26	119	1015	-	429	64	88	412	3582	-	429	64	88	412	3582
118	Employment Center 3	Office Park (ITE 750) - KSF	337.5	244	38	52	239	2030	350	263	39	54	253	2200	350	263	39	54	253	2200
		Total Trips	-	244	38	52	239	2030	-	263	39	54	253	2200	-	263	39	54	253	2200
119	Employment Center 4	Office Park (ITE 750) - KSF	168.75	122	19	26	119	1015	310	233	35	48	224	1948	310	233	35	48	224	1948
		Total Trips	-	122	19	26	119	1015	-	233	35	48	224	1948	-	233	35	48	224	1948
120	Employment Center 5	Office Park (ITE 750) - KSF	-	-	-	-	-	-	210	158	23	32	152	1320	236	178	26	36	170	1483
		Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	300	11	64	77	29	967	300	11	64	77	29	967
		Total Trips	-	0	0	0	0	0	-	169	87	109	180	2287	-	189	90	113	199	2451
121	Employment Center 6	Office Park (ITE 750) - KSF	-	-	-	-	-	-	-	-	-	-	-	-	350	263	39	54	253	2200
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	263	39	54	253	2200
122	Employment Center 7	Office Park (ITE 750) - KSF	-	-	-	-	-	-	-	-	-	-	-	-	350	263	39	54	253	2200
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	263	39	54	253	2200
123	Employment Center 8	Office Park (ITE 750) - KSF	-	-	-	-	-	-	-	-	-	-	-	-	350	263	39	54	253	2200
		Total Trips	-	0	0	0	0	0	-	0	0	0	0	0	-	263	39	54	253	2200



Table 3D-1 (continued) Trip Generation Calculations for MDS Traffic Model

Traffic Zone ID	Zones	Land Use (DU - Dwelling Units; KSF - 1000 Square Feet)	2015					2020					2025							
			Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily	Amount	Trip (AM)		Trip (PM)		Daily
				In	Out	In	Out			In	Out	In	Out			In	Out			
130	Los Picaros Corridor 1	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	178	142	185	155	151	4342	1045	834	1084	912	888	25489	
		Total Trips	-	0	0	0	0	-	142	185	155	151	4342	-	834	1084	912	888	25489	
131	Los Picaros Corridor 2	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	209	167	217	182	178	5090	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	167	217	182	178	5090	
132	Village Center 1	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	23	18	24	20	20	561	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	18	24	20	20	561	
133	Village Center 2	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	75	60	78	65	64	1829	
		Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	-	-	-	-	-	190	7	40	48	18	613	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	67	118	114	82	2442	
134	Village Center 3	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	10	8	10	9	8	244	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	8	10	9	8	244	
135	Village Center 4	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	10	8	10	9	8	244	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	8	10	9	8	244	
136	Village Center 5	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	25	20	26	22	21	610	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	20	26	22	21	610	
137	Village Center 6	Specialty Retail Center (ITE 814) - KSF	-	-	-	-	-	-	-	-	-	-	-	75	60	78	65	64	1829	
		Condo/Townhouse (ITE 230) - DU	-	-	-	-	-	-	-	-	-	-	-	200	7	43	51	19	645	
		Total Trips	-	0	0	0	0	-	0	0	0	0	0	-	67	120	116	83	2474	
Mesa del Sol Total Trips				2492	2902	3584	3277	75366		4658	5357	6864	6226	144479		6760	7916	9622	8722	200024

3E Off Site Roadway Effects

3E.1 Off-Site Enhanced Network

Based on results of the travel demand modeling performed during the Level A planning process for the 2025 No-Build scenario (i.e. no development at Mesa del Sol), it has been observed that much of the existing transportation network in the Albuquerque South Valley area is inadequate to serve future traffic growth as forecast by MRCOG, without Mesa del Sol. As a means to distinguish the traffic impacts due to Mesa del Sol development from the traffic impacts on the existing network without Mesa del Sol, it has been discussed with City of Albuquerque Department of Municipal Development staff and agreed that a theoretical “enhanced network” for off-site roadways in the area would be developed. This enhanced network includes the addition of theoretical capacity improvements needed to meet acceptable levels of service in 2015 and 2025, unrelated to Mesa del Sol. All travel demand modeling developed for this Level B document is based on this premise and approach.

Modification to MTP Off-Site Assumptions for 2015 and 2025

Widespread capacity deficiencies are foreseen in the vicinity of Mesa del Sol in the regional Metropolitan Transportation Plan (MTP), completely unrelated to any development in Mesa del Sol itself. It is therefore difficult to distinguish the root cause of traffic capacity issues associated with the proposed development given this background condition. The background MTP network for 2015 and 2025 was modified in this analysis, adding lanes to MTP roadways where necessary to provide sufficient capacity for the “no build” condition. The “Area of Impact” relative to the identification of the need for enhancements that has been taken into consideration in this analysis is shown in Figure 3E-1 following. The location of the increases in capacity in the background transportation network is illustrated on Figures 3E-2 and 3E-3 for 2015, and on Figures 3E-8 and 3E-9 for 2025. Tables 3E-1 and 3E-2 list all of the lane additions to the area’s transportation network to create the “enhanced” system.

Generally speaking, MTP roads planned for 2015 and 2025 were widened by one lane in each direction where they were deficient in terms of capacity. Exceptions were:

- Stretches of NM 47 in Valencia County required an additional two lanes in each direction by 2025.
- River crossings on Rio Bravo and on Bridge were widened by two and three lanes respectively by 2025 in order to provide sufficient capacity to serve travel demand crossing the river. Note that this results in bridges as wide as 10 lanes, the feasibility of which is not implied in this analysis. It only serves to establish a working baseline condition on which to portray traffic impacts related to the proposed development. (An obvious and recurrent problem with transportation planning in the area is the lack of adequate river crossing capacity, and the strong need for new bridges over the Rio Grande.)

3E.2 Off-Site Effects

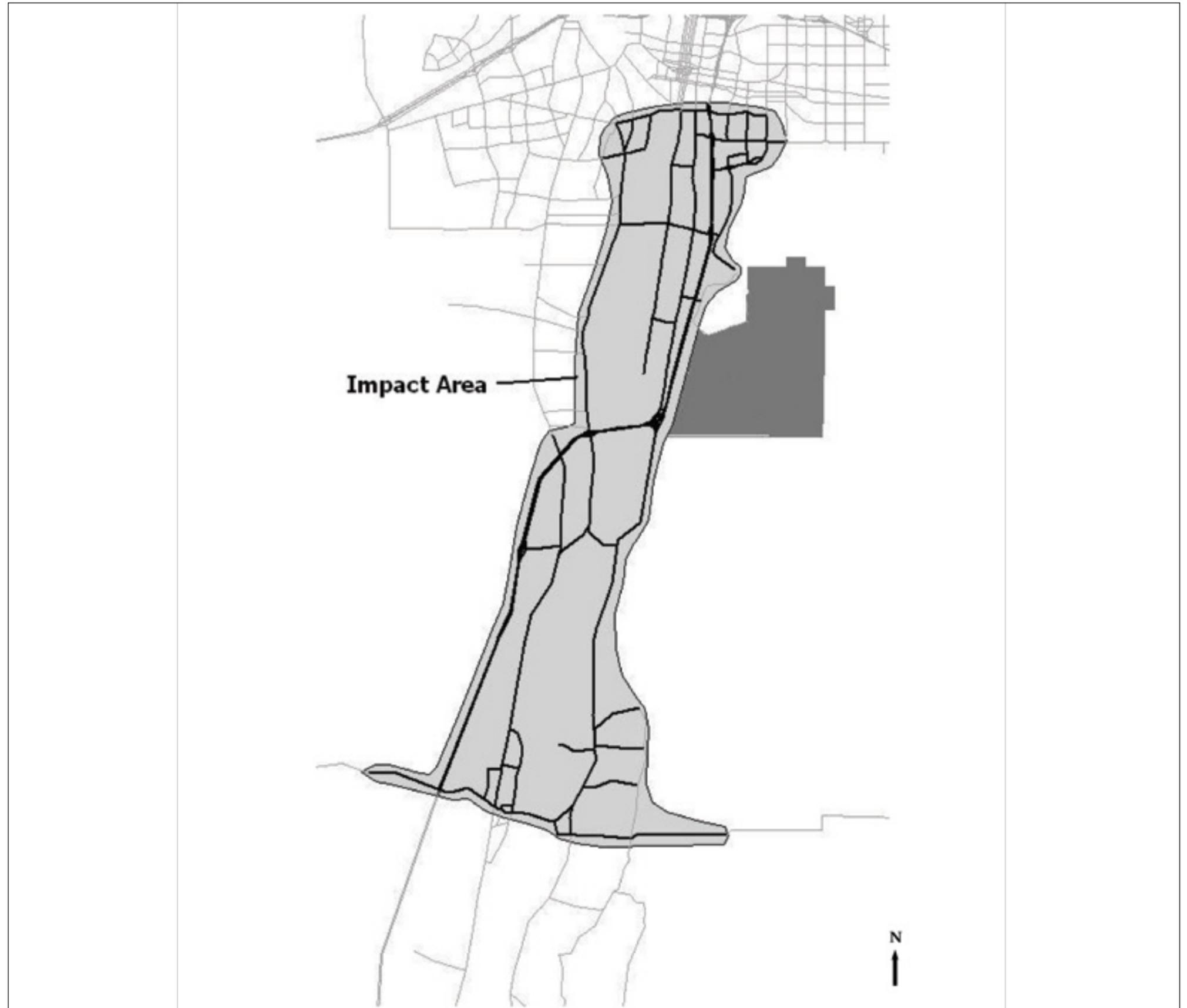
These assumptions for an enhanced network were carried forward as background to the Level B Plan associated with the Mesa del Sol development in 2015 and 2025. Traffic volumes were forecast for 2015 and 2025 as shown in Appendix 3C. Off-site effects (capacity deficiencies) of these forecast volumes are shown on Figures 3E-4 through 3E-7 for 2015 and on Figures 3E-10 through 3E-13 for 2025.

Tables 3E-3 and 3E-4 summarize the Off-Site Capacity Deficiencies for 2015 and 2025 respectively. These tables also include a listing of the specific location of the improvements (lane additions) needed to address the capacity concerns, and the conceptual cost of the improvements in 2006 dollars.



**DESIGNATED
IMPACT AREA**

Figure 3E-1





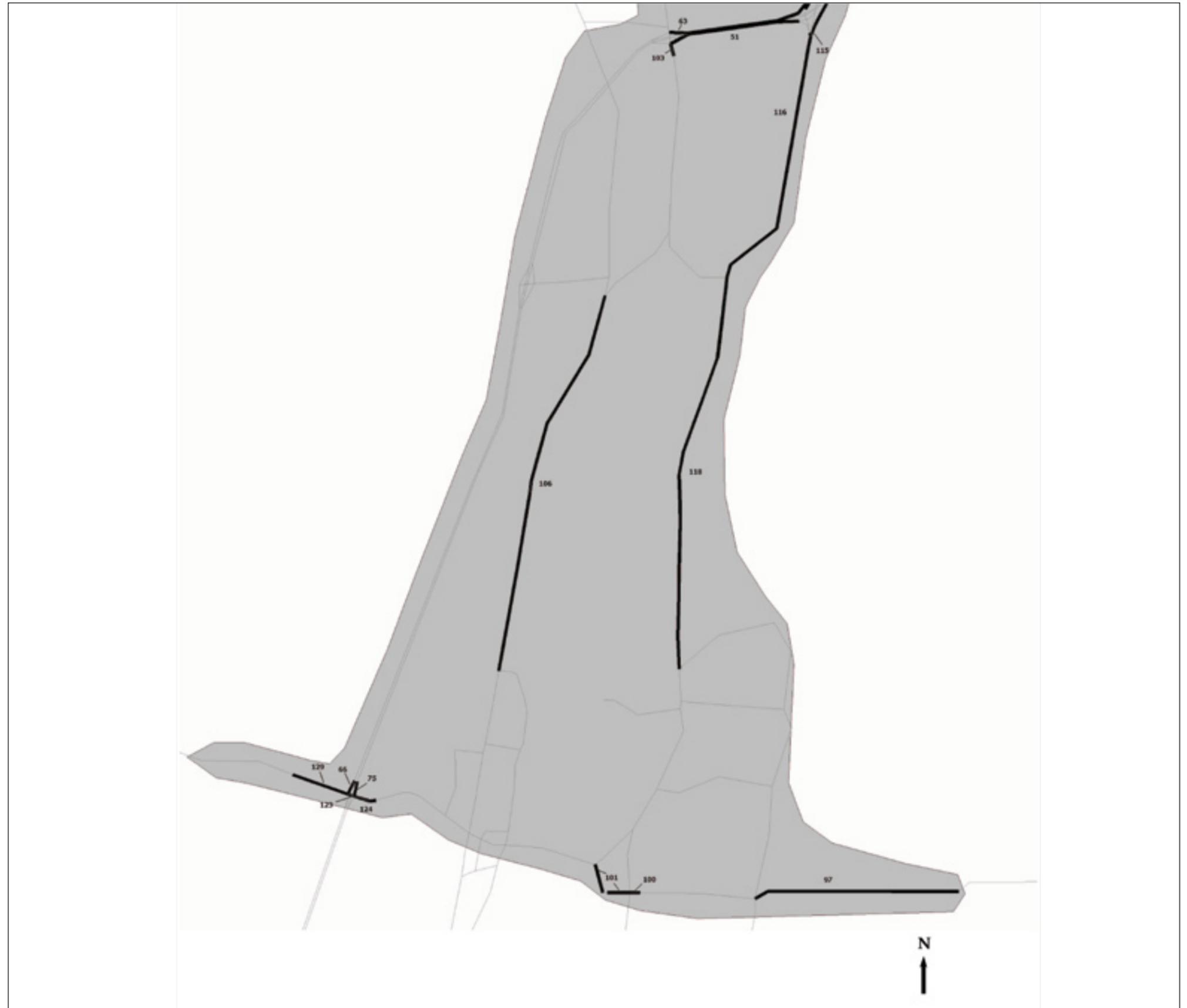
**ENHANCED MTP
NETWORK 2015
(NORTH SEGMENT)**

Figure 3E-2



**ENHANCED MTP
NETWORK 2015
(SOUTH SEGMENT)**

Figure 3E-3





**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2015
(NORTH SEGMENT)**

Figure 3E-4

Legend

- LOS E
- LOS F
- Rio Grande

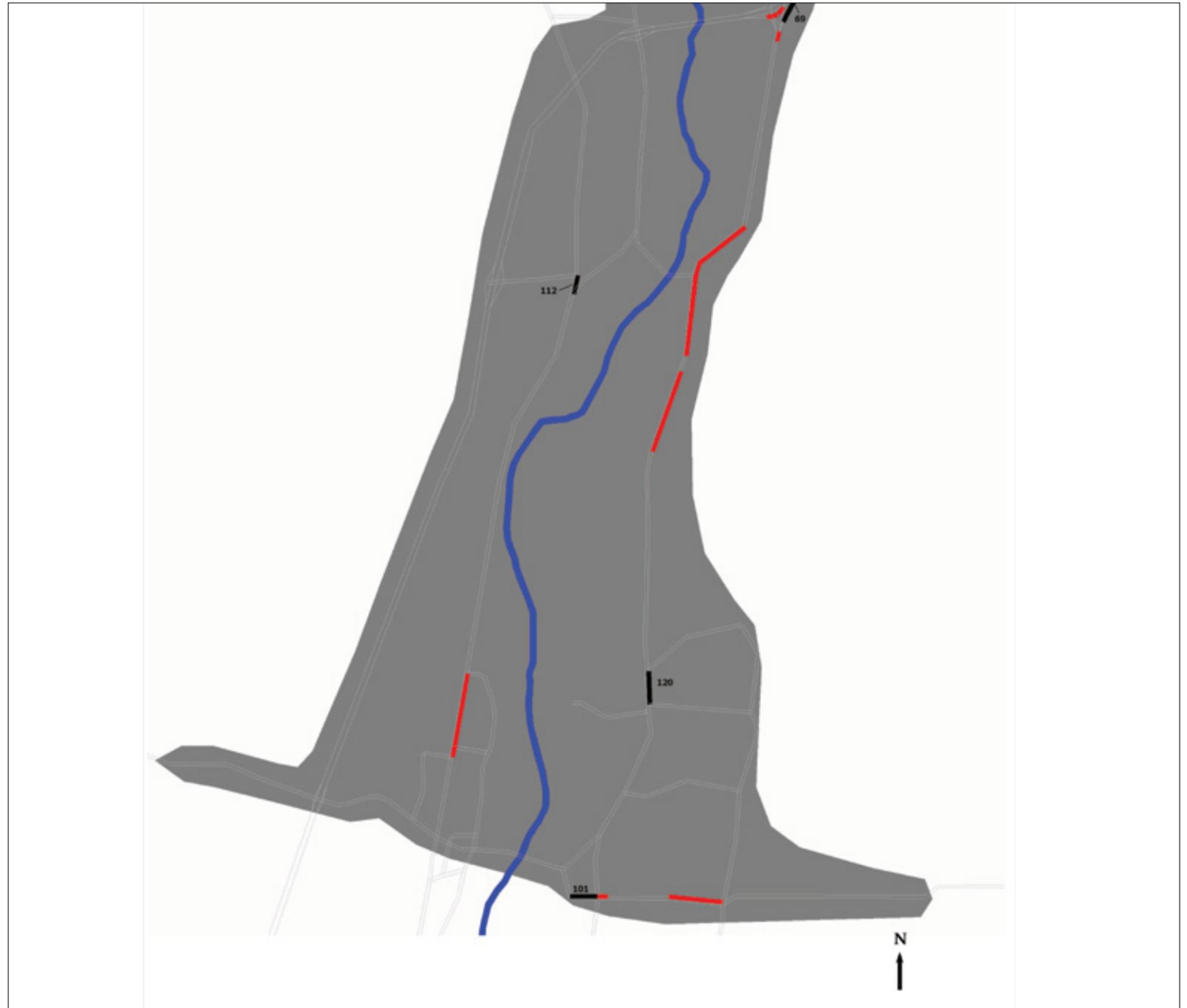


**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2015
(SOUTH SEGMENT)**

Figure 3E-5

Legend

-  LOS E
-  LOS F
-  Rio Grande





**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2015
(NORTH SEGMENT)**

Figure 3E-6

Legend

- LOS E
- LOS F
- Rio Grande



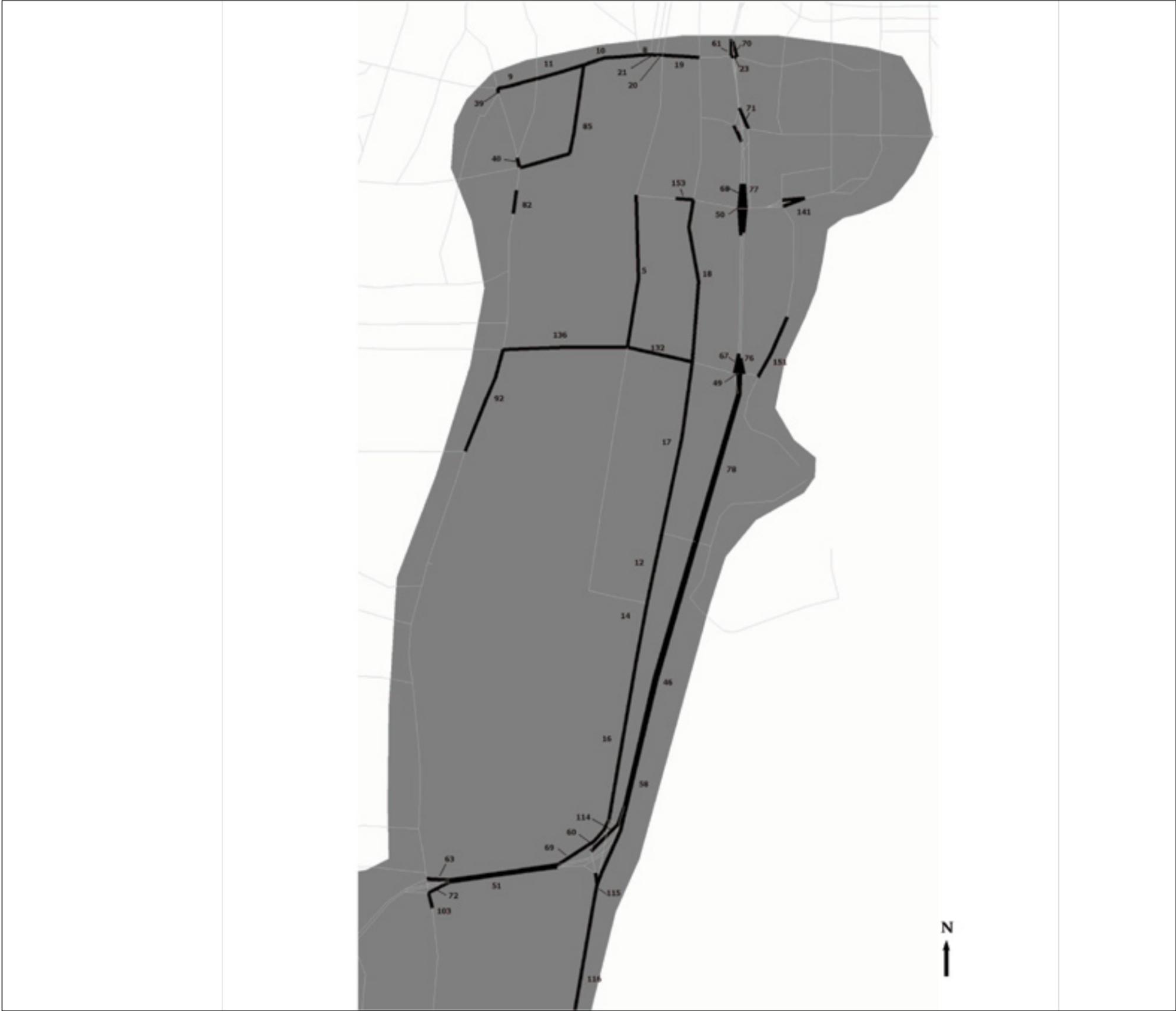
**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2015
(SOUTH SEGMENT)**

Figure 3E-7

Legend

-  LOS E
-  LOS F
-  Rio Grande





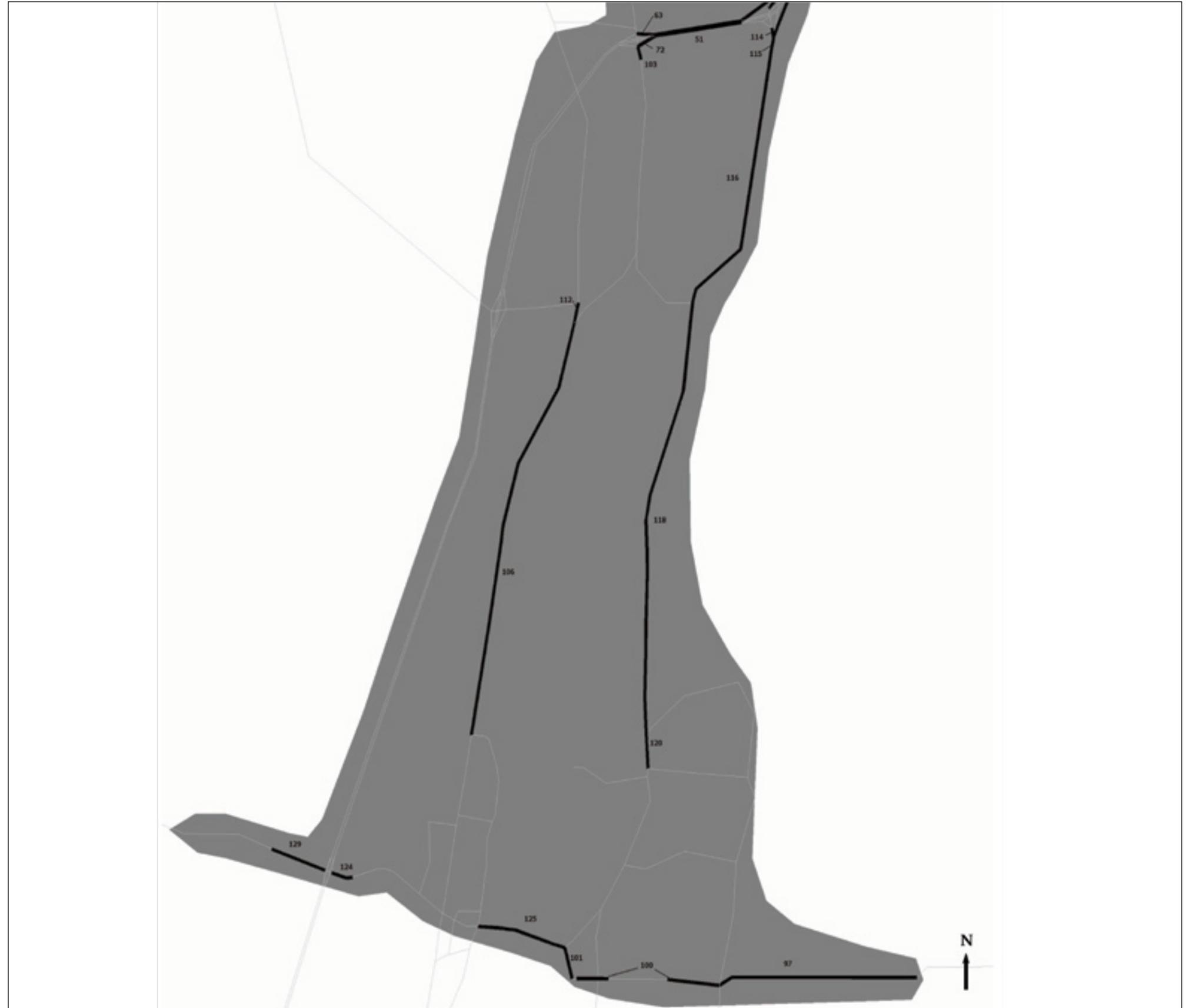
**ENHANCED MTP
NETWORK 2025
(NORTH SEGMENT)**

Figure 3E-8



**ENHANCED MTP
NETWORK 2025
(SOUTH SEGMENT)**

Figure 3E-9





**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2025
(NORTH SEGMENT)**

Figure 3E-10

Legend

- LOS E
- LOS F
- Rio Grande

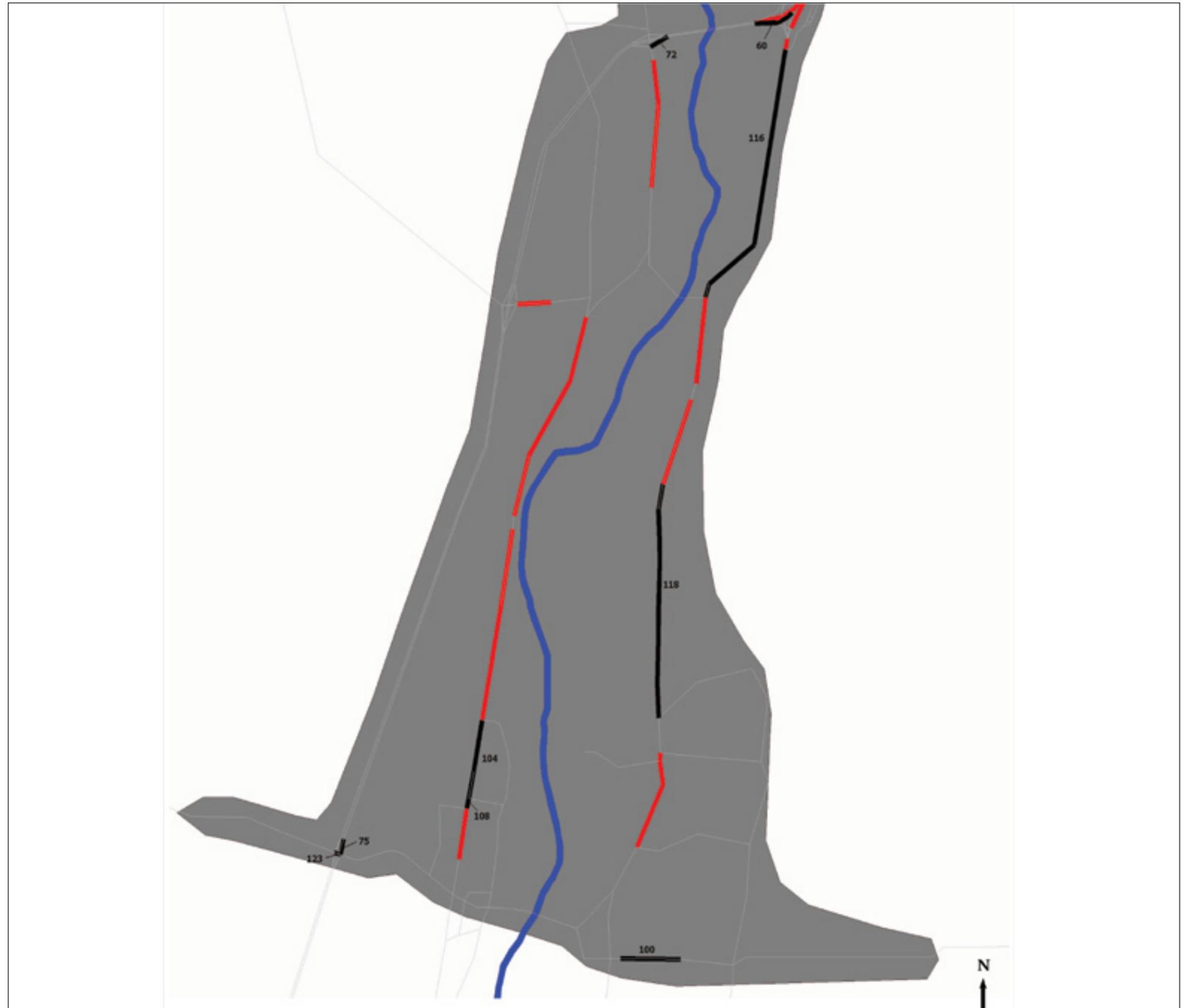


**LEVEL OF SERVICE
DEFICIENCIES
AM PEAK HOUR 2025
(SOUTH SEGMENT)**

Figure 3E-11

Legend

-  LOS E
-  LOS F
-  Rio Grande





**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2025
(NORTH SEGMENT)**

Figure 3E-12

Legend

- LOS E
- LOS F
- Rio Grande

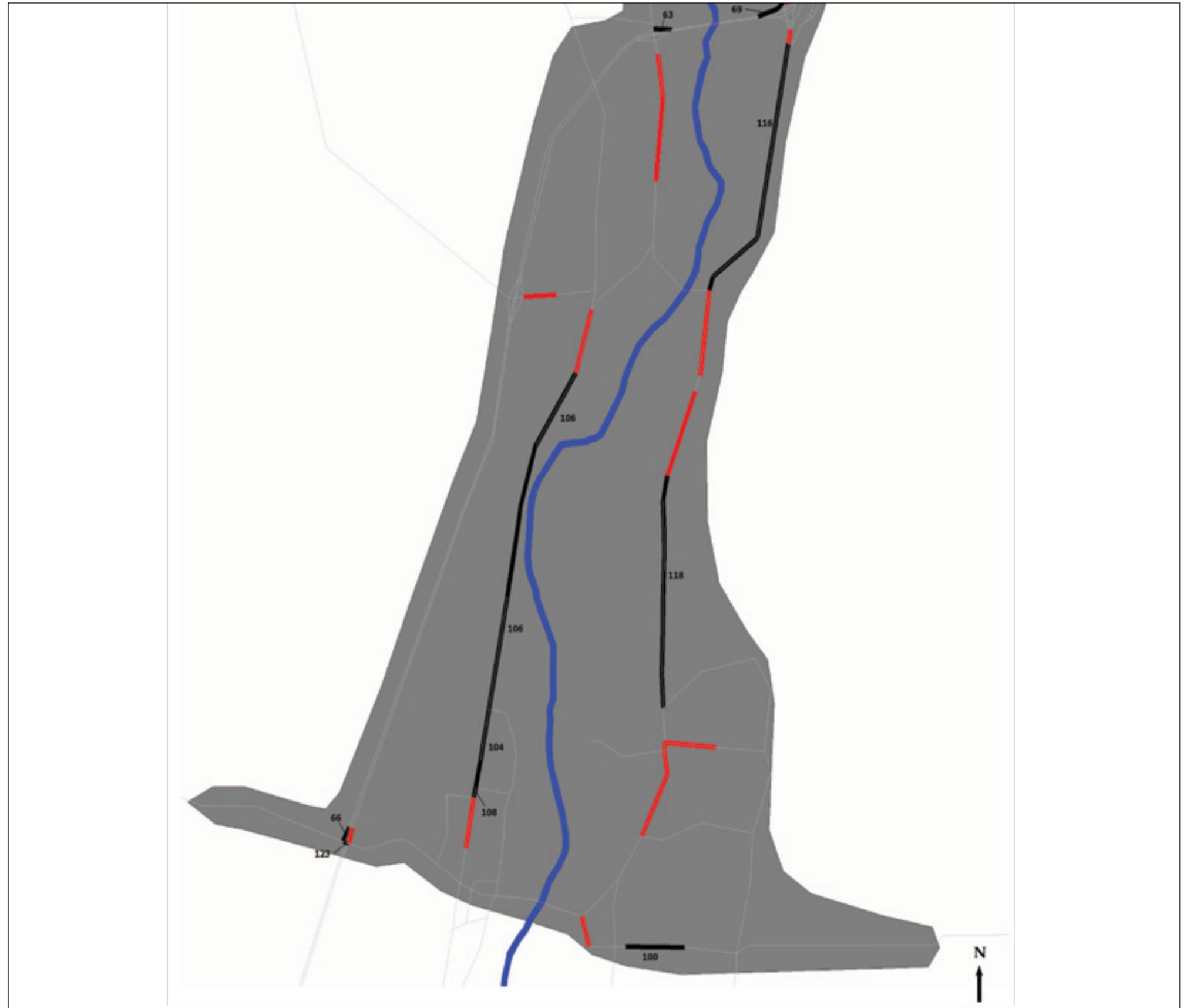


**LEVEL OF SERVICE
DEFICIENCIES
PM PEAK HOUR 2025
(SOUTH SEGMENT)**

Figure 3E-13

Legend

-  LOS E
-  LOS F
-  Rio Grande



**Table 3E-1 2015 “Enhanced” MTP
Lane Additions to Roadways in Addition to the MTP for 2015**

MapIndex	Roadway	From	To	Directional Miles	2015 MTP Lanes	Added Lanes	2015 Enhanced Lanes	Added Lane-Mi
5	2nd	Woodward	Rio Bravo	3.08	1	1	2	3.08
8	Bridge	8th	4th	0.20	2	2	4	0.40
10	Bridge	Isleta	8th	1.16	2	2	4	2.32
11	Bridge	Sunset	Isleta	0.98	2.3	0.7	3	0.69
14	Broadway	Desert	MDS Blvd	1.88	2	1	3	1.88
16	Broadway	MDS Blvd	I-25	2.58	2	1	3	2.58
19	Cesar Chavez	2nd	Broadway	0.74	2	1	3	0.74
20	Cesar Chavez	3rd	2nd	0.12	2	1	3	0.12
21	Cesar Chavez	4th	3rd	0.14	2	1	3	0.14
23	Cesar Chavez	I-25	At Interchange	0.06	2	1	3	0.06
34	Gibson	I-25	University	0.03	2	1	3	0.03
46	I-25	At Interchange	MDS	1.90	2	1	3	1.90
51	I-25	Broadway	Isleta	2.21	2	1	3	2.21
56	I-25	Gibson	Sunport	0.52	2	1	3	0.52
58	I-25	MDS	Broadway	1.48	2	1	3	1.48
60	I-25 Off Ramp	To Broadway		0.90	1	1	2	0.90
61	I-25 Off Ramp	To Cesar Chavez		0.18	1	1	2	0.18
62	I-25 Off Ramp	To Gibson		0.17	1	1	2	0.17
63	I-25 Off Ramp	To Isleta		0.24	1	1	2	0.24
66	I-25 Off Ramp	To NM 6		0.19	1	1	2	0.19
67	I-25 Off Ramp	To Rio Bravo		0.31	1	1	2	0.31
68	I-25 Off Ramp	To Sunport		0.59	1	1	2	0.59
69	I-25 On Ramp	From Broadway		1.03	1	1	2	1.03
70	I-25 On Ramp	From Cesar Chavez		0.16	1	1	2	0.16
71	I-25 On Ramp	From Gibson		0.21	1	1	2	0.21
72	I-25 On Ramp	From Isleta		0.23	1	1	2	0.23
75	I-25 On Ramp	From NM 6		0.19	1	1	2	0.19
76	I-25 On Ramp	From Rio Bravo		0.31	1	1	2	0.31
77	I-25 On Ramp	From Sunport		0.27	1	1	2	0.27
78	I-25	Rio Bravo	MDS	5.51	2	1	3	5.51
79	I-25	Sunport	Rio Bravo	2.18	2	1	3	2.18
85	Isleta	Bridge	Goff	2.09	1.3	0.7	2	1.46
97	Meadowlake	E of NM 263		5.44	1	1	2	5.44
100	NM 263	NM 47	La Ladera	0.12	1	1	2	0.12
101	NM 263	NM 6	NM 47	0.98	1	1	2	0.98
103	NM 314	I-25	NM 147	0.16	1	1	2	0.16
106	NM 314	NM 45	Los Lentos	9.56	1	1	2	9.56
114	NM 47	I-25	At Interchange	0.47	2	1	3	0.47
115	NM 47	I-25	MDS Village 4	0.30	2	1	3	0.30
116	NM 47	MDS Village 4	NM 147	6.22	2	1	3	6.22
118	NM 47	NM 147	Peralta	9.80	2	1	3	9.80
123	NM 6	I-25	At Interchange	0.08	2	1	3	0.08
124	NM 6	I-25	Don Pasqual	0.34	2	1	3	0.34
129	NM 6	W of I-25		1.42	1	1	2	1.42
135	Rio Bravo	I-25	University	0.30	2	1	3	0.30
136	Rio Bravo	Isleta	2nd	2.50	2	1	3	2.50
141	Sunport Off Ramp	To University		0.47	1	1	2	0.47
151	University	Sunport	Rio Bravo	1.34	2	1	3	1.34

**Table 3E-2 2025 “Enhanced” MTP
Lane Additions to Roadways in Addition to the MTP for 2025**

MapIndex	Roadway	From	To	Directional Miles	2025 MTP Lanes	Added Lanes	2025 Enhanced Lanes	Added Lane-Mi
5	2nd	Woodward	Rio Bravo	3.08	1	1	2	3.08
8	Bridge	8th	4th	0.20	2	2	4	0.40
9	Bridge	Goff	Sunset	0.82	2.3	0.7	3	0.57
10	Bridge	Isleta	8th	1.16	2	2	4	2.32
11	Bridge	Sunset	Isleta	0.98	2.3	0.7	3	0.69
12	Broadway	Bobby Foster	Desert	1.46	2	1	3	1.46
14	Broadway	Desert	MDS Blvd	1.16	2	1	3	1.16
16	Broadway	MDS Blvd	I-25	3.28	2	1	3	3.28
17	Broadway	Rio Bravo	Bobby Foster	3.50	2	1	3	3.50
18	Broadway	Woodward	Rio Bravo	3.30	2	1	3	3.30
19	Cesar Chavez	2nd	Broadway	0.74	2	1	3	0.74
20	Cesar Chavez	3rd	2nd	0.12	2	1	3	0.12
21	Cesar Chavez	4th	3rd	0.14	2	1	3	0.14
23	Cesar Chavez	I-25	At Interchange	0.12	2	1	3	0.12
39	Goff	Bridge	Tapia	0.10	1	1	2	0.10
40	Goff	Sunset	Isleta	0.20	1	1	2	0.20
46	I-25	At Interchange	MDS	0.74	2	1	3	0.74
49	I-25	At Interchange	Rio Bravo	0.75	2	1	3	0.75
50	I-25	At Interchange	Sunport	1.00	2	1	3	1.00
51	I-25	Broadway	Isleta	2.21	2	1	3	2.21
58	I-25	MDS	Broadway	2.11	2	1	3	2.11
60	I-25 Off Ramp	To Broadway		0.60	1	1	2	0.60
61	I-25 Off Ramp	To Cesar Chavez		0.18	1	1	2	0.18
63	I-25 Off Ramp	To Isleta		0.24	1	1	2	0.24
67	I-25 Off Ramp	To Rio Bravo		0.20	1	1	2	0.20
68	I-25 Off Ramp	To Sunport		0.52	1	1	2	0.52
69	I-25 On Ramp	From Broadway		0.98	1	1	2	0.98
70	I-25 On Ramp	From Cesar Chavez		0.16	1	1	2	0.16
71	I-25 On Ramp	From Gibson		0.40	1	1	2	0.40
72	I-25 On Ramp	From Isleta		0.23	1	1	2	0.23
76	I-25 On Ramp	From Rio Bravo		0.17	1	1	2	0.17
77	I-25 On Ramp	From Sunport		0.51	1	1	2	0.51
78	I-25	Rio Bravo	MDS	6.02	2	1	3	6.02
82	Isleta	Arenal	Bake	0.46	1.3	1	2.3	0.46
85	Isleta	Bridge	Goff	2.84	1.3	1	2.3	2.84
92	Isleta	Rio Bravo	Gun Club	2.20	1.3	1	2.3	2.20
97	Meadowlake	E of NM 263		5.44	1	1	2	5.44
100	NM 263	NM 47	La Ladera	1.56	1	1	2	1.56
101	NM 263	NM 6	NM 47	1.26	1	1	2	1.26
103	NM 314	I-25	NM 147	0.32	1	1	2	0.32
106	NM 314	NM 45	Los Lentos	9.56	1	1	2	9.56
112	NM 45	NM 317	NM 314	0.44	1	1	2	0.44
114	NM 47	I-25	At Interchange	0.39	2	1	3	0.39
115	NM 47	I-25	MDS Village 4	0.30	2	1	3	0.30
116	NM 47	MDS Village 4	NM 147	6.22	2	1	3	6.22
118	NM 47	NM 147	Peralta	9.80	2	2	4	19.60
120	NM 47	Peralta	Molina	0.80	2	1	3	0.80
124	NM 6	I-25	Don Pasqual	0.68	2	1	3	0.68
125	NM 6	Los Lentos	NM 263	2.62	2	1	3	2.62
139	NM 6	W of I-25		1.42	1	2	3	2.84
132	Rio Bravo	2nd	Broadway	1.34	2	1	3	1.34
136	Rio Bravo	Isleta	2nd	2.50	2	2	4	5.00
141	Sunport Off Ramp	To University		0.47	1	1	2	0.47
151	University	Sunport	Rio Bravo	1.34	2	1	3	1.34
153	Woodward	2nd	Broadway	0.36	1	1	2	0.36



Table 3E-3 Off-Site Capacity Deficiencies 2015-D "Build" Scenario

Map Index	Roadway Name	Direction	Lanes (Directional)	AM Hourly Volume	PM Hourly Volume	Dictating Peak Hour	Theoretical Capacity (Directional)	V/C	LOS	Section Length (ft)	Length (mi)	Limits	Typical Section Type	Conceptual Cost- Lane Addition (2006 Dollars)	Jurisdiction	Comments	
City *																	
21	Cesar Chavez	EB	3	2,615	2,709	AM/PM	2,400	1.13	F	370	0.07	4th	3rd	URBAN	\$ 0.1 Million	City	
10	Bridge Blvd**	WB	4	3,659	3,780	AM/PM	3,200	1.18	F	2,112	0.40	City Boundary	8th	URBAN	\$ 2.3 Million	City	
8	Bridge Blvd	WB	4		3,320	PM	3,200	1.03	F	528	0.10	8th	4th	URBAN	\$ 0.2 Million	City	
33	Gibson	EB	2	2,391		AM	2,200	1.08	F	370	0.07	I-25	At Interchange	URBAN	\$ 0.1 Million	City	
34	Gibson	EB	2		2,491	PM	2,200	1.13	F	158	0.03	I-25	University	URBAN	\$ 0.1 Million	City	
										Length Subtotal	3,538 ft	00.67 mi			City Subtotal	\$ 2.8 Million	
*Costs provided for Long Range Planning purposes																	
**Includes cost for bridge (12' lane x 1200' length)																	
County***																	
11	Bridge Blvd	WB	3	2,452		AM	2,400	1.02	F	1,373	0.26	Sunset	Isleta	URBAN		County	Borderline Condition
10	Bridge Blvd	WB	4	3,659	3,780	AM/PM	3,200	1.18	F	950	0.18	Isleta	City Boundary	URBAN	\$ 0.7 Million	County	
92	Isleta	SB	1.3		1,132	PM	1,040	1.08	F	1,478	0.28	Rio Bravo	Gun Club	URBAN	\$ 0.5 Million	County	
										Length Subtotal	3,802 ft	00.72 mi			County Subtotal	\$ 1.3 Million	
***Costs provided For Information Only, not subject to Planned Communities Criteria																	
State***																	
64	I-25 Off Ramp	NB	1	741		AM	700	1.05	F	2,693	0.51	To MDS		RAMP		State	Design to Avoid
67	I-25 Off Ramp	NB	1	737		AM	700	1.05	F	1,056	0.20	To Rio Bravo		RAMP		State	Covered in 2015 PM
67	I-25 Off Ramp	NB	2		1,549	PM	1,400	1.10	F	1,637	0.31	To Rio Bravo		RAMP	\$ 0.2 Million	State	
60	I-25 Off Ramp	SB	2		1,746	PM	1,400	1.24	F	1,214	0.23	To Broadway		RAMP	\$ 0.2 Million	State	
69	I-25 On Ramp	NB	2	1,578		AM	1,400	1.12	F	2,376	0.45	From Broadway		RAMP	\$ 0.2 Million	State	
73	I-25 On Ramp	NB	1		810	PM	700	1.15	F	2,693	0.51	From MDS		RAMP		State	Design to Avoid
77	I-25 On Ramp	SB	1	756		AM	700	1.08	F	1,742	0.33	From Sunport		RAMP	\$ 0.2 Million	State	
77	I-25 On Ramp	SB	2		1,551	PM	1,400	1.10	F	1,426	0.27	From Sunport		RAMP		State	Covered in 2015 AM
76	I-25 On Ramp	SB	1		747	PM	700	1.06	F	2,693	0.51	From Rio Bravo		RAMP	\$ 0.3 Million	State	
101	NM 263	SB	1	778		AM	750	1.03	F	1,795	0.34	NM 6	NM 47	HIGHWAY-RURAL		State	Borderline Condition
101	NM 263	SB	1		887	PM	750	1.18	F	317	0.06	NM 6	NM 47	HIGHWAY-RURAL	\$ 1.9 Million	State	
112	NM 45	SB	1	890		AM/PM	850	1.05	F	1,162	0.22	NM 317	NM 314	HIGHWAY-RURAL		State	Borderline Condition
120	NM 47	SB	2	1,721	1,819	AM/PM	1,700	1.07	F	2,112	0.40	Peralta	Molina	HIGHWAY-RURAL	\$ 0.6 Million	State	Borderline Condition
114	NM 47	SB	3		2,288	PM	2,250	1.01	F	1,795	0.34	I-25	At Interchange	HIGHWAY-RURAL		State	Borderline Condition
115	NM 47	SB	3		2,313	PM	2,250	1.02	F	792	0.15	I-25	MDS Village 4	HIGHWAY-RURAL		State	Borderline Condition
104	NM 314	SB	1		891	PM	850	1.04	F	4,752	0.90	Los Lentos	Trujillo	HIGHWAY-RURAL		State	Borderline Condition
108	NM 314	SB	1		876	PM	850	1.03	F	634	0.12	Trujillo	Tondre	HIGHWAY-RURAL		State	Borderline Condition
										Length Subtotal	30,888 ft	05.85 mi			State Subtotal	\$ 3.6 Million	
***Costs provided For Information Only, not subject to Planned Communities Criteria																	
										Total Length	38,227 ft	07.24 mi			Total cost	\$ 8.0 Million	

Table 3E-4 Off-Site Capacity Deficiencies 2025-E "Build" Scenario

Map Index	Roadway Name	Direction	Lanes (Directional)	AM Hourly Volume	PM Hourly Volume	Dictating Peak Hour	Theoretical Capacity Directional	V/C	LOS	Section Length (ft)	Length (mi)	Limits	Typical Section Type	Conceptual Cost-Lane Addition (2006 Dollars)	Jurisdiction	Comments	
City*																	
8	Bridge	EB	4	3,632		AM	3,200	1.13	F	528	0.10	8th	4th	URBAN	\$ 0.2 Million	City	
8	Bridge	WB	4	3,759		AM	3,200	1.17	F	528	0.10	8th	4th	URBAN		City	Covered in 2015 PM
10	Bridge**	EB	3	4,354		AM	4,000	1.12	F	2,112	0.40	City Boundary	8th	URBAN	\$ 2.4 Million	City	
10	Bridge	WB	4		4,473	PM	4,000	1.11	F	2,112	0.40	City Boundary	8th	URBAN		City	Covered in 2015 PM
20	Cesar Chavez	EB	3	2,562		AM	2,400	1.23	F	317	0.06	3rd	2nd	URBAN	\$ 0.1 Million	City	
20	Cesar Chavez	WB	3		2,521	PM	2,400	1.05	F	317	0.06	3rd	2nd	URBAN	\$ 0.1 Million	City	
21	Cesar Chavez	EB	2	2,956		AM	2,400	1.17	F	370	0.07	4th	3rd	URBAN		City	Covered in 2015 AM
21	Cesar Chavez	WB	3		3,048	PM	2,400	1.27	F	370	0.07	4th	3rd	URBAN	\$ 0.1 Million	City	
19	Cesar Chavez	EB	3	2,562		AM	2,400	1.06	F	1,954	0.37	2nd	Broadway	URBAN	\$ 0.7 Million	City	
19	Cesar Chavez	WB	3		2,521	PM	2,400	1.05	F	1,954	0.37	2nd	Broadway	URBAN	\$ 0.7 Million	City	
34	Gibson	EB	1	2,594		AM	2,200	1.10	F	158	0.03	I-25	University	URBAN		City	Covered in 2015 PM
34	Gibson	WB	2		2,544	PM	2,200	1.15	F	158	0.03	I-25	University	URBAN	\$ 0.1 Million	City	
131	Randolph	WB	1		771	PM	750	1.02	F	1,478	0.28	University	Yale	URBAN		City	Borderline Condition
153	Woodward	EB	1	728		AM	675	1.07	F	2,165	0.41	2nd	Broadway	URBAN	\$ 0.8 Million	City	
153	Woodward	WB	1		783	PM	675	1.16	F	2,165	0.41	2nd	Broadway	URBAN	\$ 0.8 Million	City	
										Length Subtotal	16,685 ft	03.16 mi			City Subtotal	\$ 5.9 Million	
*Costs provided for Long Range Planning purposes																	
**Includes cost for bridge (12' lane x 1200' length)																	
County***																	
10	Bridge	EB	3	4,354		AM	4,000	1.12	F	950	0.18	Isleta	City Boundary	URBAN	\$ 0.7 Million	County	
10	Bridge	WB	4		4,473	PM	4,000	1.11	F	950	0.18	Isleta	City Boundary	URBAN		County	Covered in 2015 PM
11	Bridge	EB	3	2,700		AM	2,400	1.06	F	2,587	0.49	Sunset	Isleta	URBAN	\$ 0.9 Million	County	
11	Bridge	WB	3		2,780	PM	2,400	1.15	F	2,587	0.49	Sunset	Isleta	URBAN	\$ 0.9 Million	County	
										Length Subtotal	7,075 ft	01.34 mi			County Subtotal	\$ 2.6 Million	
***Costs provided For Information Only, not subject to Planned Communities Criteria																	
State***																	
56	I-25	SB	3		5,884	PM	5,700	1.03	F	1,373	0.26	Gibson	Sunport	HIGHWAY-URBAN		State	Borderline Condition
60	I-25 Off Ramp	EB	1	773		AM	700	1.10	F	2,323	0.44	To Broadway		RAMP	\$ 0.2 Million	State	
60	I-25 Off Ramp	NB	1	773		AM	700	1.11	F	370	0.07	To Broadway		RAMP	\$ 0.1 Million	State	
60	I-25 Off Ramp	SB	2		1,425	PM	1,400	1.01	F	1,214	0.23	To Broadway		RAMP		State	Covered in 2015 PM
62	I-25 Off Ramp	NB	1	779	859	AM/PM	700	1.23	F	475	0.09	To Gibson		RAMP	\$ 0.1 Million	State	
64	I-25 Off Ramp	NB	2	961		AM	700	1.24	F	845	0.16	To MDS		RAMP	\$ 0.0 Million	State	Design to Avoid
67	I-25 Off Ramp	SB	2	1,736		AM	1,400	1.11	F	1,109	0.21	To Rio Bravo		RAMP	\$ 0.1 Million	State	
61	I-25 Off Ramp	SB	2		1,482	PM	1,400	1.05	F	950	0.18	To Cesar Chavez		RAMP	\$ 0.1 Million	State	
63	I-25 Off Ramp	WB	2		1,590	PM	1,400	1.13	F	1,267	0.24	To Isleta		RAMP	\$ 0.1 Million	State	
66	I-25 Off Ramp	SB	1		1,566	PM	900	1.74	F	1,003	0.19	To NM 6		RAMP	\$ 0.1 Million	State	
68	I-25 Off Ramp	SB	1		841	PM	700	1.20	F	1,056	0.20	To Sunport		RAMP	\$ 0.1 Million	State	
73	I-25 On Ramp	NB	1		770	PM	700	1.10	F	792	0.15	From MDS		RAMP		State	Design to Avoid
76	I-25 On Ramp	NB	2		1,461	PM	1,400	1.04	F	1,056	0.20	From Rio Bravo		RAMP		State	Borderline Condition
72	I-25 On Ramp	EB	1	1,559		AM	1,400	1.79	F	1,214	0.23	From Isleta		RAMP	\$ 0.1 Million	State	
75	I-25 On Ramp	NB	1	1,619		AM	900	1.01	F	1,003	0.19	From NM 6		RAMP		State	Borderline Condition
100	NM 263	EB	1		769	PM	750	1.02	F	3,907	0.74	NM 47	La Ladera	HIGHWAY-RURAL		State	Borderline Condition
100	NM 263	WB	1	764		AM	750	1.26	F	3,907	0.74	NM 47	La Ladera	HIGHWAY-RURAL	\$ 1.1 Million	State	

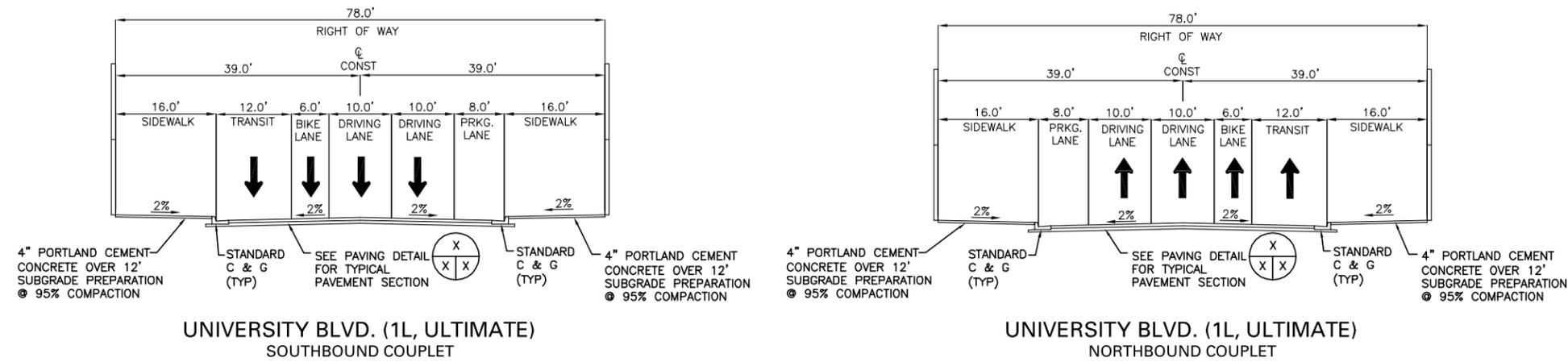


Table 3E-4 (Continued) Off-Site Capacity Deficiencies 2025-E "Build" Scenario

Map Index	Roadway Name	Direction	Lanes (Directional)	AM Hourly Volume	PM Hourly Volume	Dictating Peak Hour	Theoretical Capacity Directional	V/C	LOS	Section Length (ft)	Length (mi)	Limits		Typical Section Type	Conceptual Cost-Lane Addition (2006 Dollars)	Jurisdiction	Comments	
104	NM 314	NB	1	1,075		AM	850	1.25	F	4,752	0.90	Los Lentos	Trujillo	HIGHWAY-RURAL	\$ 1.3 Million	State		
104	NM 314	SB	1		1,128	PM	850	1.32	F	4,752	0.90	Los Lentos	Trujillo	HIGHWAY-RURAL	\$ 0.8 Million	State		
108	NM 314	NB	3	1,069		AM	850	1.18	F	634	0.12	Trujillo	Tondre	HIGHWAY-RURAL	\$ 0.2 Million	State		
108	NM 314	SB	1		1,108	PM	850	1.30	F	634	0.12	Trujillo	Tondre	HIGHWAY-RURAL	\$ 0.2 Million	State		
106	NM 314	SB	2		1,743	PM	1,700	1.02	F	21,278	4.03	NM 45	Los Lentos	HIGHWAY-RURAL		State	Borderline Condition	
116	NM 47	EB	3	3,018		AM	2,550	1.18	F	3,432	0.65	MDS Village 4	NM 147	HIGHWAY-RURAL	\$ 0.9 Million	State		
116	NM 47	WB	3		3,054	PM	2,550	1.19	F	3,432	0.65	MDS Village 4	NM 147	HIGHWAY-RURAL	\$ 0.9 Million	State		
116	NM 47	NB	3	3,018		AM	2,550	1.17	F	12,989	2.46	MDS Village 4	NM 147	HIGHWAY-RURAL	\$ 3.6 Million	State		
116	NM 47	SB	3		2,856	PM	2,550	1.12	F	12,989	2.46	MDS Village 4	NM 147	HIGHWAY-RURAL	\$ 3.6 Million	State		
118	NM 47	NB	2	2,985		AM	2,550	1.08	F	14,098	2.67	NM 147	Peralta	HIGHWAY-RURAL	\$ 3.9 Million	State		
118	NM 47	SB	3		3,018	PM	2,550	1.18	F	14,098	2.67	NM 147	Peralta	HIGHWAY-RURAL	\$ 3.9 Million	State		
123	NM 6	EB	4	1,846	2,061	AM/PM	1,700	1.21	F	422	0.08	I-25	At Interchange	HIGHWAY-RURAL	\$ 0.1 Million	State		
136	Rio Bravo	EB	4	4,481		AM	4,400	1.17	F	6,600	1.25	Isleta	2nd	URBAN	\$ 2.3 Million	State		
136	Rio Bravo	WB	4		4,512	PM	4,400	1.02	F	6,600	1.25	Isleta	2nd	HIGHWAY-URBAN		State	Borderline Condition	
										Length Subtotal	130,574 ft	24.73 mi			State Subtotal	\$ 23.8 Million		
***Costs provided For Information Only, not subject to Planned Communities Criteria																		
										Total Length	154,334 ft	29.23 mi			Total Cost	\$ 31.6 Million		

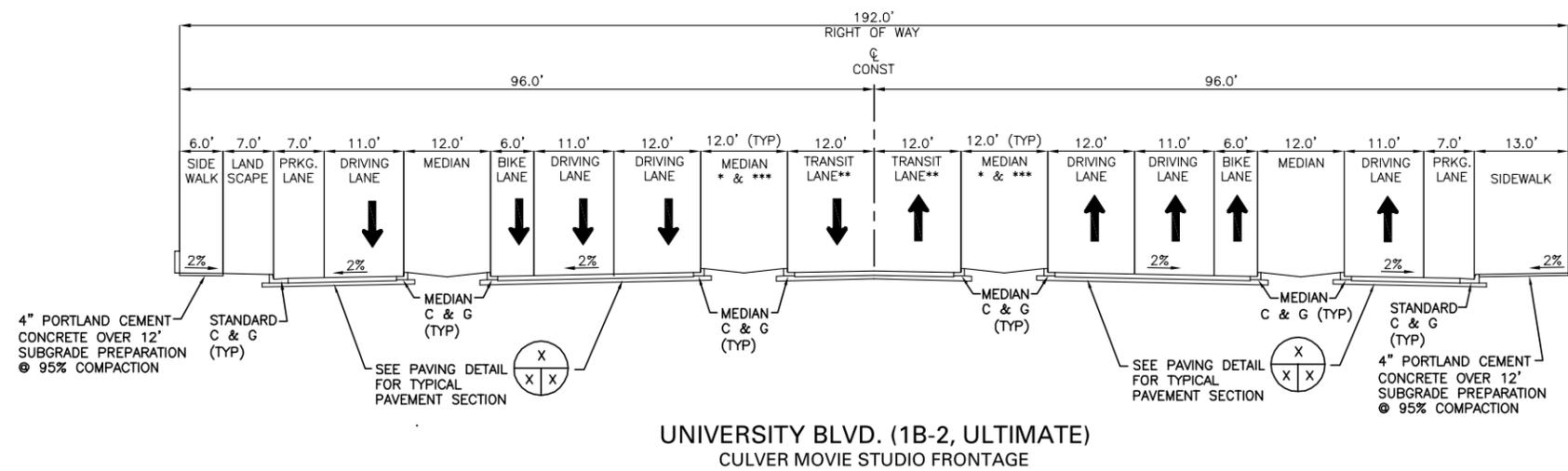
**TYPICAL
ROADWAY SECTION,
UNIVERSITY BLVD.**

Figure 3F-1



UNIVERSITY BLVD. (1L, ULTIMATE)
SOUTHBOUND COUPLER

UNIVERSITY BLVD. (1L, ULTIMATE)
NORTHBOUND COUPLER



UNIVERSITY BLVD. (1B-2, ULTIMATE)
CULVER MOVIE STUDIO FRONTAGE

* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.

** TRANSIT LANE CONFIGURATION TO BE DETERMINED BASED ON SELECTION OF TRANSIT TYPE.

*** ACTUAL WIDTHS MAY VARY BY LOCATION. REFER TO CONSTRUCTION PLANS FOR LOCATIONS OF VARIANCE. MEDIAN TO ACCOMMODATE LEFT TURN LANES AND FUTURE TRANSIT STATIONS AS NECESSARY.

Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



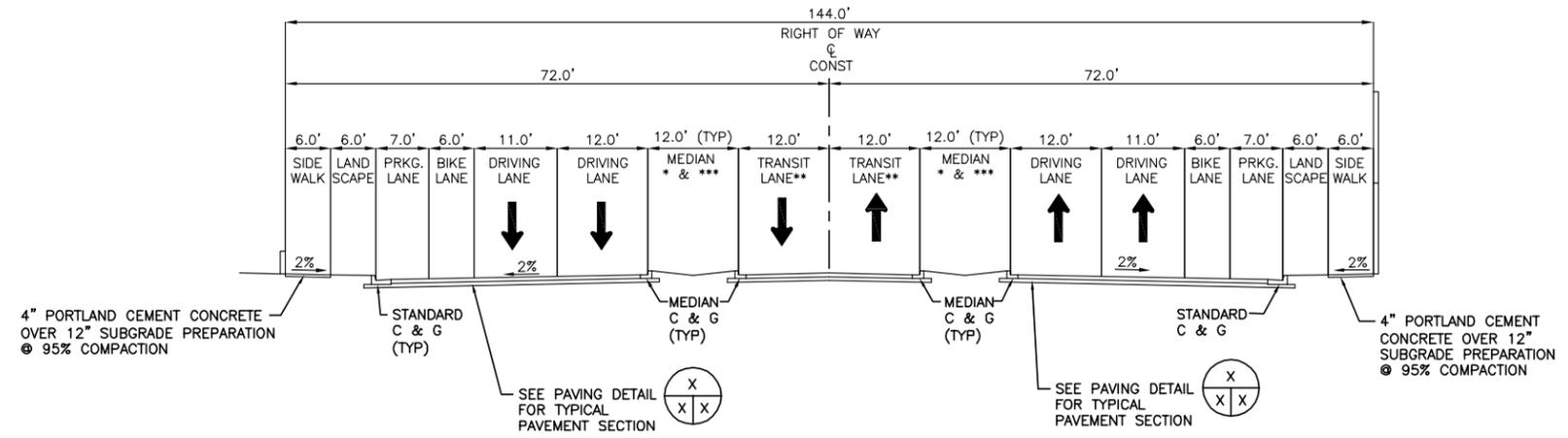
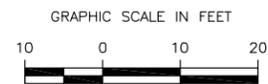
TYPICAL ROADWAY SECTION, UNIVERSITY BLVD.

Figure 3F-2

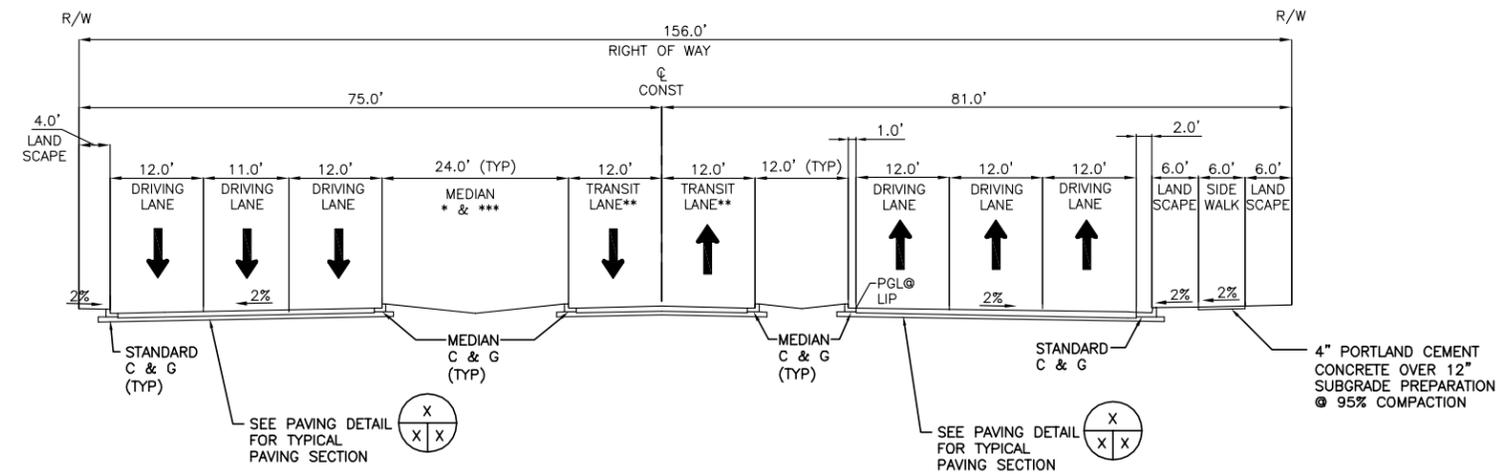
Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



UNIVERSITY BLVD. (1E-2, ULTIMATE)
NORTH CULVER MOVIE STUDIO PROPERTY LINE TO BOBBY FOSTER ROAD



UNIVERSITY BLVD. (ULTIMATE)
BOBBY FOSTER ROAD TO LEVEL B BOUNDARY AT NORTH JOURNAL PAVILION ACCESS

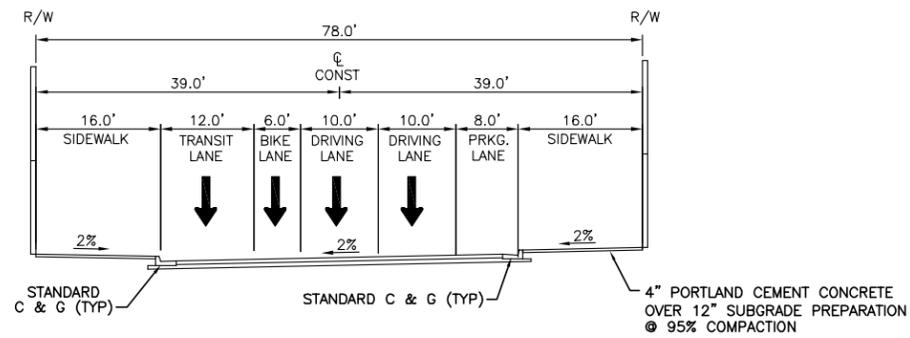
* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.

** TRANSIT LANE CONFIGURATION TO BE DETERMINED BASED ON SELECTION OF TRANSIT TYPE.

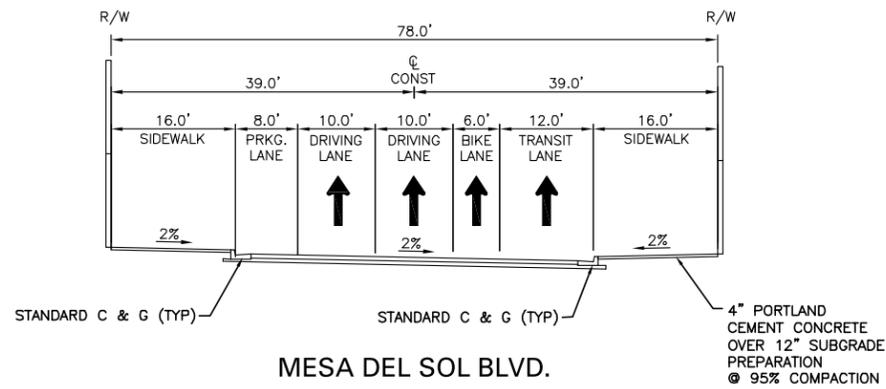
*** ACTUAL WIDTH MAY VARY, MEDIAN(S) TO ACCOMMODATE LEFT TURN LANE(S) AND FUTURE MEDIAN TRANSIT STATIONS AS NECESSARY.

**TYPICAL
ROADWAY SECTION,
MESA DEL SOL BLVD.**

Figure 3F-3



**MESA DEL SOL BLVD.
COUPLET 1, 2 & 3 WESTBOUND (1L)**

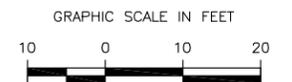


**MESA DEL SOL BLVD.
COUPLET 1, 2 & 3 EASTBOUND (1L)**

Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



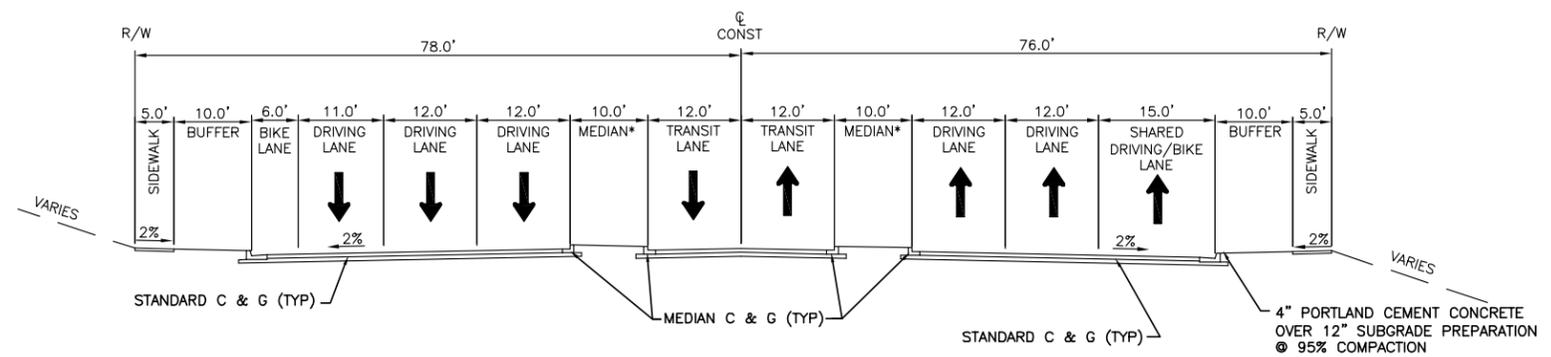
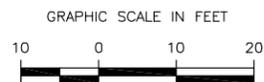
**TYPICAL
ROADWAY SECTION,
MESA DEL SOL BLVD.**

Figure 3F-4

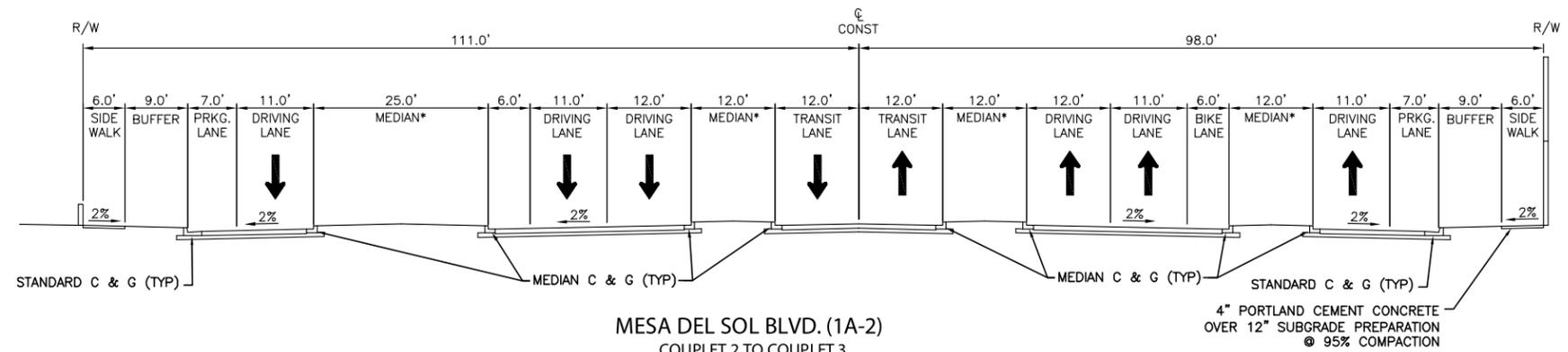
Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



MESA DEL SOL BLVD. (1G-2)
COUPLLET 1 TO CONNECTOR ROAD 44 / COUPLLET 2

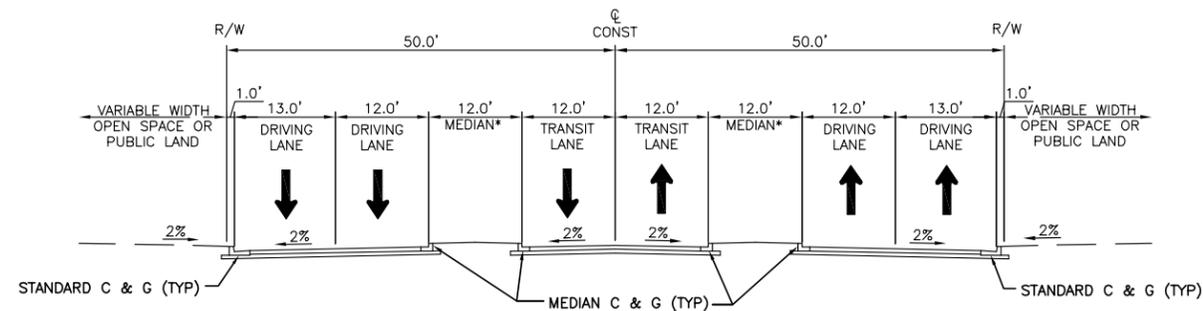


MESA DEL SOL BLVD. (1A-2)
COUPLLET 2 TO COUPLLET 3

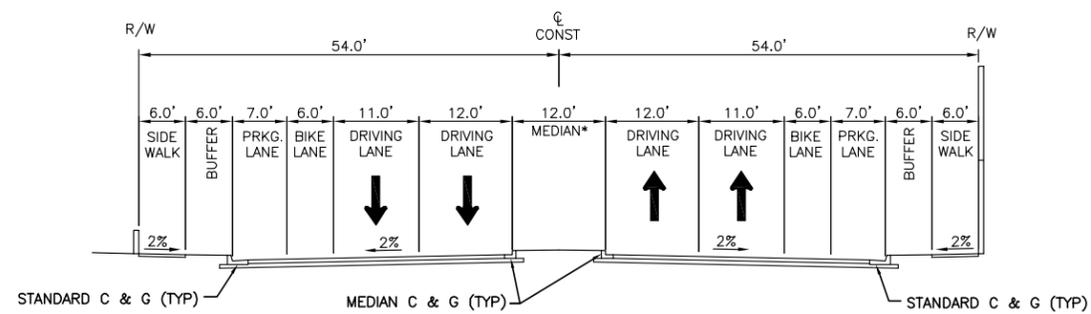
* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.

**TYPICAL
ROADWAY SECTION,
MESA DEL SOL BLVD.**

Figure 3F-5



**MESA DEL SOL BLVD. (1J-2)
COUPLER 3 TO LEVEL "B" BOUNDARY**



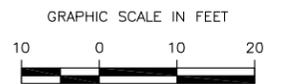
**AVENUE 1 (1F-2)
UNIVERSITY BLVD. TO LEVEL "B" BOUNDARY**

* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.

Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



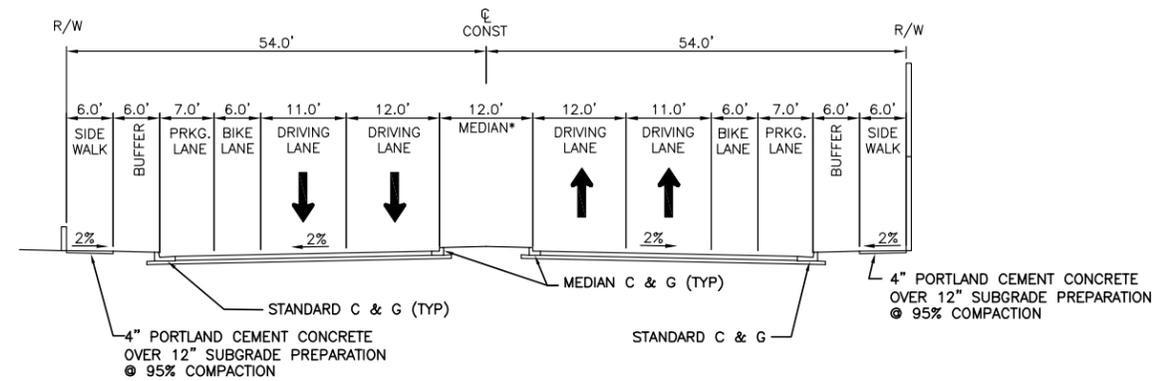
**TYPICAL
ROADWAY SECTION,
MESA DEL SOL BLVD.**

Figure 3F-6

Legend

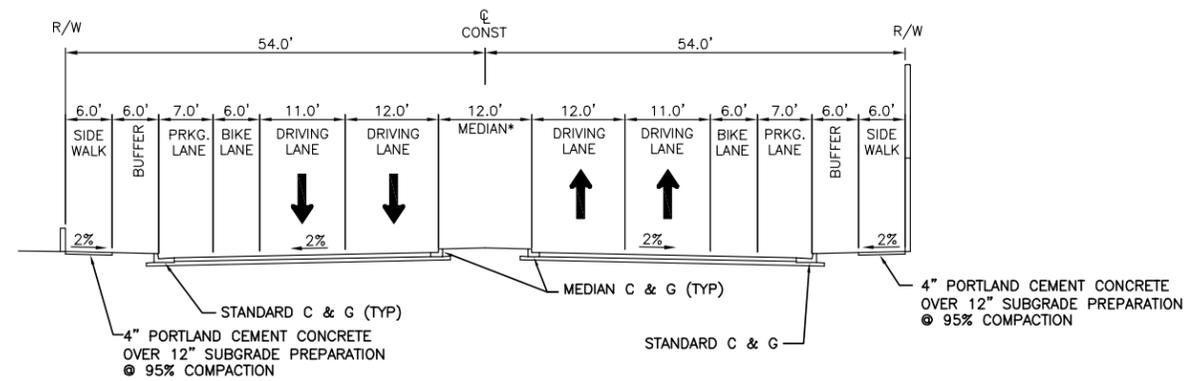
Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



AVENUE 2 (1F-2)
UNIVERSITY BLVD. TO LEVEL "B" BOUNDARY

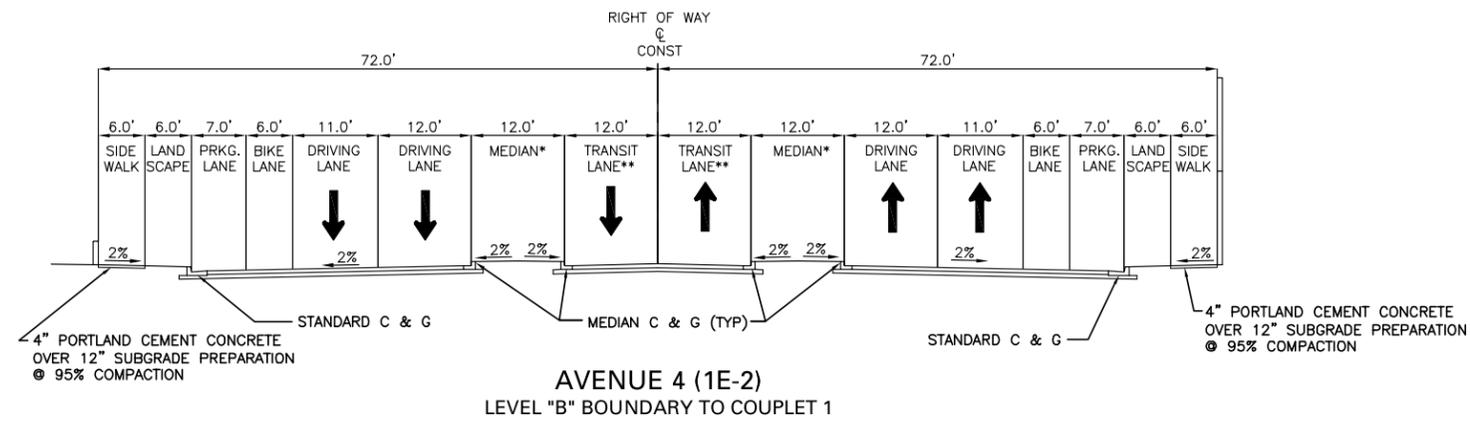
* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.



AVENUE 3 (1F-2)
MESA DEL SOL BLVD. TO LEVEL "B" BOUNDARY

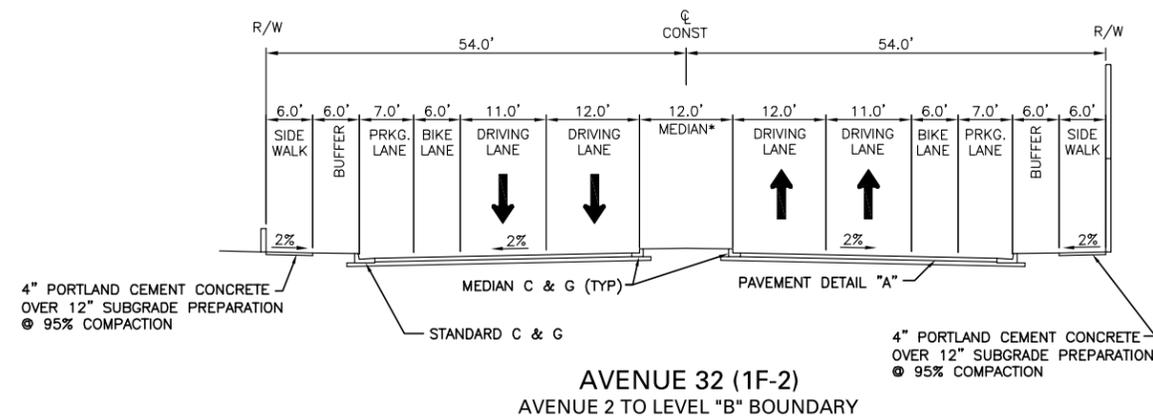
**TYPICAL
ROADWAY SECTION,
MESA DEL SOL BLVD.**

Figure 3F-7



* MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE; SLOPES TO BE DETERMINED DURING DESIGN PROCESS.

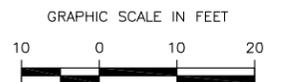
** TRANSIT LANE CONFIGURATION TO BE DETERMINED BASED ON SELECTION OF TRANSIT TYPE.



Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



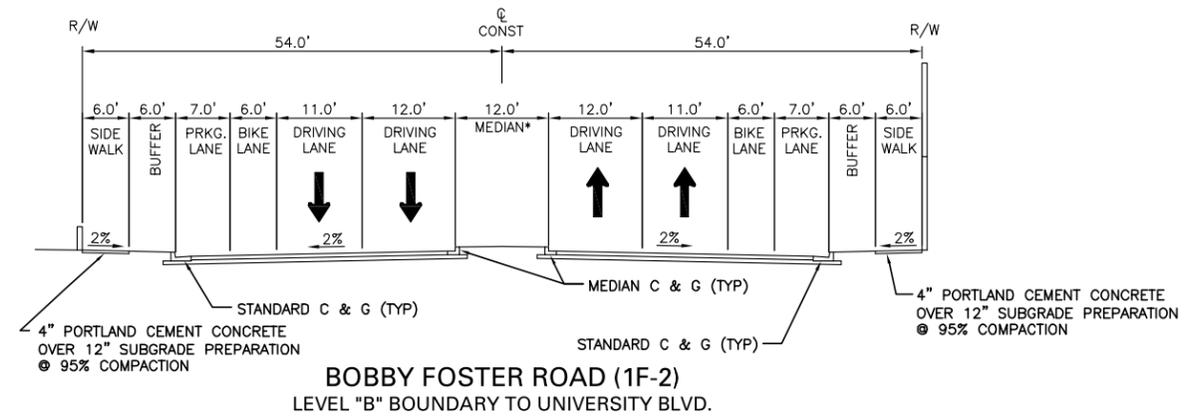
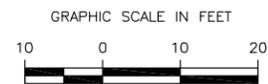
**TYPICAL
ROADWAY SECTION,
BOBBY FOSTER ROAD**

Figure 3F-8

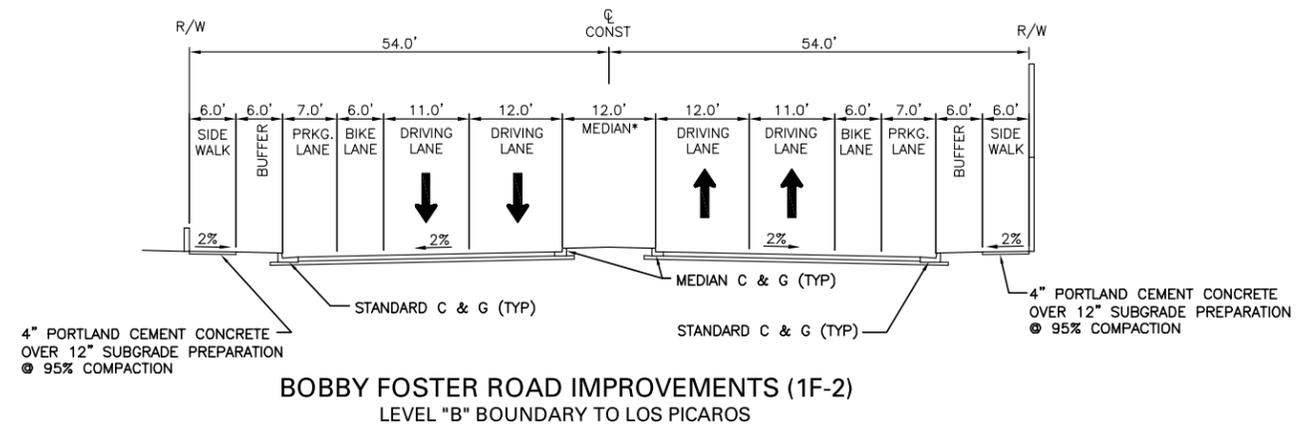
Legend

Notes:

1. Refer to Level B Plan Section 2.5 "Landscape Planning and Design" for median treatments.



MEDIANS TO DRAIN INSIDE FOR WATER HARVESTING PURPOSE;
SLOPES TO BE DETERMINED DURING DESIGN PROCESS.





STORMWATER MANAGEMENT

LEVEL B PLAN : OCTOBER 2006

APPENDIX **4A**



MESA DEL SOL

Preserving and Restoring the Natural Cycle

Stormwater Management

Mesa del Sol promotes and provides environmentally sustainable approaches to stormwater management. These approaches require innovative shifts in thinking, with both short term and long term solutions in mind.

4A.1 Introduction

Sustainability concepts require significant compliance to natural cycles, including the hydrologic cycle, as discussed in Section 1.3, Sustainability. However, the more current drainage management approach today in many communities is the “conveyance approach,” wherein the goal is to get rid of the stormwater. Stormwater is collected and concentrated through a network of pipes and structures and conveyed downstream, gradually enlarging as the tributaries are added to the system. Due to the velocities and hard surfaces, suspended pollutants in the stormwater are carried long distances to an outfall, typically a natural body of water. This system does not mimic natural systems very well and too often presents the stark fenced hardscapes of most stormwater systems as symbolically meaning that “water is hazardous.”

The alternative presented for the vast majority of Mesa del Sol is a “water harvesting and infiltration approach,” also referred to as an “urban rainfall harvest.” Sustainable stormwater management seeks to preserve and restore the hydrologic cycle wherever possible and practical. While water harvesting is more generally related to the smaller, more frequent storm events, an infiltration system seeks to infiltrate runoff from the larger storm events into the adjacent ground as near as possible to the water source. Discharge of stormwater occurs through soil recharge (infiltration), evaporation and plant transpiration. A balance is sought between collection of stormwater in conventional systems and the location and frequency of retention and infiltration ponds. This approach of frequent infiltration and evapo-transpiration reduces overall runoff volumes and minimizes conventional piping systems, replenishes shallow groundwater storage and minimizes pollutant discharge to natural watercourses.

The “infiltration approach” in Mesa del Sol, while achieving significant environmental goals, goes further to add the concept of “stormwater as an amenity.” This concept has been shown to produce higher land values and greater marketability. It also provides recreational and visual opportunities, and creates potential wildlife habitat, that attract many buyers in today’s market. With these goals in the forefront, the following discussion of stormwater management primarily addresses the primary trunk system for stormwater

management in Mesa del Sol Level B planning area. Please refer to Figures 4A-1 and 4A-2. The Water Conservation Master Plan may be referred to for a discussion of drainage “microsystems” at the lot or tract level.

4A.2 Previous Studies

Previous master plans which include drainage discussions have been completed for Mesa del Sol including the Mesa del Sol Master Plan and the Mesa del Sol Level A Community Master Plan from June 2005. The Southeast Valley Drainage Management Plan and the Southeast Valley Drainage Management Plan: Far Southeast Valley and Tributary Area to East (Wilson, 1986) both address the drainage downstream of the Western Escarpment of Mesa del Sol.

4A.3 Historic Conditions

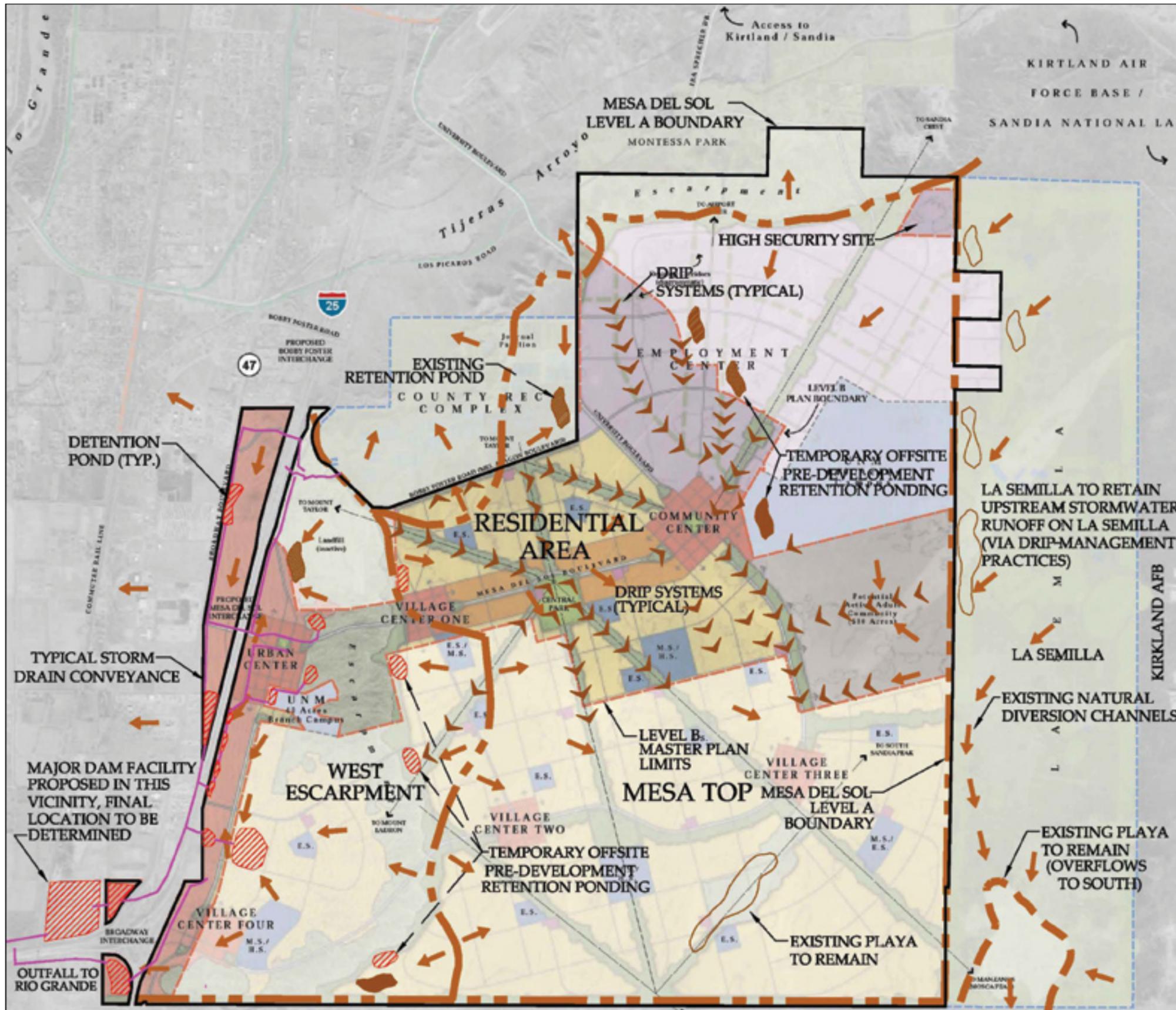
This stormwater master plan studies and reports on the five primary development zones of the Level B planning area (Figure 4A-7):

- 1) The Employment Center area (Mesa Top)
- 2) The Residential Area (Mesa Top)
- 3) The I-25/Broadway Corridor Area (Western Escarpment)
- 4) The County Recreational Complex lands (Mesa Top)
- 5) The La Semilla and Kirtland Air Force Base (KAFB) lands (Mesa Top)

The majority of Mesa del Sol is located within a closed basin and contains several natural playas as shown in Figure 4A-3. The mesa top is a closed basin so no storm water escapes from it to the Tijeras Arroyo, the Rio Grande or to any other downstream surface drainage system. Other portions of the project, such as the west facing escarpment, are more typical of local landforms with drainage basins discharging to arroyos contributing to the greater Rio Grande watershed. The escarpment drains westward toward the Rio Grande or northward to the Tijeras Arroyo. Western escarpment slopes are also very unique, consist-

OVERALL STORMWATER PLAN

Figure 4A-1



Legend

Notes:

Shown facilities are illustrative only.

Mesa Top Area

Drainage management concept plan uses distributed retention/infiltration ponds (drips) to collect all flows generated on the mesa top in the residential lands.

Non-residential lands (i.e. employment center, UNM, public sites) may utilize shared onsite drip systems.

West Escarpment

The drainage management concepts of collecting runoff in detention ponds and discharging storm water to a large storm water detention basin as proposed by the AMAFCA study entitled "Southwest valley drainage management plan", dated Jan. 1988. The detention pond discharges to the Rio Grande.

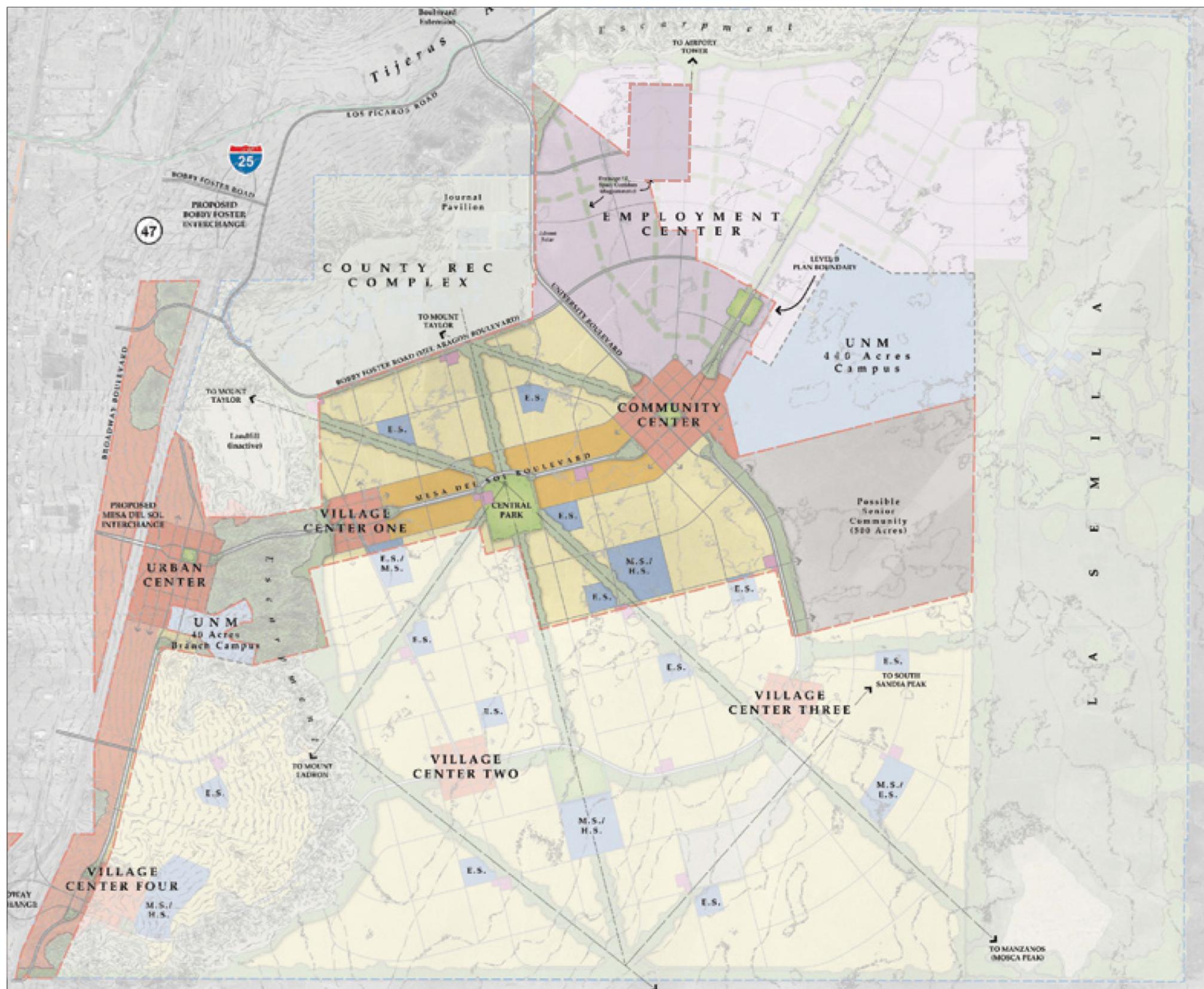
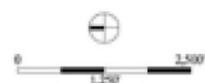
-  Drip (distributed retention and infiltration pond)
-  Temporary Retention Pond
-  Surface Flow Direction
-  Developed Basin Lines
-  Mesa del Sol Boundary



**PROPOSED MDS
LAND USAGE**

Figure 4A-2

Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.



ing of very steep slopes and large areas unsuitable for development. This DMP respects the intrinsic natural value of the rugged and unique landscape while addressing water quality goals relative to discharges to the Rio Grande.

Currently, there are no improved drainage facilities serving the Mesa del Sol development. Figure 4A-4 shows all areas with the Mesa del Sol boundary draining to the existing playas and the delineated drainage basins. As described, a substantial portion of Mesa del Sol is a closed basin, hereafter referred to as the Mesa Top. This area consists of slopes ranging from mild (less than 5%) to extremely flat (less than 0.5%). The Mesa Top encompasses nearly 5,900 acres, composed of deep sandy loam soil, principally supports a grass based vegetative community including Black grama, Sand dropseed, Indian ricegrass, while some shrubs and cacti are also present.

A significant portion of the project at the western margin of the Mesa Top slopes westward and discharges storm runoff toward the valley floor. Designated as the Western Escarpment, stormwater runoff from this area is currently conveyed through existing drainage culverts traversing I-25 followed by structures downstream under NM 47 (Broadway) and designed to serve historic conditions. Beyond I-25 and NM 47 are limited improved drainage structures capable of conveying existing runoff to the Rio Grande. The Western Escarpment area is typified by steep slopes descending from the mesa top at greater than 10% slopes which lessen to below 10% adjacent to the interstate. The escarpment land forms are defined by deep gravelly sandy soils with moderate to steep slopes. Vegetation is comprised of a grass-shrub mixture including Black grama, and bush muhly. Shrubs include sagebrush and creosote. A portion of Mesa del Sol, about 200 acres, is located in the strip between I-25 and Broadway.

Portions of Mesa del Sol drain to the south discharging onto the Isleta Pueblo. The most significant discharge to Isleta Pueblo originates in the Manzano mountains picks up additional flows from basin in Kirtland Air Force Base, flows into La Semilla and then heads southward via Hell's canyon. The remaining discharges to the south are from small localized basins with will be either undeveloped or incorporated into the overall drainage infrastructure.

The last drainage area is the northern escarpment, which includes parts the county recreation center an area to the north of the employment center along the north boundary of the project. The area drains northward across private property ultimately discharging to the Tijeras Arroyo. These steeper areas begin at the transition from mesa top to incised channels discharging to the upper terrace of the Tijeras Arroyo flood plain below. Minimal development is planned for basins draining to the Tijeras Arroyo.

4A.4 Methodology

The methodology applied for hydrological analysis of both existing and proposed development conditions is the City of Albuquerque's 1997 Development Process Manual (DPM), Chapter 22. Section 2 of this chapter details the use of a hydrologic computer program (HYMO) for the determination of storm runoff volumes and flow rates as modified for the AMAFCA/Albuquerque region (AHYMO). The model is particularly useful for large watersheds with significant routing analysis requirements, such as those impacting or within Mesa del Sol. The 100-year, 10-day duration storm was adopted for areas utilizing retention facilities while the 100-year 24-hour duration storm was used for other types of facilities.

Retention ponding was designed for the 100-year, 10-day storm, with no credit given for the depleting actions of evaporation, minor surface infiltration and passive infiltration devices. It is considered that with monitoring of these ponds, and documentation of successful stormwater discharge, that the design event for the ponds may be reduced. The remainder of the storm drainage infrastructure will be designed for 100-year, 6-hour storm event capacity.

Precipitation

Historically, the majority of rainfall occurring in Albuquerque is the result of local thunderstorms that occur during the summer months and this can result in flash flooding downstream. Rainfall values for the Mesa del Sol site were determined by spatial interpolation from the NOAA Atlas 14 – Volume 1, 2004. The total rainfall depths used in the AHYMO computer runoff models are:

- Rain One (1 hour – 100 year) 1.84 inches
- Rain Six (6 hour – 100 year) 2.17 inches
- Rain Day (24 hour – 100 year) 2.58 inches

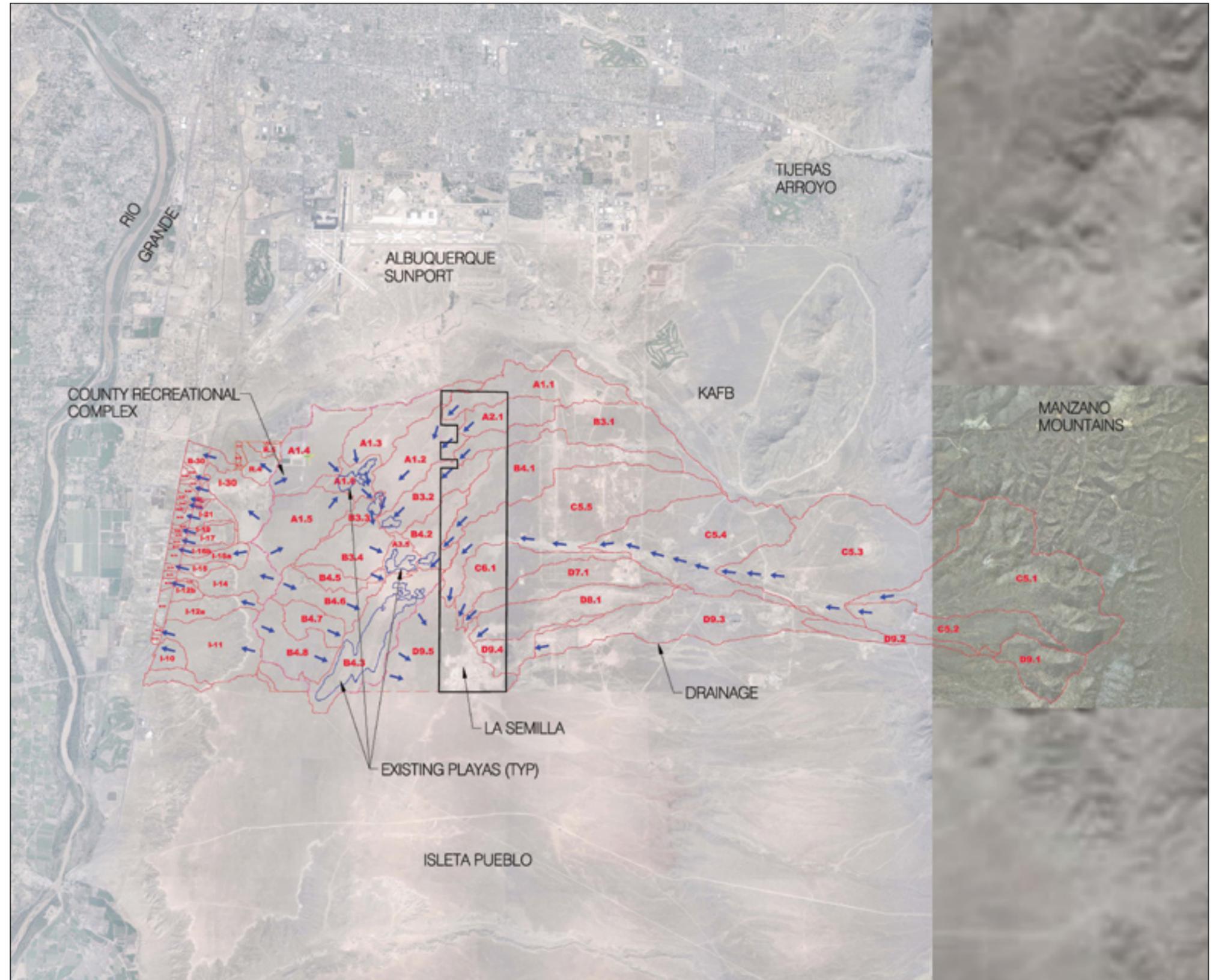
Time to Peak

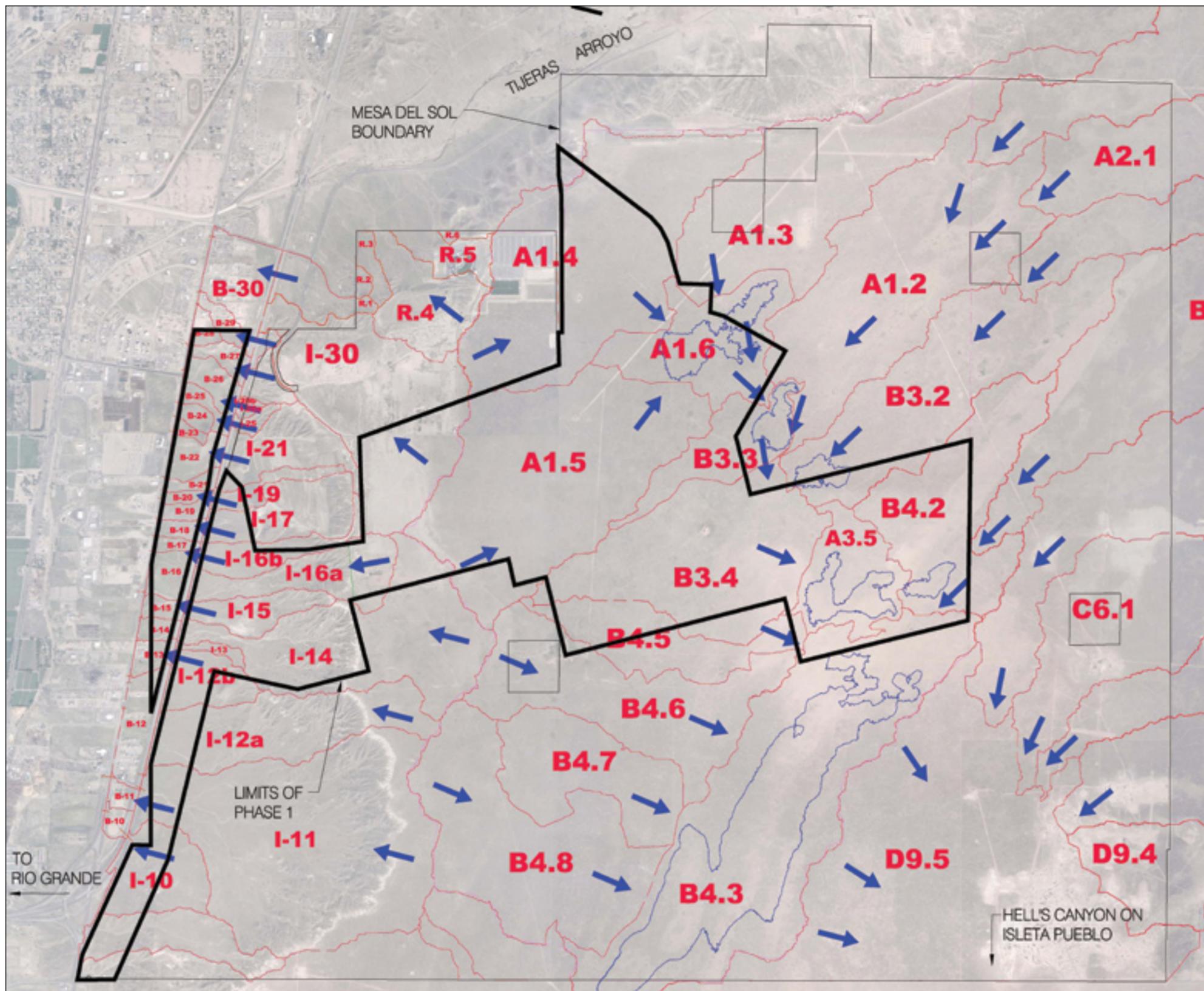
The AHYMO program utilizes a time of concentration method in order to determine the time to peak for each contributing drainage basin. The time of concentration is defined as the time it takes for runoff to travel from the farthest upstream point in a basin to the basin outfall. The time to peak is defined as the time it takes for the runoff hydrograph at the outlet of a basin to reach its peak and is estimated as two-thirds of the time of concentration. This report utilizes the SCS Upland Method to calculate time of concentration for basins with reach lengths less than 4,000 ft, the United States Department of the Interior Bureau of Reclamation lag time equation for basins with reach lengths greater than 12,000 ft, and a transition equation for basins with reach lengths between 4,000 ft and 12,000 ft as described in the DPM Section 22.2.



**ONSITE AND OFFSITE
DRAINAGE BASINS**

Figure 4A-3





**ONSITE
DRAINAGE BASINS**
Figure 4A-4



Land Treatments

Land treatment types describe land conditions relative to physical characteristics and surface conditions. Table A-4 in Section 22.2 of the DPM describes the land conditions associated with each treatment type. There are four treatment types: A, B, C, and D. Type A is the most pervious being undisturbed and relatively flat, while Type D is the most impervious typically due to pavement and rooftops. However, undeveloped areas with slopes between 10% and 20% are modeled as Type B, and those areas with slopes greater than 20% are modeled as Type C, in accordance with the DPM. These conditions prompt more runoff despite a lack of development. In addition, landscaped areas and areas of soil disturbance are classified as Type B or C respectively. In the existing conditions model, most of the area that contributes to Mesa del Sol is undeveloped. However, small developed areas on the KAFB were quantified using orthographic photography. These areas were modeled as being 90% C and 10% D. For the developed conditions model land treatments were based on anticipated development and the specific assignments are discussed in more detail with each of the specific developed conditions models.

Sediment Bulking Factors

Sediment bulking accounts for increases in flow rates and volumes due to sediment in the runoff. For this study, a bulking factor of 12 percent was used. This is a commonly adopted value related to the highly erosive nature of soils in the area.

Routing

The Muskingum-Cunge method was used to route runoff flows through arroyo reaches. The geometry of the arroyo cross sections and the arroyo reach lengths were evaluated using aerial mapping developed for Bernalillo County in 2004. The Manning's coefficient (N) value used for routing was 0.03 for all natural arroyo channels.

4A.5 Existing Conditions Hydrology

Until recently, Mesa del Sol remained substantially undeveloped with the exception of the Journal Pavilion amphitheater located within the County Recreational Complex. East of Mesa del Sol, portions of Kirtland Air Force Base supporting Sandia National Labs research facilities are developed at a very low density creating marginal amounts of impervious area. This section describes the impact of design storms incident to the master planned area prior to construction of improvements. Existing conditions drainage basins are illustrated in Figure 4A-4.

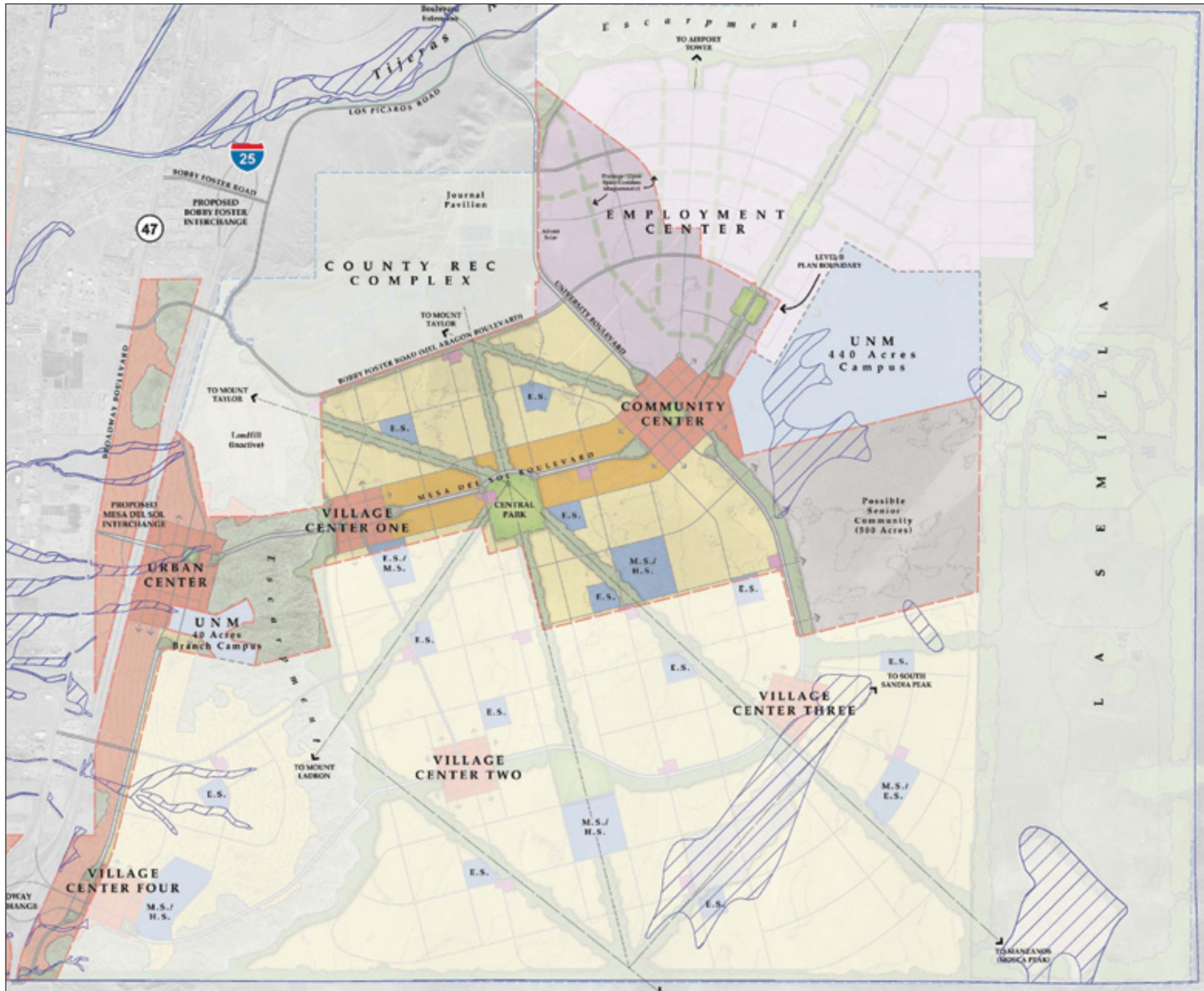
La Semilla/Mesa Top Basins

La Semilla is a State Land Office reserve where no development is planned, and which acts as a buffer zone between the eastern side of Mesa del Sol and Kirtland Air Force Base (KAFB). Although there will be no development in the area, it will play a role in controlling offsite flows, and retaining them outside of Mesa del Sol. Runoff from KAFB south of the Tijeras Arroyo discharges westward to the northern portion of La Semilla. Generally, the KAFB contributing area is relatively flat (slopes less than 10%), with large tracts of open space broken up by roads, buildings, paving and other types of human activity. Developed areas were assigned with B, C, or D treatments as recommended by the DPM.

The runoff from the Manzano Mountains crosses KAFB property before entering the southern half of La Semilla. Watershed basins originating in the Manzano Mountains have slopes between 10-20%, and were classified as Land Treatment B or Treatment C if slopes exceed 20%, in accordance with the DPM.

The Mesa Top is part of a unique hydrologic area for Albuquerque which consists of several small playas and one very large playa capable of retaining 2,300 ac-ft of runoff. The existing playas have sufficient storage capacity to accommodate very infrequent storm event in the range of the 500-year storm event. The 100-year design storm generates approximately 380 acre feet of runoff, well below the calculated 2,500 ac-ft. capacity of the existing playa system. The City of Albuquerque design criteria established by the drainage ordinance and the Design Process Manual (DPM), does not adequately address drainage management requirements for the Mesa Top area, specifically the playa condition. These playas are reflected in the FEMA floodplains of Figure 4A-5

The existing drainage patterns through the northern portion of La Semilla connect runoff from parts of KAFB, to existing playas in Mesa del Sol. The basins labeled with either an "A" or a "B" prefix contribute to the playas and form a closed drainage system, (the prefixes coincide with the prefixes used in the 1983 MDS master plan). The mesa top is primarily undisturbed and with grades less than 10% so it is primarily classified as a Type A, land treatment. At this time the only areas with notable development contributing to the Mesa Top are in KAFB. The land treatments inside the project boundaries are primarily Type A (soil uncompacted by human activity). Table 1 summarizes the basin size, land treatment, time to peak (tp), modeled peak flow, and runoff volumes from a 24-hr, 100-year event. Refer to Figure 4A-10 for a basin map.



FEMA FLOOD PLAINS

Figure 4A-5



Table 4A-1 Existing Condition Hydrologic Modeling Results

Basin	Basin Area (ac)	%A	%B	%C	%D	tP (hrs)	Q100 (cfs)	V (ac-ft)
A1.1	731.0	80.24	0.00	17.78	1.98	0.815	252.3	34.1
A1.2	629.0	100.00	0.00	0.00	0.00	0.687	197.3	23.2
A1.3	533.2	100.00	0.00	0.00	0.00	0.622	184.6	19.7
A1.4	663.0	100.00	0.00	0.00	0.00	0.685	208.6	24.4
A1.5	653.8	100.00	0.00	0.00	0.00	0.626	225.0	24.1
A1.6	227.4	100.00	0.00	0.00	0.00	0.618	79.2	8.4
A2.1	346.1	96.00	0.00	3.60	0.40	0.580	135.7	13.4
A3.1	968.3	78.34	0.00	19.50	2.17	1.041	269.9	46.1
A3.2	480.8	100.00	0.00	0.00	0.00	0.738	140.3	17.7
A3.3	135.0	100.00	0.00	0.00	0.00	0.557	48.9	5.0
B3.4	457.5	100.00	0.00	0.00	0.00	0.499	196.9	16.9
B3.5	154.3	100.00	0.00	0.00	0.00	0.385	82.0	5.7
B4.1	1064.1	85.09	0.00	13.42	1.49	0.846	333.1	47.0
B4.2	361.7	100.00	0.00	0.00	0.00	0.682	114.2	13.3
B4.3	945.8	100.00	0.00	0.00	0.00	0.801	254.6	34.9
B4.4	181.5	100.00	0.00	0.00	0.00	0.606	63.4	6.7
B4.5	396.7	100.00	0.00	0.00	0.00	0.533	160.0	14.6
B4.6	262.6	100.00	0.00	0.00	0.00	0.422	133.3	9.7
B4.7	486.0	100.00	0.00	0.00	0.00	0.483	216.1	17.9
TOTAL	9,678 ac							381 ac-ft

Six playas ranging in size from 15.7 to 2,300 Ac-ft were identified and included in the model. The cumulative capacity of the five smaller playas within basins A1.2, A1.4, A1.6, B3.2, B3.3, B4.2, and A3.5 north of the main playa is approximately 222 ac-ft. All of the smaller playas spill in the 24-hr, 100-yr event and ultimately the overflow reaches the 2,300 ac-ft playa where it is retained. The total runoff volume routing through the playa system is approximately 380 ac-ft during the 24-hr 100-year event, which is far less than the total capacity of the largest playa. In the 100-year event, only 158 ac-ft of runoff reaches the main playa and most of this volume reaches the playa principally through overflow from the small playas. Since the mesa top is a closed basin, it will remain closed after development to avoid impact to Isleta Pueblo in the future. The standard for retention is the 10-day event however; the additional volume created by this event is related specifically to the amount of impervious area. Given the extremely small amounts of imperviousness in the watershed, the resulting additional volume is negligible.

Offsite basins contributing to the southern half of La Semilla originate in the Manzano Mountains. The natural historic flow path then heads south and crosses into Isleta Pueblo via the Hell's Canyon Wash. The basins which ultimately end up in Hell's Canyon are identified with "C" and "D" prefixes. The total run-off from these basins during the 24-hour 100-year event is approximately 740 ac-ft. Fortunately this runoff does not need to be managed since it never actually crosses into Mesa del Sol and is conveyed along historic drainage routes which will not be disturbed by the Mesa del Sol development.

Table 2 lists basin characteristics such as size, land treatment, time to peak (tp), modeled peak flow rate, and runoff volumes from a 24-hr, 100-year event for the basins discharging into Hell's Canyon.

County Recreation Complex

Located adjacent to Mesa del Sol and west of University Blvd. is the Bernalillo County Recreation Complex. The complex site occupies approximately 600 acres and is planned to support public entertainment and recreation activities. Journal Pavilion and the soccer field complex already exist on the site, and other public facilities are planned. All future development will be in the eastern portion of property, and the remainder of the complex will remain open space.

The existing conditions drainage pattern for this area is split between three different basins, one area drains west through culverts traversing I-25 before reaching the Rio Grande. The second drains eastward into the mesa top playas, and the third area drains via several smaller natural channels to the Tijeras Arroyo. Modeled runoff from each of the basins is listed in Table 3. Basins R.1 through R.6 are located entirely inside the Recreation Center area. Basins I-30b and A1.4 are existing basins on the recreation center site and are also part of the escarpment, and mesa top drainage models respectively.

**Table 4A-2 Existing Conditions Hydrologic Modeling Results
Hell's Canyon Basins**

Basin	Basin Area (ac)	%A	%B	%C	%D	tP (hrs)	Q100 (cfs)	Vol (ac-ft)
C5.1	2335.9	18.97	15.97	64.85	0.21	0.694	1522.1	159.9
C5.2	775.2	59.51	13.90	26.11	0.48	0.622	383.5	38.7
C5.3	2457.2	62.76	4.24	31.16	1.84	0.659	1197.6	128.4
C5.4	1665.1	85.25	0.00	13.28	1.48	0.845	521.3	73.5
C5.5	1851.9	77.70	0.00	20.07	2.23	0.964	559.1	88.5
C6.1	623.0	94.97	0.00	4.53	0.5	0.612	234.5	24.4
D7.1	757.5	81.35	0.00	16.78	1.86	0.646	323.2	35.0
D8.1	1080.7	100.00	0.00	0.00	0.00	0.721	323.1	39.9
D9.1	451.6	5.68	9.81	84.51	0.00	0.251	812.8	35.2
D9.2	244.2	100.0	0.00	0.00	0.00	0.541	97.2	9.0
D9.3	1292.8	83.87	0.00	14.52	1.61	0.865	401.9	57.9
D9.4	275.1	100.00	0.00	0.00	0.00	0.402	146.4	10.1
D9.5	1121.5	100.00	0.00	0.00	0.00	0.769	314.2	41.3

The portion of basin 1-30b to the south of Bobby Foster Road, approximately 152 acres, will be converted to residential development. This area will be cut off from its historic path and flow intercepted before Bobby Foster Road. Drainage management details for the Residential Area are discussed later in the Developed Condition section.

The remaining portion of the basin north of Bobby Foster roads includes approximately 228 acres in the southwest corner of the county recreation property which drains westward under I-25 through six 36-inch CMP's. Development is not anticipated in any part of the basin downstream of Bobby Foster Road, so runoff will continue to drain along historic paths under I-25 and Broadway outside of the Mesa del Sol development area. The area between the I-25 and Highway 47 just to the north of the Mesa del Sol boundary drains to the north and west where it is eventually routed to the Rio Grande.

The Western Escarpment Area (Broadway/I25 Corridor)

The eastern boundary of the Escarpment area is defined primarily by steep slopes that drop off from the Mesa Top and the western boundary is Broadway (NM 47) west of I-25. Escarpment runoff crosses both I-25 and Broadway crosses the valley and ultimately

**Table 4A-3 Existing Conditions Hydrologic Modeling Results
Recreation Complex Basins**

Basin ID	Basin Area (ac)	Land Treatment Percentages				t _P (hrs)	Q ₁₀₀ (cfs)	V (ac-ft)
		%A	%B	%C	%D			
1-30b	409.1	82.11	8.62	5.71	3.56	0.133	244.9	16.6
A1.4	663.0	100.00	0.00	0.00	0.00	0.685	186.2	21.8
R.1	4.8	7.85	19.43	72.72	0.00	0.133	12.2	0.34
R.2	6.5	15.73	34.19	50.08	0.00	0.133	13.6	0.37
R.3	20.6	24.24	33.62	42.14	0.00	0.133	41.0	1.11
R.4	130.8	61.12	18.78	18.20	1.76	0.150	198.0	5.8
R.5	49.5	41.10	13.59	9.15	36.16	0.133	119.0	4.1
R.6	6.6	21.67	24.97	53.37	0.00	0.133	13.5	0.37

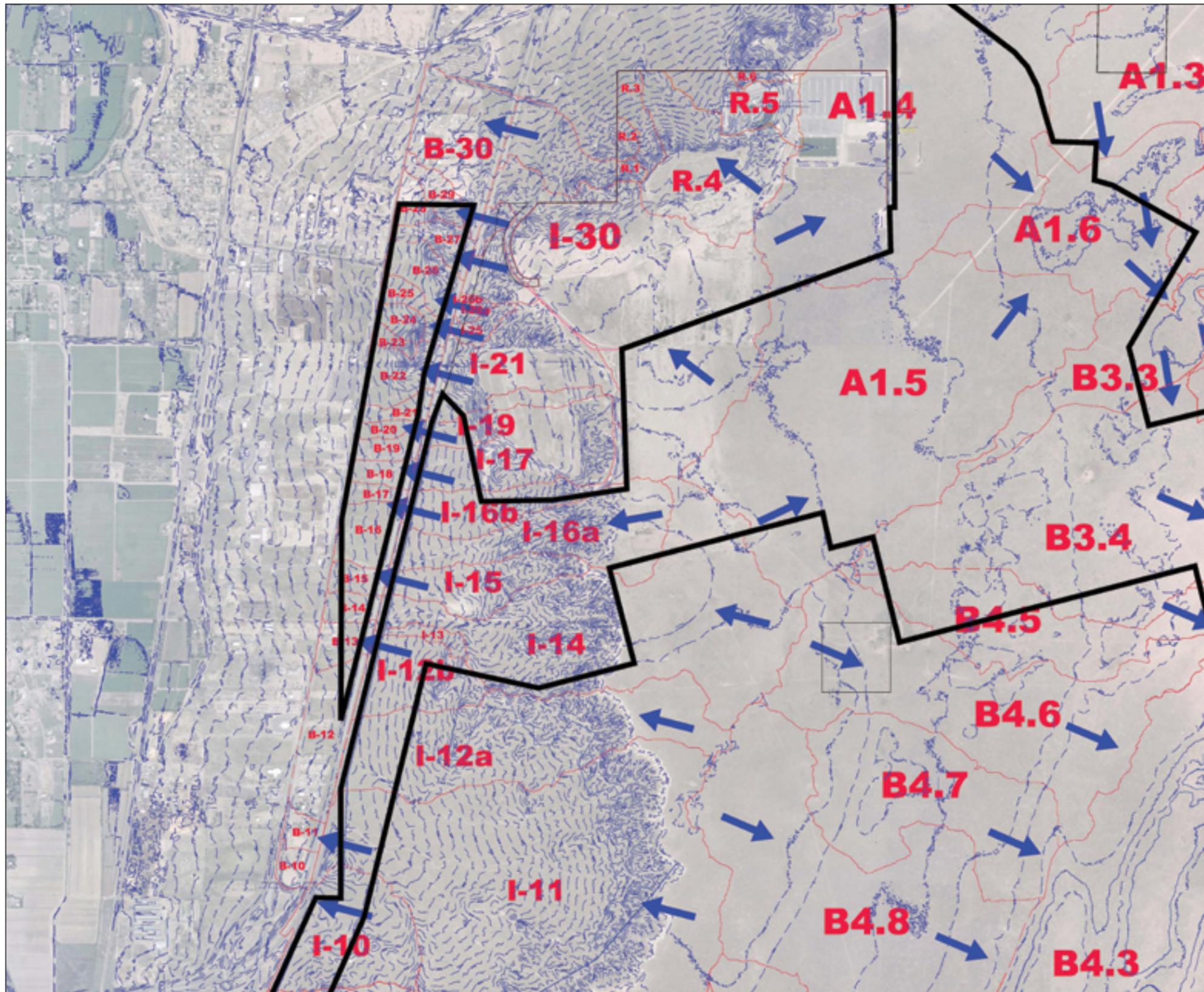
discharges to the Rio Grande. Currently the area to the east of I-25 is undeveloped and land treatments were based on the local conditions. Areas closest to the highway were primarily treated as Type A because the area is relatively flat (slopes less than 10 percent) and undisturbed. However, the terrain becomes steeper proceeding toward the eastern side of the basin; so much of the Escarpment is treated as Type B or Type C to account for steep slopes. The strip between I-25 and Broadway is currently a mixture of commercial establishments, industrial facilities, and salvage yards, and was considered when assigning land treatments. Table 4 summarizes the existing conditions for the Western Escarpment with basin areas shown in the Escarpment Existing Conditions Drainage Conditions figure (Figure 4A-6).

The existing drainage system routes escarpment runoff via 15 culverts under I-25 and 21 culverts under Broadway. The culverts along I-25 range in size from a single 30-inch corrugated metal pipe (CMP) up to three 4-ft x 10-ft concrete box culverts (CBCs). Traversing Broadway, culverts range in size from a single 30-inch CMP up to a battery of three 66-inch CMPs. The existing system was designed to manage runoff in historic channels, beginning in undeveloped areas and draining to areas with limited development. Currently, the largest basin area traversing I-25 is approximately 1.1 square miles, with a peak discharge of 437 cfs and conveyed by three 4-ft x 10-ft CBCs under I-25. The total existing conditions runoff volume from the escarpment basins is approximately 135 ac-ft. These discharge onto the valley flow after flowing in structures under Broadway.



**Table 4A-4
Western Escarpment Existing
Hydrologic Modeling Results**

Basin ID	Basin Area (acres.)	%A	%B	%C	%D	tP (hrs)	Q100 (cfs)	V (ac-ft)
I-10	117.7	55.9	33.9	10.1	0.0	0.133	186.58	4.9
I-11	713.2	63.1	21.7	15.2	0.0	0.407	437.55	29.5
I-12a	242.7	59.2	24.8	16.0	0.0	0.386	160.37	10.2
I-12b	67.1	55.1	32.1	12.8	0.0	0.133	105.06	2.8
I-13	10.6	56.8	31.3	11.9	0.0	0.133	15.62	0.4
I-14	379.7	71.8	13.6	14.5	0.0	0.421	215.31	15.1
I-15	61.3	49.4	30.0	20.6	0.0	0.169	84.11	2.7
I-16a	122.7	59.6	21.1	19.3	0.0	0.312	95.80	5.2
I-16b	63.8	59.7	25.4	14.9	0.0	0.223	64.03	2.7
I-17	111.4	26.9	55.3	17.8	0.0	0.192	153.87	5.4
I-19	31.9	23.8	60.7	15.5	0.0	0.170	47.61	1.6
I-21	106.3	12.5	65.6	22.0	0.0	0.181	194.58	5.6
I-25	11.0	15.5	37.6	46.9	0.0	0.133	22.94	0.6
I-26a	5.8	21.1	34.9	44.1	0.0	0.133	11.77	0.3
I-26b	0.8	31.8	31.4	36.8	0.0	0.133	1.22	0.0
I-27	25.3	28.4	28.4	43.2	0.0	0.133	30.49	0.8
I-30a	8.9	26.3	28.2	45.5	0.0	0.177	30.88	1.0
I-30b	409.1	82.1	8.6	5.7	3.6	0.395	290.01	19.9
B-10	12.1	74.4	15.1	10.4	0.0	0.133	17.03	0.5
B-11	11.5	88.5	7.9	3.6	0.0	0.133	14.54	0.4
B-12	61.1	54.3	7.2	13.2	25.4	0.189	102.92	4.3
B-13	18.8	59.0	9.4	12.1	19.5	0.137	35.06	1.2
B-14	13.6	87.3	10.3	2.3	0.0	0.133	16.96	0.5
B-15	13.2	83.0	13.3	3.7	0.0	0.133	17.46	0.5
B-16	32.9	91.2	7.8	1.0	0.0	0.154	35.44	1.1
B-17	9.1	89.0	9.5	1.5	0.0	0.133	11.16	0.3
B-18	13.5	89.1	9.4	1.5	0.0	0.133	16.73	0.5
B-19	14.1	85.4	12.5	2.1	0.0	0.133	17.92	0.5
B-20	8.4	92.5	6.5	1.0	0.0	0.133	10.14	0.3
B-21	11.9	77.9	16.9	5.1	0.0	0.133	16.33	0.5
B-22	32.7	52.8	27.7	19.5	0.0	0.133	52.29	1.4
B-23	6.5	32.1	39.8	28.1	0.0	0.133	11.65	0.3
B-24	11.7	42.2	32.8	25.1	0.0	0.133	19.79	0.5
B-25	15.6	64.7	20.6	14.8	0.0	0.133	22.89	0.6
B-26	30.1	50.1	27.1	22.8	0.0	0.133	49.42	1.4
B-27	20.4	29.4	28.0	42.6	0.0	0.133	40.11	1.1
B-28	12.8	34.0	23.4	18.0	24.6	0.133	29.04	1.0
B-29	15.6	21.1	28.7	31.3	13.3	40.30	1.34	1.3
B-30	87.0	12.6	24.5	38.2	14.9	219.94	8.04	8.0
Total	2942							135.1



REC COMPLEX
AND ESCARPMENT
EXISTING DRAINAGE
CONDITIONS

Figure 4A-6



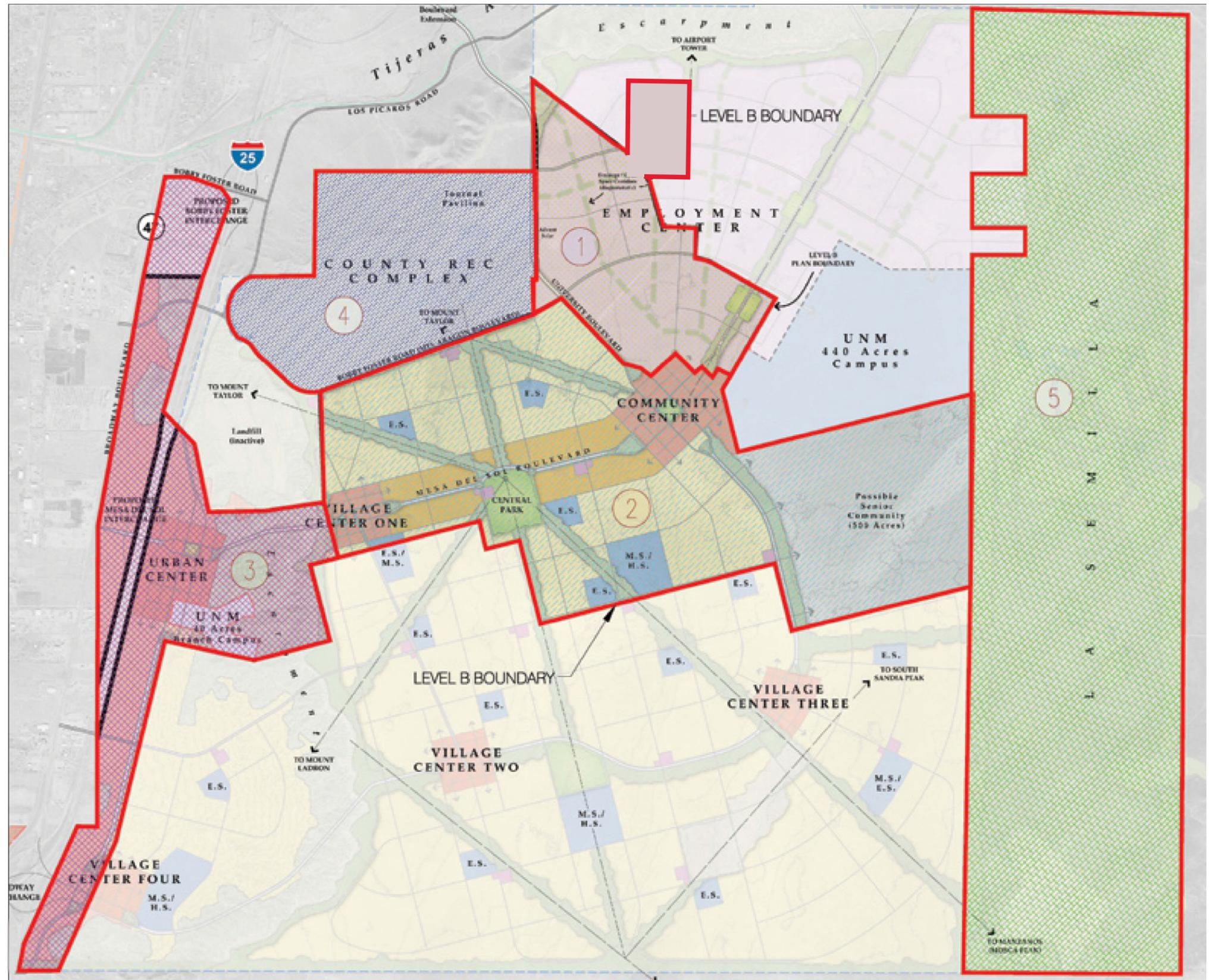
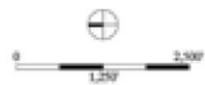
**LEVEL B
PLANNING ZONES**

Figure 4A-7

Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.

Legend

- 1. Employment Center
- 2. Residential Area
- 3. I-25/Broadway
- 4. County Rec.
- 5. La Semilla



4A.6 Level B Stormwater Master Plan (Developed Conditions)

Due to the flat slopes associated with the Mesa Top, collecting and retaining developed runoff onsite in strategically located retention ponds is the most practical and sustainable approach to storm water management, as opposed to a single very large ponding area. This plan proposes creating regional ponds within the identified open space areas that are distributed throughout the community at locations appropriate to serve adjacent upstream development. Each pond is proposed as a retention pond or a system of retention ponds, self contained and not necessarily connected to any other major drainage areas. These “Distributed Retention Irrigation/Infiltration Ponds” (DRIPS) are proposed as the primary drainage management method for the Mesa Top watershed. This approach is modular and scalable and therefore, ponds can easily be located anywhere phasing needs dictate and can be sized to meet the local design runoff volume for the contributing area. This ease of location and design makes the DRIP system applicable to all parts of the playa basin area.

The DRIP scheme is also intended to be multi-use. These ponds shall serve as drainage areas which are also visually aesthetic and may include open space trails, recreational areas, sitting areas, water fountains, xeriscaping, and wildlife habitat. The DRIP system that is proposed for the mesa-top area closely resembles the existing drainage situation present in this area. This solution is practical and viable method for stormwater management in the Mesa Top area. Please reference Figure 4A-8 for DRIP ponding schematics.

Future detailed drainage planning and design may present a slightly modified approach for certain areas in future Level C drainage submittals or in special overlay District areas. This modified approach continues the concept of the DRIP system but rather than each pond fully retaining the 10-day storm volume, the

ponds retain and infiltrate only smaller stormwater volumes at the distributed regional pond locations. This occurs because the regional DRIP ponds are provided a small outlet (bleed line) that discharges southerly to a large terminal retention pond, which has no outlet. The pond would be located, very appropriately, in the vicinity of the large existing playa in the southern portion of Mesa del Sol lands. At this terminal pond location, evapo-transportation and infiltration on a large scale would mimic, to some degree, the historic runoff patterns of the Mesa Top area. An additional benefit of this approach is the reduction of ponding areas required in and around the Community Center.

Further, opportunities to use stormwater collected by the ponds for additional uses beyond just the immediate pond site area will be considered over time, such as collection of stormwater for irrigation purposes.

La Semilla

This master plan proposes creating regional ponds within the identified open space areas that are distributed throughout the community at locations appropriate to serve adjacent development. Each pond is proposed as a retention pond or a system of retention ponds, self-contained and may or may not be connected to other ponding areas. The developed conditions for the Mesa Top are discussed in more detail below in the Employment Center and Residential Lands sections.

Distributed Retention Irrigation/Infiltration Ponds (DRIPS) are proposed as the primary drainage management method for the Mesa Top and La Semilla watersheds. This approach is somewhat modular and scalable and therefore, ponds can easily be located anywhere phasing needs dictate and can be sized to meet the local design runoff volume for the contributing area. The ponds will be within open space corridors and sized to accept drainage from the 100-year, 10-day storm event. Each retention pond will include water quality measures, as well as shallow groundwater infiltration capabilities. These ponds will also serve as drainage areas which are visually aesthetic and include open space trails, recreational areas, pedestrian sitting areas, water fountains, xeriscaping, and wildlife habitat. The DRIP system proposed for the mesa-top area closely resembles the existing playa storage situation in this area. This ease of location and design makes the DRIP system applicable to all parts of the playa basin area.

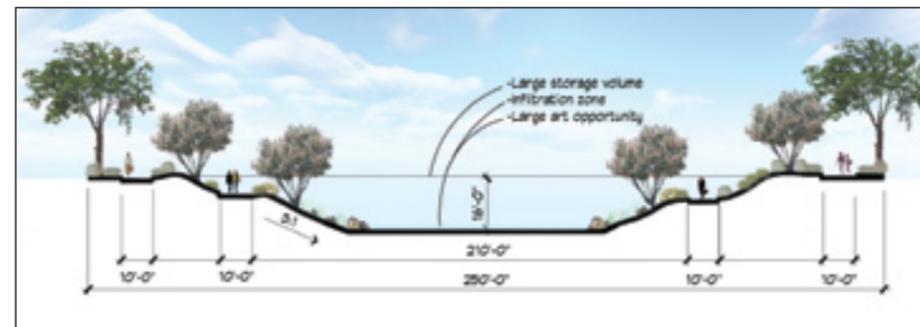
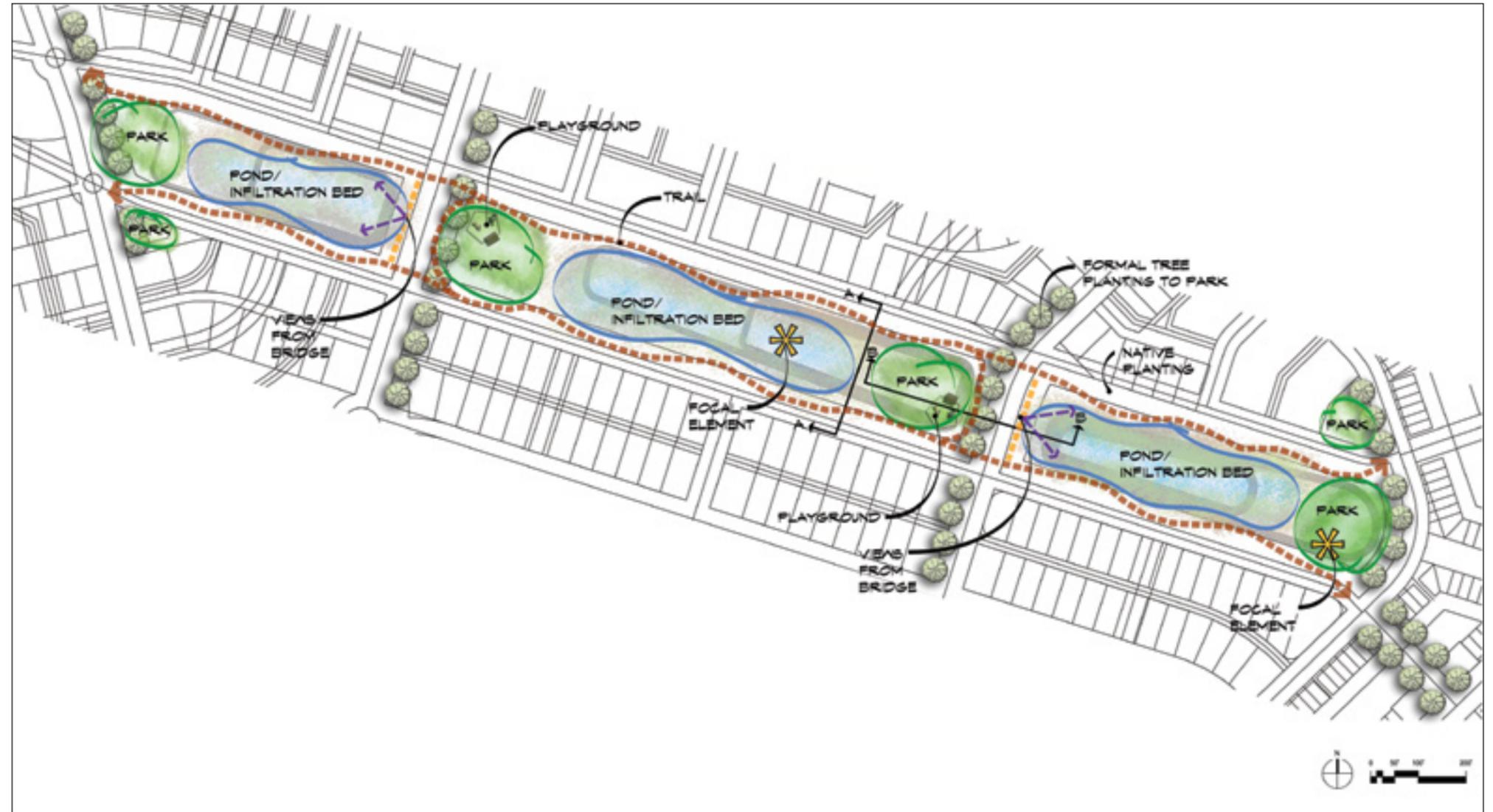
The first step in storm water management for the La Semilla mesa top basin is to redistribute runoff to promote sustainable development, shallow groundwater recharge, and support local wildlife. One method for this is to capture off-site runoff in La Semilla before it enters Mesa del Sol. The current proposal includes constructing seven ponds at the La Semilla/ Mesa del Sol boundary, each sized to retain the 100-year, 10-day event generated by upstream contributing areas. The conceptual ponds are illustrated in Figure 4A-9. Each pond will be graded to create variable depths such that local wildlife populations can access the water surface and to support transitional life zones when full. The inside of the embankment is proposed to have a three foot horizontal to one foot vertical slope (3'H:1'V maximum). Table 5 shows the retention volume and contributing area for each pond.

These ponds may be managed individually using a variety of strategies in order to maximize the pond's environmental value. These proposed ponds will transform La Semilla and Mesa Top into two separate closed systems.

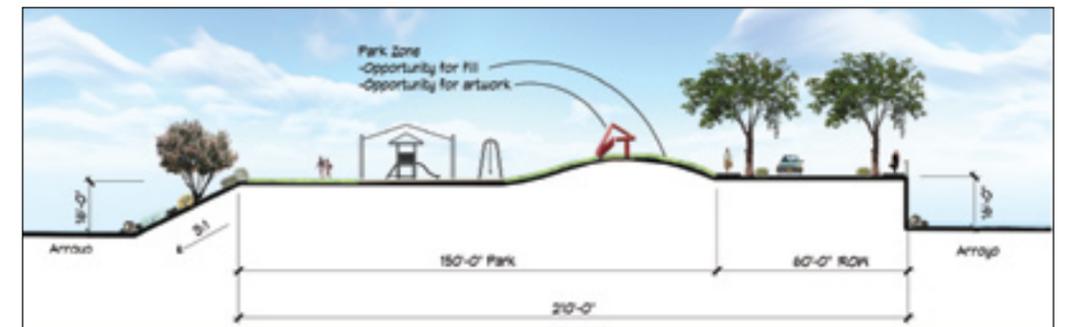


**OPEN SPACE POND
AND SECTION DETAIL**

Figure 4A-8



Section A (not to scale)



Section B (not to scale)

Table 4A-5 Proposed Retention Pond Volumes for Offsite Drainage

Pond ID	Contributing Basins	Contributing Area (acres)	Volume of Storage (ac-ft)
A-1 Pond	A1.1, 4% of A1.2	756.1	36.8
A-2 Pond	A2.1, 7% of A1.2	390.1	15.2
A-3 Pond	A3.1	968.3	48.7
A-4 Pond	B4.1	1064.1	49.0
A-3.2 Pond	35% of A3.2	168.3	6.2
A-4.2 Pond 1	31% of B4.2	112.1	4.1
A-4.2 Pond 2	12% of B4.2	43.4	1.6

Volume of Storage Calculated based on the Runoff Volume from each basin and Eq a-9 from the COA DPM Chapter 22.2.

$$V_{10DAYS} = V_{360} + AD * (P_{10DAYS} - P_{360}) / 12 \text{ in/ft}$$

V360 and AD from the Summary Spreadsheet

P10DAYS = 4.08 in and P360 = 2.58 in from NOAA Atlas 14

Mesa Top - Employment Center

The Level B Employment Center consists of approximately 500 acres of industrial, commercial and mixed used development as shown in Figure 4A-10. The employment center will incorporate the DRIP system on-site retention ponds, the primary storm water management method for the Mesa Top area. Developed condition runoff generated by the Employment Center will drain directly into the DRIP system, and consist of nine retention ponds strategically located throughout the development. Figure 4A-11 shows the Employment Center developed conditions basins and the pond locations. This drainage system will use larger retention ponds designed to serve multiple development sites and can retaining the 10-day, 100-year storm.

Assigned land treatments for commercial areas are 90% land treatment D and 10% land treatment B with roads assumed at 100% land treatment D. Results of the hydrologic calculations are provided in Table 6, which also lists the anticipated 10-day volumes generated for each development block. DRIP system ponds within these blocks will be sized

to accommodate the associated contributing area runoff volume. Drainage from each development block, and from the adjacent roads will be conveyed to the DRIP ponds via surface flow and storm drains. Alignments for the storm drains have yet to be determined therefore the time of concentration for each basin was conservatively assumed to be the minimum $t_c = 0.2$ hours

Offsite areas to the north and east currently drain to the Level B area of the Employment Center. Some of these areas are within future Employment Center plans. Temporary ponds will be constructed just north and east of Level B area to temporarily retain these flows. These temporary pond locations will be located in areas of anticipated future retention ponding. Accordingly, these existing flows will be managed permanently offsite and will not affect the current Phase 1 area. .

The UNM lands to the east, currently drain into the Level B area. A temporary pre-development retention pond, and associated temporary facilities such as diversion channeling, will be located on these lands to retain the existing drainage. Once developed, these lands will retain the 100-year, 10-day storm event within open space areas onsite.

Approximately 40 acres has been set aside in the Employment Center’s far northeast corner for a “high security” site. The site will retain its stormwater runoff either onsite or on immediately adjacent lands.

**Table 4A-6 Developed Conditions Hydrologic Modeling Results
Employment Center Basins**

Basin ID	Area acres	Land Treatment Percentages				tp (hr)	Q100 cfs	Runoff Vol. ac-ft	Pond Vol. ac-ft
		A	B	C	D				
EC1	55.7	0.0%	8.9%	0.0%	91.1%	0.133	240	9.4	16.996
EC2	76.6	0.0%	9.0%	0.0%	91.0%	0.133	330	12.9	23.396
EC3	126.3	0.0%	8.9%	0.0%	91.1%	0.133	538	21.3	38.496
EC4	60.7	0.0%	8.9%	0.0%	91.1%	0.133	262	10.3	18.536
EC5	56.0	0.0%	8.8%	0.0%	91.2%	0.133	240	9.4	17.043
EC6	43.5	0.0%	8.7%	0.0%	91.3%	0.133	188	7.3	13.299
EC7	31.3	0.0%	8.5%	0.0%	91.5%	0.133	136	5.3	9.6
EC8	45.9	0.0%	8.9%	0.0%	91.1%	0.133	199	7.8	14.032
EC9	26.4	0.0%	8.8%	0.0%	91.2%	0.133	114	4.4	8.035

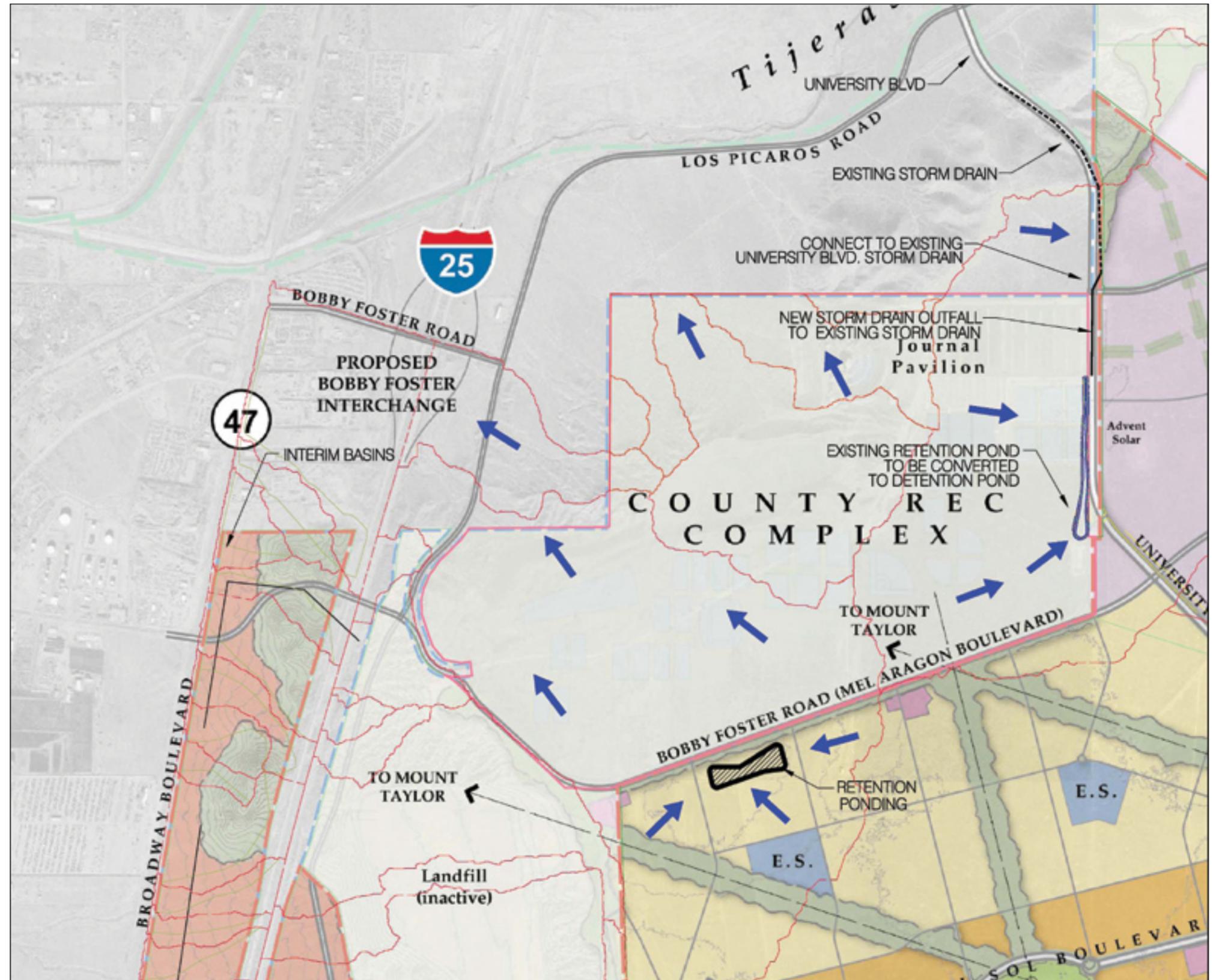


**OFFSITE DRAINAGE
PLANNING**

Figure 4A-9

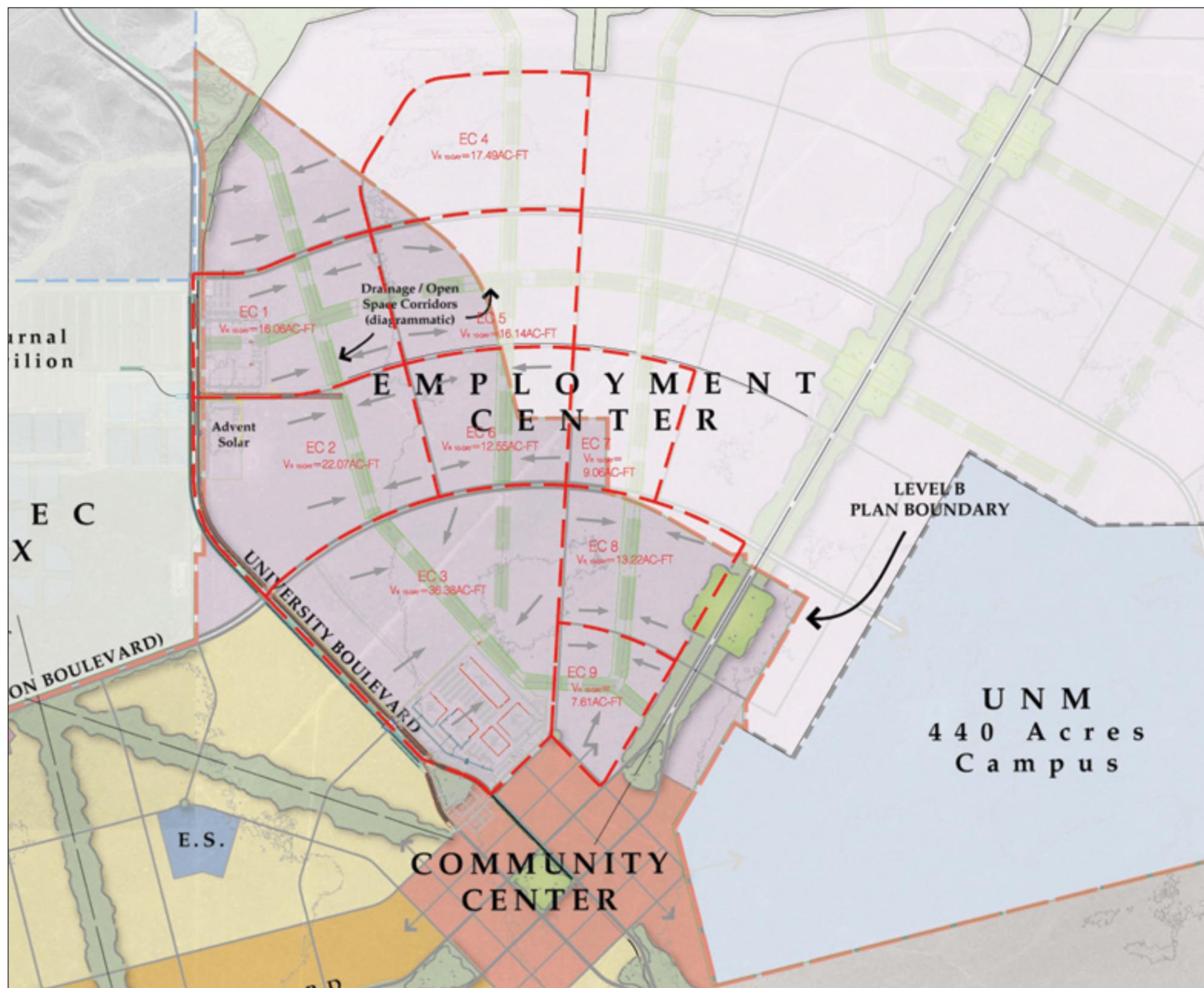
Notes

Implementation of this drainage plan requires continued coordination with the county of Bernalillo staff.



MESA TOP/COMMERCIAL
DRAINAGE PLAN

Figure 4A-10



Legend

-  Drainage Basin
-  Open Space/Regional Ponds
-  Basin Flow Direction



RESIDENTIAL AREAS DRAINAGE MANAGEMENT PLAN

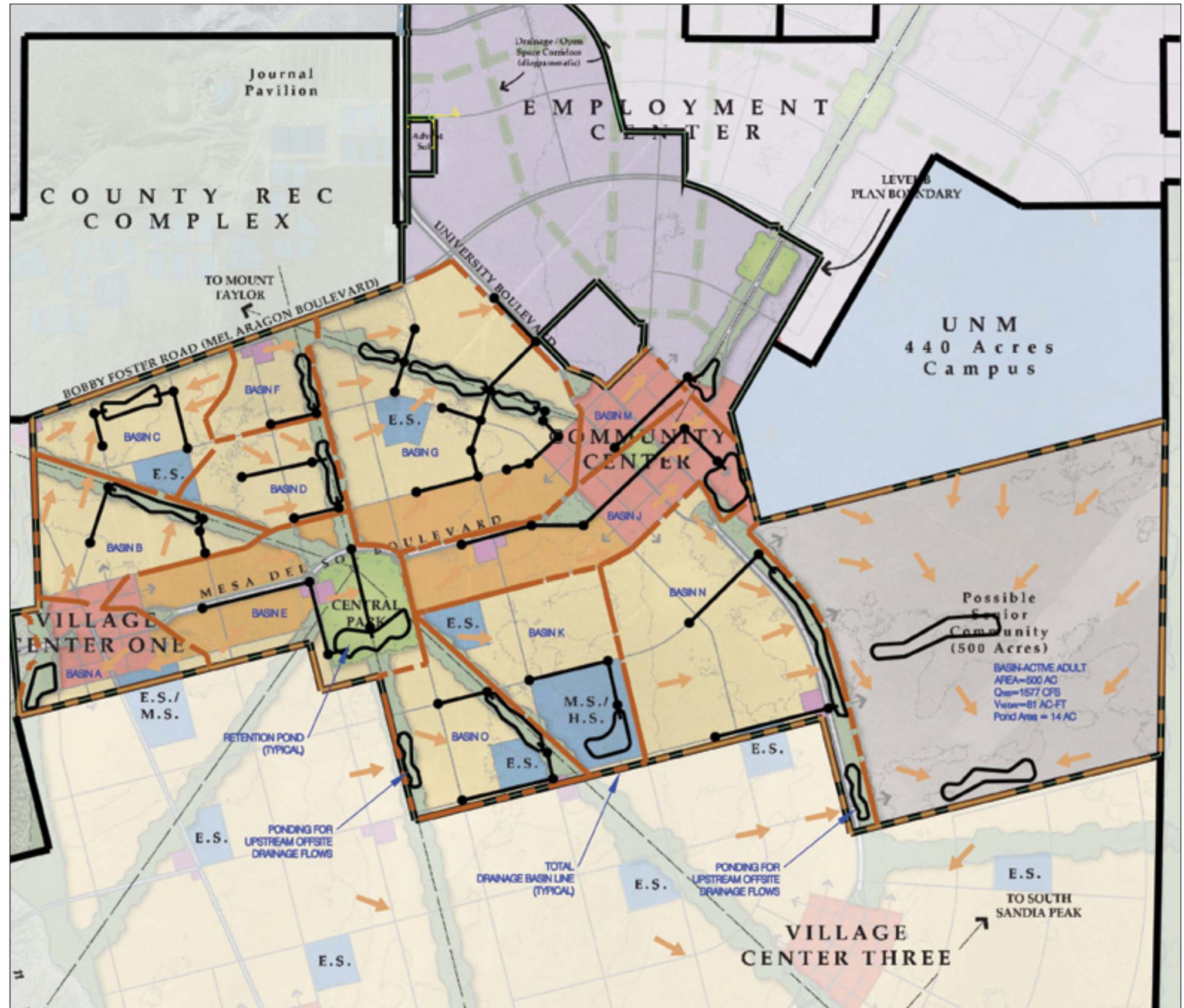
Figure 4A-11

Legend

Notes:

- Illustrative Only
- Storm drain system shown is intended to illustrate typical storm drain collection system and drip pond. Does not necessarily apply to final future subdivision planning

-  Total Drainage Basin
-  Drainage Subbasin
-  Storm Drain and Outfall
-  Basin Flow Direction
-  Drip Pond (Retention Pond)



Mesa Top Lands - Village Center/Community Center

The Level B master plan area of Mesa del Sol includes two significant mixed use centers on the Mesa Top; the Community Center and Village Center One. These areas will include a mix of retail uses, higher-density housing, transit, and public facilities. They are not intended to have large open space or park areas that would be conducive to the proposed storm water management approach for the Mesa Top lands. Instead, storm water runoff would be conveyed out of the Centers toward trunk open space corridors or parks within residential neighborhoods. Conveyance of storm runoff would be through a combination of surface flow in the street network and public storm drain systems, reference Figure 4A-11 and Table 6.

Mesa Top Lands - Residential Area

Collecting and retaining developed runoff on a neighborhood scale is determined to be the most practical approach to storm water management for the Mesa Top residential lands. This approach is equivalent to that proposed in the Employment Center. Trunk open space corridors that, in part, define neighborhood edges are primary locations for retention ponds. In addition, the planning and layout of each residential neighborhood will incorporate open space, parks, and school playing fields that will integrate necessary retention ponds into the plan to accommodate the design storm volume. Distributed Retention Irrigation/Infiltration Ponds (DRIPS) are the primary drainage management method for the residential areas. The modular and scalable nature of the DRIPS allow them to be located anywhere phasing needs dictate and to be sized to meet the design runoff volume for the contributing area. Figure 4A-11 shows schematic pond locations in the trunk open space and residential areas.

The proposed storm water management approach is that each neighborhood retain all runoff generated within its boundaries. Ponds for a given neighborhood may also accept runoff from adjacent Village or Community Centers. Future detailed drainage design for each neighborhood may dictate that some inter-neighborhood movement of runoff will be necessary to accommodate optimal pond locations within the neighborhoods and/or better use the storage capacity within trunk open space areas. The detailed drainage design for each neighborhood will also evaluate the street and storm drain hydraulics for conveyance of storm runoff to the ponds.

One area of interest in the Residential Lands is the proposed 500-acre Senior Community development site, located on the eastern edge of the Residential Area. On-site retention is the proposed storm water management for this site. Adjacent trunk open space areas shown in the Phase 1 area will not be available for storage of runoff from the Senior Community site. Therefore, all runoff generated by this site will be retained onsite.

Storage volume requirements have been determined for the Mesa Top Community Center, Village Center One, and Residential Lands. This area was divided into drainage basins

based on existing topography and the location of trunk open space corridors. The volume requirements are based on the 100-year, 10-day storm event. The pond capacities and dimensions are summarized in Table 7.

The proposed use of Distributed Retention and Infiltration Ponds (DRIPS) as the preferred storm water management approach for the Mesa Top Residential Area in Phase 1 does not specify the exact number and frequency of ponding and area to be covered. This concept does not preclude the use of more regional retention ponds to serve multiple neighborhoods should future detailed design and on-the-ground experience determine that a more regional approach would better serve the Mesa del Sol community.

The proposed use of Distributed Retention and Infiltration Ponds (DRIPS) as the preferred storm water management approach for the Mesa Top Residential Area in this Level B plan does not specify, at this time, the exact number and frequency of ponding and area to be covered. This concept does not preclude the use of more regional, less frequent retention ponds to serve multiple neighborhoods should future detailed design and actual experience determine that a more regional approach would better serve the Mesa del Sol community in Level C planning efforts.

**Table 4A-7 Proposed Development Conditions Basins —
Mesa Top Residential Areas**

Basin	Area (acres)	Q (cfs)	Volume (ac-ft)	Receiving Pond
A	61	240	16	3
B	86	291	16	3
C	78	261	15	3
D	58	192	11	2
E	144	500	29	6
F	42	137	8	5
G	251	849	48	8
J	121	477	32	6
K	112	372	20	4
M	36	145	10	2
N	208	683	37	7
O	92	304	17	3
Active Adult	500	1577	81	14



County Recreation Center

The County Recreation Center straddles three different drainage basins as is shown in Figure 4A-12, some drainage goes toward I-25, some runoff reaches the Tijeras Arroyo, and historically some flows go to the Mesa Top playas.

There are also nearly 185 acres in the county recreation complex that overlap with the existing conditions A1.4 basin, this area is nearly one third of the A1.4 basin. If this area were left undisturbed it would drain to the Mesa Top playas; however build-out associated with the recreation complex, and the University Blvd. extension is disrupting historic flow paths, so drainage infrastructure for this basin is required. A retention pond along University Blvd. has been built; the current pond is approximately 10 ac-ft and has been sized to retain the 100-yr 10-day event for contributing parking lot of Journal Pavilion. As additional recreation site development advances the pond must be increased in size and converted to a detention facility.

The model for the fully developed conditions assumed that areas draining to the detention pond will be primarily impervious areas such as parking lots and roof tops. Based on this assumption runoff from the developed basins can be controlled by a 23 Ac-Ft detention facility with a 24-inch outlet pipe discharging to the Tijeras Arroyo via the University storm drain. This model will need revision as development plans become more firmly established. The practical management of this 23 acre-feet is to distribute about the RecPlex lands in a manner that works with the land planning and provides functional and aesthetic quality.

Several small basins are located in the northwest portion of the Recreation Complex property; these basins are identified as R.1 to R.6. There are currently no plans for development in these basins, and all drain along historic paths which lie outside of the Mesa del Sol property. One of these basins, R.1 which encompasses nearly 55 acres, drains to I-25b but less than 5 acres are inside the Recreation Complex boundary. An increase in flow from a developed R.1 basin will require analysis when development plans are firmly established in the future. Basins R.2 to R.6 discharge to the Tijeras Arroyo within historic channels. No development is expected in these basins so the natural drainage system will be left intact see the existing conditions discussion for additional information about these basins.

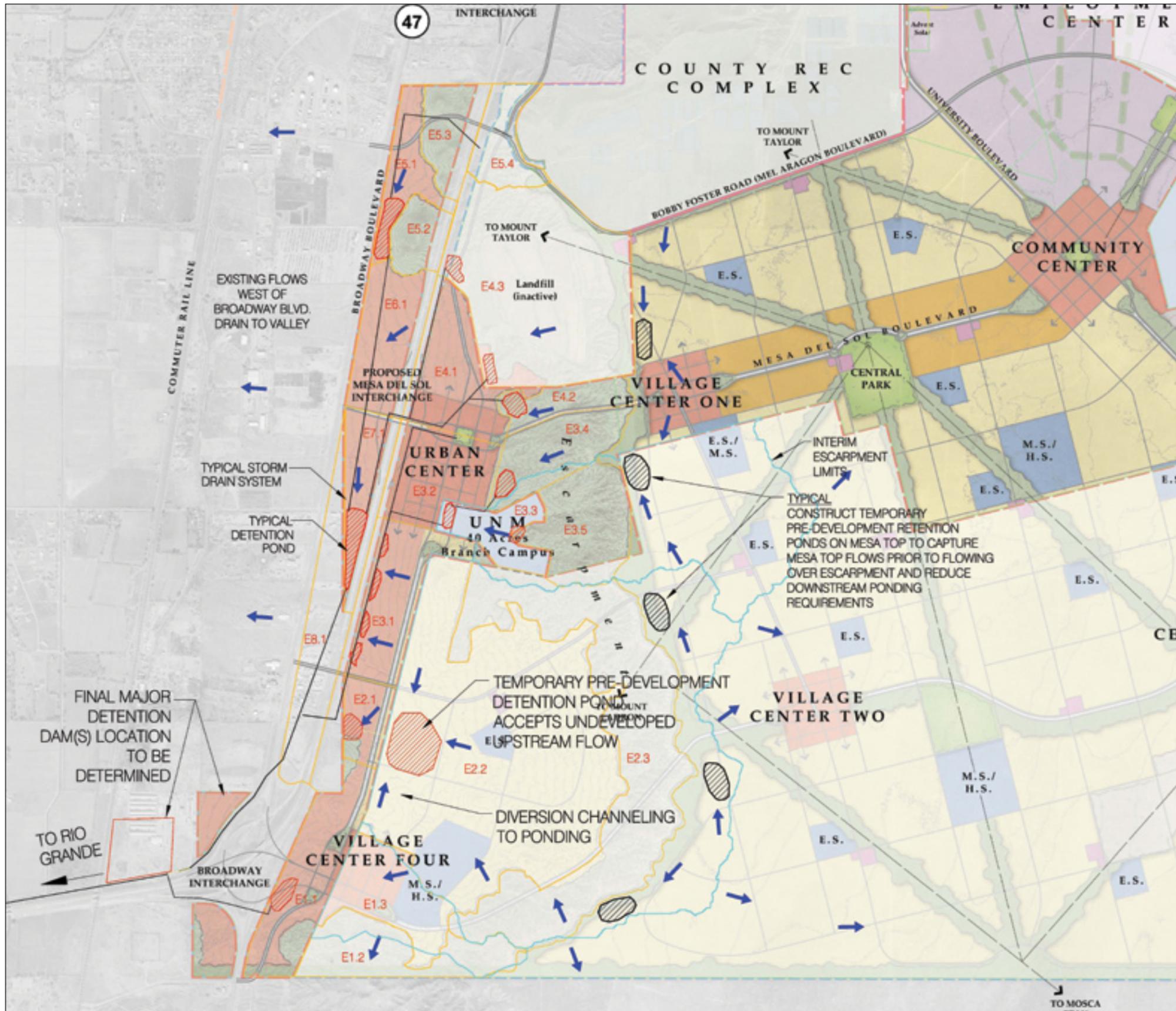
Western Escarpment Lands

Initial development in the escarpment area will be served by drainage infrastructure that provides service to the commercial strips along I-25 and Broadway but it will also need to have the capacity to handle later residential development to the east. The proposed conveyance system within the commercial areas includes storm sewers with detention

ponds sized to minimize the discharge and conveyance pipe sizes. Many of the proposed detention facilities will be upstream of the commercial corridor to attenuate peak discharges entering from non-commercial areas. Along the Mesa del Sol stretch of I-25, conveyance under the highway may be limited to four structures, three existing structures conveyances will be used and a fourth is required and is planned as part of the Mesa del Sol interchange project. In the future flows will be diverted to the south and discharged to the Rio Grande via a single conveyance pipe or channel. Figure 4A-12 illustrates the detention and conveyance scenario proposed to support future developed flows. Existing structures along I-25 and Broadway can be abandoned and plugged to prevent uncontrolled nuisance flows.

The Broadway and I-25 basins currently lack storm drain infrastructure capable of detaining and conveying flows to the Rio Grande. This area was studied as part of the Southeast Valley Drainage Management Plan approved by AMAFCA (Wilson, 1986). In the study, Wilson and Company, Inc identified a system of channels and storm drains that would collect developed runoff from the region including all of the west escarpment area of Mesa del Sol and convey and discharge the storm water runoff to the Rio Grande. Mesa del Sol proposes working with AMAFCA to develop a regional drainage plan that refines the SE Valley DMP to address Mesa del Sol's planned improvements.

The Level B development along the I-25 and Broadway corridors will be primarily comprised of urban and commercial land use. Future development, outside of the Level B boundary, will be sandwiched between the steep slopes dropping off of the mesa top and the commercial developments along I-25, and includes primarily residential development. The upper steep slopes of the escarpment and the inactive landfill area will remain undeveloped open space. Currently, the far western extent of the mesa top drains westward to the escarpment edge, however much of the runoff from those areas will be retained with mesa top development. For modeling purposes, two different development phases were considered. The first interim conditions model, considers only the initial development along I-25 and Broadway within the plan area. The second model reflects ultimate build-out of the entire Western Escarpment. As new drainage systems are added and as Mesa del Sol development progresses, the drainage basins for the escarpment area will be altered. The interim and ultimate drainage basin boundaries are shown in on the West Escarpment figure. Much of the proposed system will be controlled by the four drainage crossings along I-25. These facilities will be used to control and route runoff entering the Broadway commercial areas. The following discussion describes routing and detention of runoff from the West Escarpment. The output from the interim and developed conditions models is included in tables 8 and 9.



**WEST ESCARPMENT
DRAINAGE MANAGEMENT
PLAN**

Figure 4A-12

Legend

-  Drainage Direction of Flow Arrow
-  Detention (Escarpment) Ponding
-  Retention (Mesa Top) Ponding



Table 4A-8 Summary Interim Conditions Escarpment Drainage

Basin	Area Acres	Interim Development Type	% A	%B	%C	% D	tP (hrs)	Q100 (cfs)	V (ac-ft)
E1.1	93.4	Comm/OS	4.0%	5.3%	14.2%	76.5%	0.235	246.2	12.62
E1.2	44.3	OS	17.6%	32.9%	45.6%	0.0%	0.355	42.0	2.50
E1.3	101.0	OS	51.1%	32.9%	16.0%	0.0%	0.469	54.1	4.41
E2.1	30.0	Comm	0.0%	0.0%	10.0%	90.0%	0.133	118.0	4.57
E2.2	923.0	OS	59.6%	23.8%	16.6%	0.0%	0.341	687.1	38.93
E3.1	88.1	Comm	0.0%	0.0%	10.0%	90.0%	0.133	343.4	13.41
E3.2	72.8	Comm	0.0%	0.0%	10.0%	90.0%	0.133	284.5	11.07
E3.3	345.0	OS	69.9%	14.4%	15.7%	0.0%	0.352	236.2	13.88
E3.4	63.0	OS	32.2%	31.7%	36.1%	0.0%	0.133	118.9	3.22
E4.1	83.9	Comm	0.0%	0.0%	10.0%	90.0%	0.133	326.2	12.73
E4.2	36.5	OS	29.3%	35.2%	35.6%	0.0%	0.133	69.4	1.89
E4.3	256.2	OS	54.6%	21.9%	23.5%	0.0%	0.343	226.7	11.34
E5.1	43.8	Comm	0.0%	0.0%	10.0%	90.0%	0.224	132.6	6.61
E5.2	29.9	OS	23.53%	35.99%	40.48%	0.0%	0.152	54.8	1.63
E5.3	44.4	OS/Paved	21.18%	30.29%	38.54%	10.0%	0.133	97.9	2.88
E5.4	40.8	OS/Paved	30.44%	25.87%	33.70%	10.0%	0.133	55.1	1.63
E6.1	74.7	Comm	0.0%	0.0%	10.0%	90.0%	0.133	291.8	11.37
E7.1	55.0	Comm	0.0%	0.0%	10.0%	90.0%	0.166	194.9	8.35
E8.1	84.0	Comm	0.0%	0.0%	10.0%	90.0%	0.343	198.0	12.73
Total	2509.6								175.8

Table 4A-9 Summary of Developed Conditions Escarpment Drainage

Basin	Area Acres	Development Type	% A	%B	%C	% D	tP (hrs)	Q100 (cfs)	V (ac-ft)
E1.1	93.40	Comm/OS	3.99%	5.33%	14.18%	76.49%	0.235	250.2	12.78
E1.2	74.39	OS	24.08%	33.55%	42.37%	0.00%	0.348	69.1	4.04
E1.3	69.37	Res/Comm/Sch	0.00%	9.48%	15.20%	75.32%	0.133	250.5	9.45
E2.1	30.04	Comm	0.00%	0.00%	10.00%	90.00%	0.133	117.9	4.57
E2.2	473.70	Res	0.00%	18.14%	18.15%	63.71%	0.176	1361.1	58.97
E2.3	289.12	OS	24.11%	33.34%	42.56%	0.00%	0.205	438.9	15.76
E3.1	88.14	Comm	0.00%	0.00%	10.00%	90.00%	0.133	343.4	13.41
E3.2	72.78	Comm	0.00%	0.00%	10.00%	90.00%	0.133	284.5	11.07
E3.3	40.00	UNM	0.00%	0.00%	20.00%	80.00%	0.133	152.7	5.78
E3.4	63.31	OS	20.52%	37.21%	42.28%	0.00%	0.248	80.2	3.50
E3.5	80.40	OS	15.80%	31.55%	52.65%	0.00%	0.199	129.7	4.73
E4.1	83.91	Comm	0.00%	0.00%	10.00%	90.00%	0.133	326.2	12.73
E4.2	32.60	OS	21.41%	38.88%	39.70%	0.00%	0.133	65.4	1.78
E4.3	256.24	OS	54.56%	21.94%	23.50%	0.00%	0.267	226.7	11.34
E5.1	43.76	Comm	0.00%	0.00%	10.00%	90.00%	0.224	132.6	6.61
E5.2	29.86	OS	23.53%	35.99%	40.48%	0.00%	0.152	54.8	1.63
E5.3	44.36	OS	23.53%	33.66%	42.82%	0.00%	0.133	89.0	2.41
E5.4	25.80	OS	33.82%	28.74%	37.44%	0.00%	0.133	77.0	2.10
E6.1	74.65	Comm	0.00%	0.00%	10.00%	90.00%	0.133	291.8	11.37
E7.1	55.00	Comm	0.00%	0.00%	10.00%	90.00%	0.166	194.9	8.35
E8.1	84.01	Comm	0.00%	0.00%	10.00%	90.00%	0.843	198.0	12.73
Total	2104.8								215.11



The northern most I-25 drainage structure is an existing 4-ft x 4-ft CBC which will link Basin E5.4 to Basin E5.3. The flow path through E5.3 will most likely follow the future Bobby Foster Road into E5.1 where a detention pond (Pond 5.1) will be used to reduce the peak flow rate. The storm drainage system conveying this runoff will use pipes ranging from 36 to 66 inches in diameter and carry a maximum flow of nearly 290 cfs. As currently proposed, runoff from E5.2 will route directly into Pond 5.1. Basins E5.4, E5.3, and E5.2 will be primarily undeveloped, and E5.1 will be a commercially developed basin. The peak pond inflow will be 339 cfs which will be attenuated to 66 cfs using a 36-inch CMP outlet with 5.5 feet of headwater, and pond storage of 8 acre feet. This pond will discharge into basin E6.1. A summary of pond sizes and volumes is included in tables 10 and 11. The interim and developed conditions for Basins E5.1 through E.5.4 should be essentially identical.

A storm drain system within Basin E6.1 will convey the discharge from Pond 5.1 and the runoff from within E6.1 to basin E7.1 and eventually to Pond 7.1. The conveyance will run along the western edge of E6.1. Since Basin E6.1 will be highly urbanized it will be primarily impervious and will not have any areas for detention facilities. As modeled, the peak outflow from E6.1 will be nearly 300 cfs which can be conveyed by 72-inch storm drains at existing grades. This drainage system will continue through basin E7.1 until it discharges into Pond 7.1. Peak discharge into this pond will be roughly 530 cfs and the size of the storm drain must increase to an 84-inch diameter pipe.

Table 4A-10 Interim Conditions – Pond Sizes and Volumes

Pond ID	Contributing Basins	Contributing Area (acres)	Volume of Storage (ac-ft)
PND1.1	E1.3, E1.2, E1.1	238.6	14.1
PND2.2	E2.2	923	31.0
PND3.3	E3.3	345	7.9
PND3.4	E3.4	63	2.2
PND3.1	E3.4, E3.3, E3.2, E3.1	568.9	19.4
PND4.3	E4.3	256.2	7.9
PND4.2	E4.2	36.5	1.4
PND5.1	E5.4, E5.3, E5.2, E5.1	159.4	7.9
PND7.1	E7.1 E6.1, All E5, E4	665.0	35.5
PND8.1	All Basins	2509.6	77.5

The second drainage structure for routing runoff under I-25 will need to be constructed as part of the Mesa del Sol interchange project. This structure will link the E4 basins with basin E7.1. Basin E4.1 will be one of the proposed urban centers in the Mesa del Sol. For that reason, no detention ponds will be used in this basin. The only potential for peak attenuation via ponding occurs upstream in basins E4.2 and E4.3 although both basins are slated to remain undeveloped. Basin 4.3 includes the closed landfill and generates a peak runoff of 227 cfs; the peak runoff form E4.2 is 69 cfs. By constructing 1.4 and 8 ac-ft detention ponds in basins E4.2 and E4.3 respectively, the peak runoff at the I-25 conveyance can be limited to 327 cfs. The developed and interim conditions for these basins will vary only slightly in that some of the mesa top will drain to the E4.2 basin, but with development that area will be cutoff, and the developed conditions runoff will decrease slightly. The runoff from the E4 basins will be delivered directly to pond 7.1 using a drainage system with pipes ranging from 36 to 66-inches in size.

Runoff from E6.1 and E4.1 will be routed through E7.1 into a detention pond to attenuate the runoff peak from the planned urban areas. Basin E7.1 will also include large commercial/urban areas and its peak runoff is expected at approximately 195 cfs during the 100-year, 24 hour event. With the additional runoff coming from off-site, the maximum peak flow entering Pond 7.1 is 805 cfs, with a total volume of 58 ac-ft. A planned 36 ac-ft detention facility with two 36-inch CMP outlets and three feet of headwater limits discharge into Basin E8.1 to 70 cfs. Even though basin 8.1 is included in the Escarpment

Table 4A-11 Fully Developed – Pond Sizes and Volumes

Pond ID	Contributing Basins	Contributing Area (acres)	Volume of Storage (ac-ft)
PND1.1	E1.1, E1.2, E1.3	237.2	19.6
PND2.3	E2.3	289.1	10.7
PND2.2	E.2.3, E2.2	762.8	52.4
PND3.5	E3.5	80.4	3.0
PND3.4	E3.4	63.3	2.1
PND3.3	E3.5, E3.4, E3.3	183.7	5.5
PND3.1	All E3 basins	344.6	18.0
PND4.3	E4.3	256.2	8.1
PND4.2	E4.2	32.6	1.3
PND5.1	All E5 basins	159.4	7.9
PND7.1	E7.1, E6.1 all E5, E4	646.2	35.7
PND8.1	All basins	2104.8	96.8

model, it is not within the Mesa del Sol boundary. It has been included in the model given runoff will be routed through the area, and as it develops it will most likely tie into the proposed Mesa del Sol drainage system. In addition to the runoff from Pond 7.1, much of the area to the south of the Mesa del Sol interchange will eventually be routed through basin E8.1. The current model exploits four existing 4-ft x 10-ft CBCs under the interstate as the third conveyance westward under I-25. The area discharging to this structure includes all of the E3 and E2 basins which will be commercial, residential, and open space areas. The E3 basins are immediately to the south of the Mesa del Sol interchange and include a commercial strip, E3.1, an urban center, E3.2, the University of New Mexico site, E3.3, and open spaces, E3.4 and E3.5. The E2 basins are to the east of the box culverts which act as the conveyance under I-25. The E2 basins consist of a small commercial area E2.1, a large residential development E2.2, and open space areas E2.3, along the escarpment slopes. Roughly half of the total escarpment area to the east of I-25 will be routed through this structure.

This area will see the largest change between interim and fully developed conditions. During the interim phases of development only basins E3.2, E3.1 and E2.1 will be developed. All the remaining areas will remain undeveloped, and a considerable amount of mesa top area will continue to drain through this area. In the long term development on the mesa top will remove approximately 400 acres from the escarpment drainage area. Ultimately, the UNM site and the residential areas will also be built out when development is complete. The division of basin E3.3 into basin E3.3 and E3.5, and the division of E2.2 into E2.2 and E2.3 reflects the change of those area from undeveloped to a mixture of open space and developed areas.

Basin E3.2 represents the urban center and will not include any detention facilities, the only available spaces for detention ponds will be in upstream and downstream basins. The peak outflow from E3.2 will be approximately 285 cfs, which will be conveyed through a storm drain system to basin E3.1. In the interim, all of the area up stream of E3.2 will be open space and require about 10 ac-ft of pond capacity so that peak outflow from E3.2 does not exceed 290 cfs. The drainage system for E3.2 and upstream areas will be controlled by pipes ranging in size from 36 to 54-inch diameter. When development is complete, additional flow resulting from UNM development will be offset by mesa top facilities limiting discharge from above. Therefore, the 10 ac-ft pond must be upsized to approximately to 10.5 ac-ft to maintain the 290 cfs peak discharge from E3.2. The runoff from E3.2 will be detained in pond PND3.1 in basin E3.1 which flow in series paralleling the interstate. Basin E3.1, developed primarily as commercial lots, generates an additional 13.4 ac-ft of runoff with a peak flow rate of 344 cfs. A total of 34 ac-ft of runoff pass through basin 3.1, with a peak flow rate of 632 cfs, requiring 20 ac-ft of detention capacity. This pond will reduce the flow peak cfs. As currently planned the outfall from the E3.1 ponds will route through E2.1 to the culverts under I-25.

Other basins also drained through these culverts are E2.1, E2.2, and E2.3. Only basin E2.1 is planned to develop in the near term, while the area to the east will be developed as a residential community much later. In the interim, the area will remain as open space; hence the area to the east was treated as a single undeveloped basin in the interim model. This basin encloses an area of over 900 acres and generates 39 ac-ft of runoff at a peak rate 687 cfs even before development. After development, approximate 474 acres of the area is slated primarily for residential development, represented by basin E2.2. Another 289 acres will be left as escarpment open space, and the remaining area will become part of the mesa top development. After development, these basins will generate nearly 75 ac-ft of runoff, with a peak flow of over 1,340 cfs from the residential area alone. Therefore, the runoff from this area will require a significant amount of storage capacity to attenuate the peak runoff directed through the I-25 culverts. In the interim conditions 31 ac-ft of storage with a maximum discharge rate of 40 cfs will suffice, with a need to increase storage to 63 ac-ft and a maximum discharge rate of 97 cfs to support full build-out. This discharge will combine with the discharge from basin E3.1 in basin E2.1, before discharging under the highway to E8.1. The modeled peak flow rates through the culvert are 169 cfs for the interim case and 215 cfs at full build-out.

Basin E8.1 is not within the boundaries of the Mesa del Sol project, so no management strategy has been developed for this basin. Nevertheless, this area will most likely be developed as a commercial district, and the development will have a major impact on the hydrology of the area. This basin will potentially generate 13 ac-ft of runoff with a peak flow rate of 198 cfs. These flows will combine in E8.1 with the previously described flows discharging from Pond 7.1, and basin E2.1 to generate a maximum flow rate of 409 cfs. This will discharge through basin E8.1 via a storm drain pipe to a final detention facility.

Village Center 4 will support a mixture of uses including urban, open space, a middle school, a high school, and residential areas. One commercial stretch will be developed in the interim phase, represented by basin E1.1, while the remaining areas will be undisturbed including basins E1.2 and E1.3. At final development, basin E1.2 includes open space, and E1.3 will be a mixture of commercial, residential and school parcels. In the interim, these basins will produce 14 ac-ft of runoff at a maximum flow rate of 297 cfs. Once developed, the volume will increase to 26 ac-ft and the corresponding discharge rate increases to 515 cfs. A single 14 ac-ft pond in E1.1 is sufficient to manage the storm runoff, with expansion to 20 ac-ft for the final conditions, with a maximum discharge of 56 cfs. This discharge must route through the Broadway/I-25 interchange area to a final detention facility.

As shown in Figure 4A-12, the ultimate detention facility stores all of the runoff from the Escarpment development and from basin E8.1. In the fully developed condition, the peak inflow to the pond is 448 cfs. A detention pond of 97 ac-ft capacity with a single 54-inch primary spillway can reduce discharge to the Rio Grande to 97 cfs.



4A.7 Stormwater Drip Ponds – Water Quality, Water Harvesting, Infiltration

Stormwater discharge quality continues to be a major national, state and local concern. Pre-development runoff generally contains only water and low concentrations of natural compounds. However, developed runoff collects a whole host of additional elements, including sediment, organic compounds such as fertilizers, excessive nutrients, heavy metals, chemicals, bacteria, viruses, oil, grease and more. A study by the USGS was reported to say that such pollutants are largely removed by only six (6) inches of soil. Vegetative cover adds significantly to the pollutants removal process. Mesa del Sol will incorporate significant stormwater quality features in its planning and construction goals. Generally, on the trunk infrastructure level, these measures are accomplished through the use of the distributed retention and infiltration ponding (DRIP) plan of the Mesa Top and the detention ponding of the Escarpment area. These ponds will incorporate distinctive water quality and water storage features, such as, First Flush/Water Quality Forebay, Main Storage Pond, Infiltration as graphically depicted on Figure 4A-8.

4A.8 Stormwater System Maintenance

The stormwater system in the Level B planning area will primarily consist of two major elements that require maintenance and operational management:

- 1) The DRIP ponding system, including the pond, water quality and infiltration devices.
- 2) The adjacent public stormwater system, including the drainage piping, manholes, inlets, etc that are generally located in public streets.

It is anticipated that public ownership and maintenance of the major storm drain system outside the ponds, will be the City of Albuquerque. This is standard procedure in the City today and should be continued.

Mesa del Sol will be responsible for private ownership and maintenance of the pond elements of the stormwater system, including pond slopes, access, landscaping infiltration, etc., possibly through a secondary maintenance agreement with the City and using a special stormwater entity or District. Removing existing FEMA floodplains on mesa top and escarpment areas may possibly require some level of public commitment to the constructed facilities that permit removal of floodplains.

Level C subdivision planning and final design of the integrated public-private system is required to refine the drainage management concepts and jurisdictional elements.

Main Storage Pond

The primary purpose of the main pond is storage of the design storm and contains all of the operational components listed. The main pond is also intended for other uses such as improved parks, playing fields, and open space areas. Areas within the pond intended to receive high use landscape treatments, such as parks or playing fields with turf, will be raised from the pond bottom such that the surface is equal to or above the two-year storm event. The lower areas of the main pond that receive the higher frequency storm runoff events are to be improved and planted with species of plants appropriate for such an open space environment, able to absorb water so as to make evapo-transpiration possible and to further filter the water moving through the main pond. It is here that water harvesting methods may most easily be used to support plant species that otherwise could not survive, resulting in a desirable habitat and open space.

Infiltration

Throughout the pond system, stormwater will be consumed by minor local infiltration, evaporation, and evapo-transpiration. This rate of recovery and discharge is highly variable; therefore, a system of infiltration devices will be used as the final discharge point of the system. This will ensure proper infiltration when there is not enough capacity at minor local infiltration areas (pervious areas) to infiltrate all of a particular storm event. Design for infiltration is intended to maintain the health of the plant materials within the pond system subject to inundation and to eliminate a potential for creating a habitat for mosquitoes or unacceptable standing water. The infiltration will be constructed facilities that act under passive hydrostatic pressure “to inject” stormwater into the subsurface soils. It is estimated for some intense development situations that other existing technologies and methods will be used that consist of vertical or horizontal perforated pipes to leach stormwater even more efficiently into the subsurface soils. The sizing and details for the system will be highly dependant on the infiltration capacity of the sub soils, to be determined on an individual site basis. A maintenance program for the infiltration devices will be established to ensure proper operation.

An infiltration basin is a shallow often buried impoundment which is designed to infiltrate storm water into the ground water. An infiltration trench (a.k.a. infiltration gallery) is a rock-filled trench with no outlet that receives stormwater runoff. Stormwater runoff passes through some combination of pretreatment measures, such as a swale and detention basin, and into the trench. Runoff is then stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. The primary pollutant removal mechanism of both of these practices is filtering through the soil. These methods are expected to have high pollutant removal efficiency and can also help recharge the groundwater. However, their use is often restricted by concerns over groundwater contamination, soils, and clogging at the site.

Catch Basins / Catch Basin Inserts

Upstream of the ponding areas, typically as part of municipal stormwater systems, catch basin (a.k.a. storm drain inlet, curb inlet) is a surface inlet to the storm drain system that typically includes a grate or curb inlet, and a sump to capture sediment, debris, and associated pollutants. Catch basins act as pretreatment for other treatment practices by capturing large sediments and debris before they enter the storm drain infrastructure system. The performance of catch basins in removing sediment and other pollutants depends on the design of the catch basin (e.g., the size of the sump) and maintenance procedures to retain the storage available in the sump to capture sediment.

Enhanced infiltration rates are desirable to minimize the length of time that the adjacent public drainage infrastructure is inundated by pond water depths.

Physical Ponding Design Criteria

The retention ponding of Mesa del Sol will be a significant feature in the environment of daily experience. Pond depths may vary from 2'-12' or more in depth and may hold from 5-30 acre feet of storage. Accordingly, ponds must be designed with care and concern for the residents of Mesa del Sol. Generally, ponds will conform to the following guidelines but may vary with individual design approved by City staff:

- 1) Provide pond side slopes with curvilinear irregular shaping and varying slopes, preferably within a 4:1 slope. However, provided a top reach of 4:1 slope is provided or access to the slope is otherwise unavailable, 3:1 slopes over significant areas are acceptable to achieve volume requirements or to add visual interest to the pond imagery. In higher activity zones, access corridors may want slightly flatter slopes than these for assured exit capability during a surprise flooding event.
- 2) In ponds of greater depths, benching of side slopes is encouraged. Depth should also vary to avoid long uninteresting reaches of pond. Given the relatively mild slopes of the ponds, and relative ease that these slopes can be managed by foot when wet, fencing is not required for these ponds but could be acceptable as part of a designed park-like environment.
- 3) Infiltration basins, if exposed, should utilize large diameter decorative rock (river stone, etc), varying sizes (6"-36" in diameter) and should meander throughout the pond area.
- 4) Riparian-styled landscaping, shade elements (trees, etc), trails and park features (benches, tables, etc) are highly encouraged in the ponding areas. Irrigated landscaping is acceptable. Multi-use activities are desired.
- 5) Decorative railings should be used adjacent to physical drainage structures. Avoid placing structures in major sight lines from adjacent properties, where possible and practical.

6) Accessibility for large maintenance equipment should be maintained.

7) Design confirmation of suitable infiltrative soils below the pond bottom is required, preferably after initial pond grading has occurred. It is desirable although not required to perform falling head infiltration rate testing of the pond bottom, or other similar testing.

4A.9 Future Design Criteria

For public safety, design calculations for stormwater system and based upon conservative assumptions. For instance, the 100- year, 10-day design storm event criterion reflects in part a concern for failure of the discharge capability of the infiltration/evapo-transpiration system of the retention ponds. This concern is well founded for the current level of experience in Albuquerque for the proposed system.

The undesired aspect of this conservatism is oversizing of stormwater infrastructure.

Recognizing the issues involved, Mesa del Sol plans to monitor and test the ponding and infiltration systems, and other water harvesting features within its master plan areas. In time, if proven satisfactorily to the City, Mesa del Sol will seek to modify current design criteria where possible.

4A.10 Phasing

Storm drainage infrastructure planning and construction will be phased to comply with the actual development pace within the Level B planning area.

Mesa Top drainage infrastructure is easily scalable to actual development planning, due to distributed and relatively frequent nature of the DRIP system.

The 1/25 Broadway Corridor on the Western Escarpment will however have at least one significant threshold. The development level that "triggers" the outfall infrastructure to the Rio Grande must be established with the City and AMAFCA. Prior to this trigger point; development can occur with the construction of interim facilities (retention ponding) that is in substantial compliance with the ultimate drainage plan with respect to such details as road location, sizing, alignments and more.





UTILITIES

LEVEL B PLAN : OCTOBER 2006

APPENDIX **5**



MESA DEL SOL

5A Water Supply

5A.1 Introduction

The Mesa del Sol Level B Water System Master Plan, as portrayed summarily in Figure 5A-1, promotes and encourages sustainable water system practices, including such innovative approaches as aggressive water conservation, high desert landscaping design, wastewater reuse plans and aquifer recharge programs to ensure less water per capita than average for the rest of the City. These sustainable concepts are fostered and promoted both by the Water Conservation Plan incorporated in this Level B Master Plan and by current Water Authority programs that have been instituted within its service area.

The latest adopted water master plan, Master Plan of Water Supply for the City of Albuquerque, New Mexico and Environs (1963), included the area that encompasses Mesa del Sol for facilities planning. The site lies physically within what is called the Hubbell Springs Trunk. Subsequent to the adopted 1963 Master Plan, the portion of Mesa del Sol above the escarpment was eliminated from the active water master planning area but is now being reconsidered with the recent advent of master planning for the Mesa del Sol area.

Mesa del Sol lies to the south and east of the existing City of Albuquerque water system. The closest major plant facilities to the area are the Miles Reservoir and Pump Station, situated on University Boulevard approximately one half mile west of Yale Boulevard, and Burton Reservoir and Pump Station situated on Carlisle Boulevard at San Rafael Road. A major 24-inch water transmission line has recently been installed in University Boulevard up to the Journal Pavilion within Mesa del Sol. The Mountain View addition, located west of Second Street and south of Rio Bravo Boulevard, is now serviced by means of a transmission line in University Boulevard and two pressure reducing stations which then continue west on Rio Bravo Boulevard, west of 1 25. There is one well and a reservoir that presently serve Montessa Park and an on-site well and reservoir on the Journal Pavilion site for service to that facility.

The Mesa del Sol Level B water supply will be designed to conform to the City of Albuquerque Water Resources Management Strategy. Since the water system will be operated and maintained by the Albuquerque Bernalillo County Water Utility Authority (WUA), system component design must conform to specific design requirements. Those general guidelines for the design of the water system as presented here are based on past usage from records for the Albuquerque Metropolitan Area, and current City of Albuquerque master plan criteria. Actual water use at Mesa del Sol is anticipated to be significantly less per capita because of a combination of water saving devices, water reuse and an aggressive water conservation program, but the basic system design must conform to WUA standards.

5A.2 Methodology

Model Used

A new system model was developed for the Level B Analysis of Mesa del Sol. This model was developed using the latest version of MHWISOFT's INFOWATER program. INFOWATER is a Geographic Information System (GIS) based model that runs within ESRI's ARCMAP program. The GIS based model software is the current water model software in use by the Albuquerque Bernalillo County Water Utility Authority (WUA). The model was developed to identify the major water infrastructure required to serve the ultimate Mesa del Sol development. This model was developed using the criteria described in the methodology section.

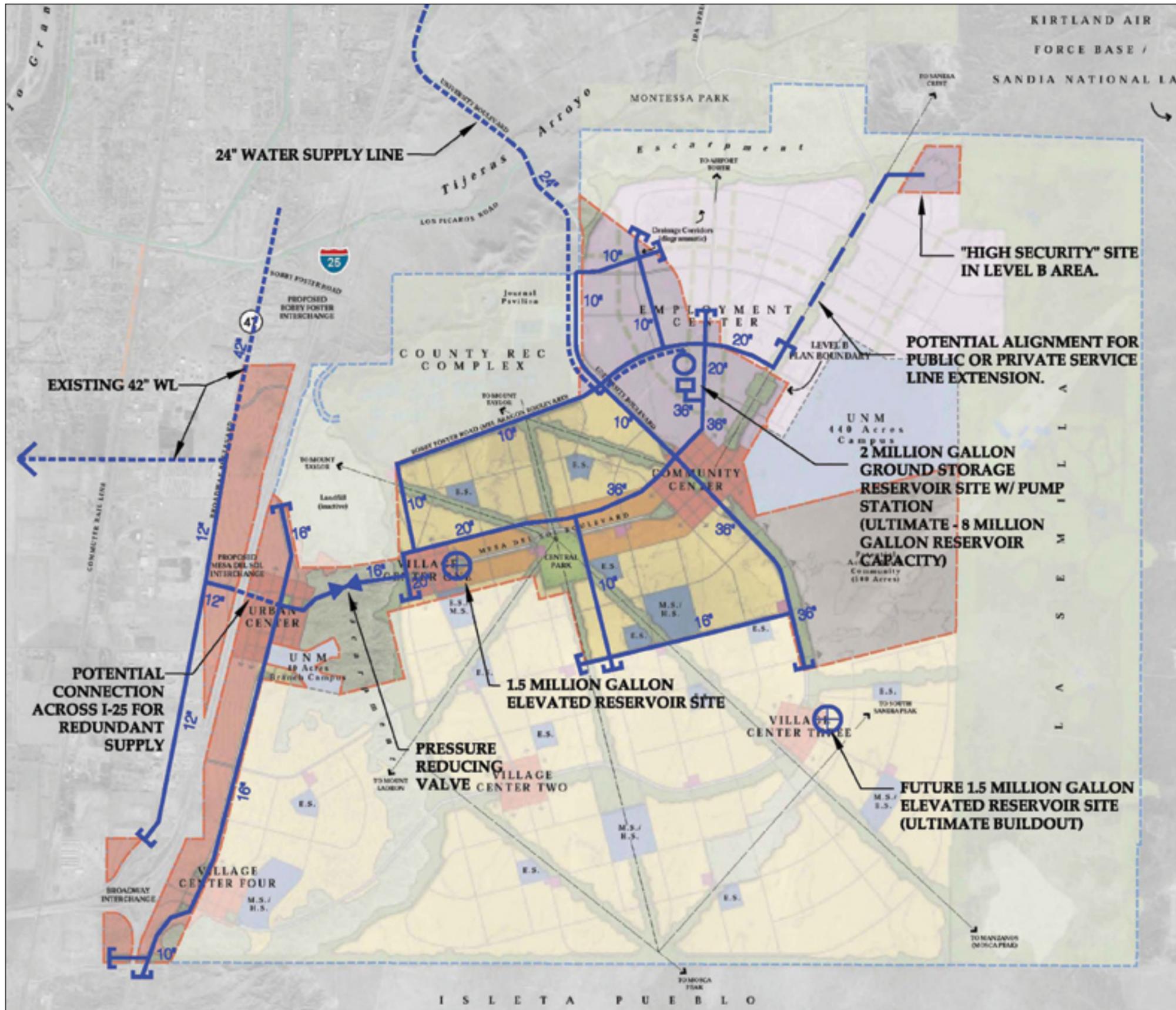
Model Demand Allocator Function

MHWISOFT's INFOWATER program has a "Demand Allocator" function that was used to allocate the calculated demand to the model. For this particular application, the Demand Allocator utilizes two GIS based coverages to allocated demand. The first is a representation of land use, transformed into polygons, that can be assigned water duty value. The second is creation of a Thiessen polygon coverage that represents areas around each of the water system "loadable nodes." When the Thiessen polygon coverage is overlain on the land use polygon coverage each loadable node is assigned values of property served by the various land use types. The demand for that node is then calculated by summing the total amount of area for each proposed land use multiplied by the water duty value for each of the land use types. This method was used to simplify the allocation of system demand in a systematic and consistent manner.

5A.3 System Demand Criteria

One of the essential elements of water system design and configuration is that of water demands. The development at full build-out will contain a mix of residential, industrial, commercial, and recreational facilities in addition to several urban centers. The major development in terms of land use will comprise residential development, which will constitute the majority of water system demand with the exception of irrigated parks and playing fields, both targeted for reuse water.

The WUA has instituted an aggressive water conservation program which consists of education in water use plus water irrigation time restrictions, mandated use of low water use fixtures in new housing, and incentive programs to change out high use fixtures to low use fixtures in existing homes. The result of that program is that per capita use, which constitutes all water usage divided by population served, has dropped from nearly 250 gallons per day average to under 180 gallons per day with a target of 75 gallons per capita day (gpcd). In fact, Administrative Instruction No. 1 adopted by the WUA effective June 1, 2006 has mandated the use of a water use of 180 gallons per household, which based on a 2.4 persons per household, equates to 75 gallons per capita per day.



PREFERRED WATER SYSTEM - TRUNK INFRASTRUCTURE PLAN

Figure 5A-1

Notes

1. The water infrastructure and line sizing shown on this plan is illustrative and subject to change with further planning with the water utility authority.
2. Water wells and associated well collector system are anticipated prior to full development of Level B area.



Unique opportunities, not available to many developed communities, exist at Mesa del Sol to offer reduced water consumption and therefore lower the number of required water rights, including potential wastewater and grey water reuse opportunities. If implemented, per capita consumption could be dramatically reduced. A detailed discussion of how the system demands were calculated is described in the following sections.

Given the aggressive water conservation goals and continuously improving system planning of both Mesa del Sol and the Water Authority, Mesa del Sol may seek to modify system demand criteria in the future to take advantage of potential system infrastructure reductions based on potential water usage savings – a key sustainability concept.

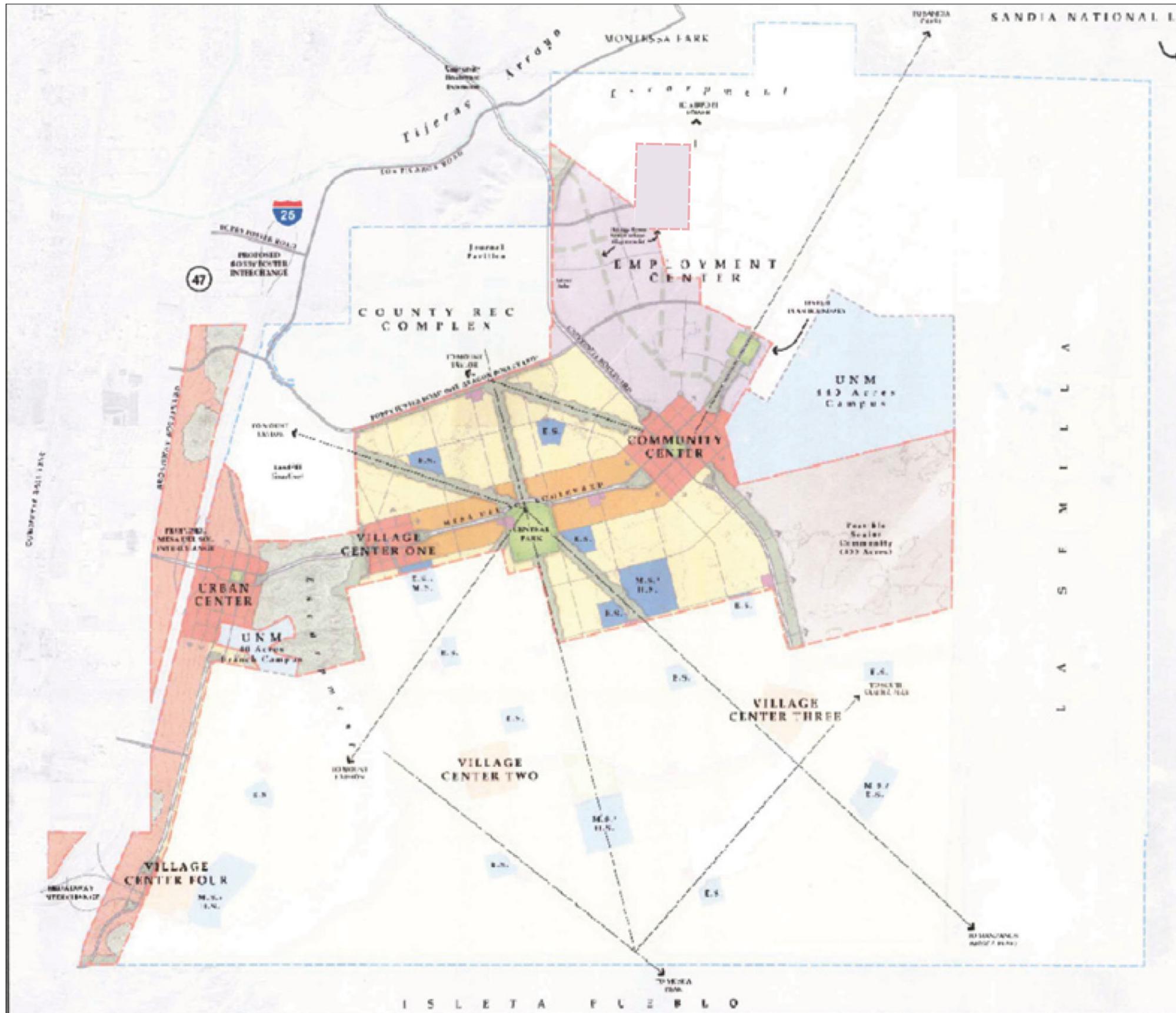
Proposed Land Use

The proposed Mesa del Sol Land use is based upon a portable document format (PDF) land use file received from Calthorpe Associates on March 8, 2006 and modified in June 2006. The proposed land use was manually recreated into an ESRI Shapefile to assist in the model demand allocation. Land use layout used for demand calculation was based upon this file. The proposed Mesa del Sol Land Use data can be seen in Figure 5A-2. All demand calculations are based upon this land use file. Table 5A-1 lists the ultimate development land use types and area values of each.

The Ultimate and Phased system demand was developed using several key assumptions. All system demand assumptions are based upon proposed land use. Demand calculations are developed from the proposed land use using a specific water duty for each type of land use.

Table 5A-1 Ultimate Development Land Use

Layer	Description	Cnt_Layer	Area (ft^2)	Area (ac)
N-B-APS-SCH	APS Schools	33	12107455.56	277.95
N-B-COMMUNITY_CTR	Community Centers	16	747798.91	17.17
N-B-EMPLOY_CTR	Employment Center	62	59693478.71	1370.37
N-B-ESCARPMENT	Escarpment - (Open Space)	93	49342696.34	1132.75
N-B-GRNWY	Green Space (Reuse Water)	247	185411774.73	4256.47
N-B-INDUST_COMMER	Industrial/ Comm Center	16	19698645.50	452.22
N-B-MIXED_USE_COMMER	Mixed Use Comm Centers	55	11951852.58	274.38
N-B-MULTI-FAM_RES	Multi Family Residential	14	5114071.82	117.40
N-B-SENIOR_COMM	Senior Community Center	18	21001795.89	482.13
N-B-SF_RES	Single Family Residential	206	142759139.71	3277.30
N-B-UNM-SCH	MDS UNM Campus	2	20981606.08	481.67
ROW	Major Road Right of way	1	32713954.13	751.01
ROWS	Right of way (Highway)	4	1127874.27	25.89



**MODIFIED
MESA DEL SOL
TAKE DOWN AREA
LAND USE**

Figure 5A-2

Revised September 2012 - addition of Tract D and removal of Tract 8 from plan area.

Legend

Land Use Category

- APS
- Community Center
- Employment Center
- Escarpment
- Greenway
- Industrial/Commercial
- Mixed Use/Commercial
- Multi-Family Residential
- Senior Community Center
- Single Family Residential
- UNM
- Right-of-Way

*As per Revised Master Plan 6/9/06



Average Day Demand

Average day water use is an estimate of the expected average day water use for each land use type. Average day use is calculated by dividing the expected total annual use by 365 days to get an expected demand value in gallons per day. Information regarding the amount of users per land use is necessary to create average day water duty values based on gallons of water use per acre. Using the average day water duty factors identified below results in a total expected Ultimate Mesa del Sol Average Day Use of 11.64 MGD.

Discussions of the water duty assumptions made for Industrial/Commercial/Institutional (ICI) use and for residential use are described in the following sections.

Industrial/Commercial/Institutional Water Duty Assumptions

Mesa del Sol Industrial/Commercial/Institutional (ICI) land use is expected to include all demand from the following sources:

- a) All APS Schools (Elementary, Middle, and High Schools)
- b) All UNM Campuses
- c) All Industrial Commercial Centers
- d) All Mixed Use Commercial Centers
- e) All areas in the Employment Center
- f) All Community Centers

ICI Demand predictions were estimated based upon building square footage and assumed FAR values for Mesa del Sol. ICI facilities using water conservation are expected to conservatively have water use between 20 and 75 gallons per year per square foot of building space depending on the water use type (See Table A-2 for assumed values). Average Day demand calculations using these values averaged very nearly 1 gpm/ac. For simplification of demand calculations, and to reflect the uncertainty in final land use the value of 1 gpm/ac was used for all analyses. This water duty value is based on a global average of all industrial commercial users and is representative of typical office, retail and school use. The estimated average day ICI use for the Ultimate Mesa del Sol Development is expected to be 4.14 MGD.

Table 5A-2 Conservative ICI Water Use Values

Description	Max FAR	Avg Day Demand (gpy/sqft)
APS Schools	0.50	20
Community Centers	0.20	40
Employment Center	0.30	40
Industrial/ Comm Center	0.30	40
Mixed Use Comm Centers	0.20	75
MDS UNM Campus	0.30	40

However, the proposed ICI average water duty of 1 gpm/ac is not valid for manufacturing processes that may require an unusually high amount of water, such as in the case of Advent Solar. Specific information is necessary for estimating the water use from any known or anticipated large water user. More detailed information regarding expected water use is necessary for the initial phase construction especially if the early phases will contain large water users.

Residential Water Duty Assumptions

The WUA has issued an Administrative Instruction No. 1 effective June 1, 2006 that will require that all new residential development have an average day water use of 180 gallons per day per household. This means that all Mesa del Sol residential development will be required to satisfy this requirement.

The ultimate residential population for the Mesa del Sol service area is assumed to be 90,000 people. This population will be housed dwelling units (DUs) located in the following land use areas:

- a) Multi-Family Residential
- b) Senior Center or Active Adult Living
- c) Single Family Residential

All assumed water use is based upon a total water use of 180 gallons per day per DU. However the total service population is limited to a combined residential service population of 90,000 people. Translation of people per DU was made by assuming an average of 2.4 people per DU. This value was selected based upon the average population data per DU for the WUA service area.

The last major assumption for residential water duty is related to the number of DUs per Acre for each residential land use type. Current DU Estimates provided by Calthorpe Associates estimates a total of 3,597 DUs in the Multi-Family Residential land use areas and 2,000 DUs in the Senior Center or Active Adult Living area located in Phase 1 Level B Area. These estimates represent the Ultimate DU values for these land use types because they include all land associated with these land use types. Based upon the allotted land use, these values represent a total of 30.64 DU/acre for Multi Family Residential and 4.15 DU/acre for the Senior Center or Active Adult Living area if major road right of way is excluded from the area of concern. These specific numbers of DUs and DUs/acre were assumed for ultimate demand calculations associated with these land use types.

The specified number of DUs for the remaining single family residential is now constrained in order to obtain a total service population of 90,000 people. The expected DU/Acre of the remaining single family residential land use can then be used to calculate the necessary DU/acre to obtain a total service population of 90,000 people. The remaining Single Family residential areas will be developed at a gross rate of 9.73 DU/acre in order to achieve the specified ultimate service population. In reality this value is a bit high for Single family residential and may be reduced by the introduction of additional multifamily residential units. The expected single family DU/acre may also be high because it excludes land associated with major road right of way. However, for purposes of this analysis all remaining single family residential land is assigned a demand associated with 9.73 DU/acre. The estimated average day residential use for the Ultimate Mesa del Sol Development is expected to be 6.75 MGD.

Other Water Duty Assumptions

Several additional land use types have been identified by Calthorpe Associates that are not expected to have any water demand. These land use types include roadways, open space areas, and parks. All major parks and median landscaping is assumed to be irrigated with reuse water and will have no demand on the potable water system. The land use areas assumed to have a water duty of zero gallons per acre are:

- a) Major and Minor Road Right of Way
- b) Highway On and off ramp Right of Way
- c) Open Space with no Development (Escarpment)
- d) Parks and Hiking Trails to be irrigated with Reuse Water

Peak Day Demand

Ultimate system sizing is typically based on meeting the expected peak day demand. Peak day demand is normally estimated by use of a Peak Day/Average Day (PD/AD) multiplier although the ratio of Peak Day/Average Day of Peak Month (PD/PM) is sometimes used as well. Demand multiplier values for the entire WUA system can be seen in Table A-3.

Table 5A-3 WUA Demand System Multiplier Values

2000 to 2004 Demand Multipliers for the Entire WUA system					
Year	2000	2001	2002	2003	2004
PD/AD Value	1.65	1.66	1.68	1.72	1.70
PD/PM Value	1.14	1.09	1.11	1.07	1.12

Based upon the level of uncertainty in this analysis a multiplier value of 1.8 was selected as a conservative estimate of the Mesa del Sol PD/AD multiplier. A PD/AD Mesa del Sol Multiplier will result in an estimated Ultimate Peak Day Demand of 19.60 MGD.

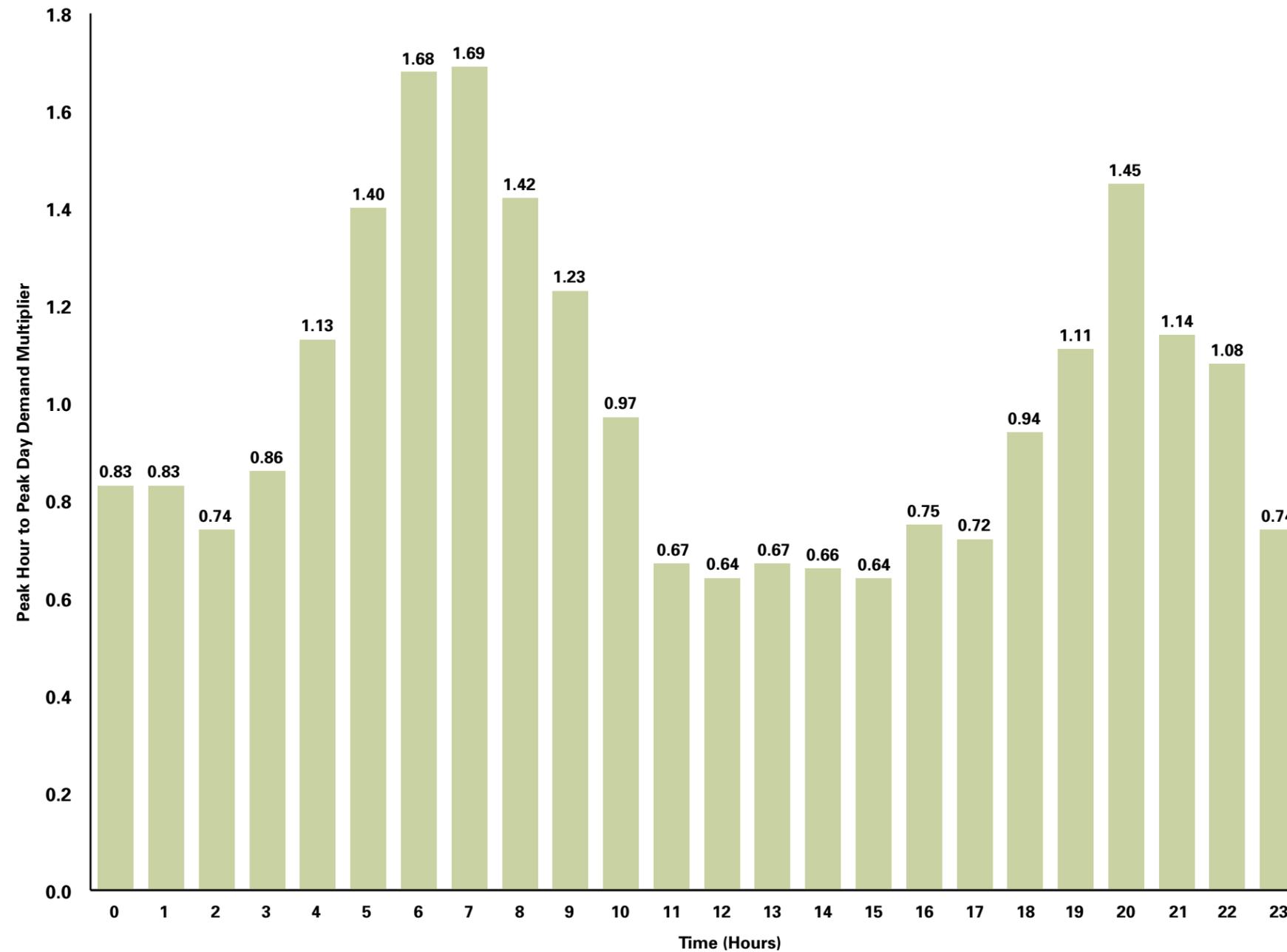
Peak Hour Demand

Peak Hour represents the maximum rate of use for any one-hour period of the Peak Day. Peak Hour demand for Mesa del Sol was obtained using an estimated diurnal curve. This curve represents the estimated variation in water use of a Peak Day for each hour of the day. The actual system demand for a given hour is calculated by multiplying the peak day demand by corresponding hourly value on the diurnal curve. The estimated diurnal curve was used for the Mesa del Sol service area regardless of the land use type.

The assumed Mesa del Sol diurnal curve is based upon the average water use for the entire service area of the five highest demand days in 2004. The diurnal curve is based on the averaged diurnal curves representative of the entire East Side of the WUA service area system demand (Area East of the Rio Grande River). This curve is taken as the best representative data for the anticipated peak day Mesa del Sol water use and was used for all model scenarios. The Assumed Mesa del Sol Diurnal Curve can be seen in Figure 5A-3.



Figure 5A-3 Assumed Mesa del Sol Peak Day Diurnal Curve



Based on the diurnal curve, a composite of the 2004 entire East Side WUA side, the Peak Hour to Peak Day (PH/PD) demand multiplier is about 1.69. The actual Peak Hour water use could be even higher under normal operating conditions. The Level A report indicated a Peak Hour factor of 2.98 was used to estimate Peak Hour from Average Day (PH/AD) which would equate to a PH/PD multiplier of 1.81. To account for the uncertainty in Peak Hour water use the peak hour value from the Diurnal curve should be increased from 1.69 to about 2.0, representing a 20% increase in the 2004 factor PH/PD multiplier. This factor is important for the initial development as well as for sizing pumps for the closed loop pumping system especially for the initial system phasing.

The Mesa del Sol Ultimate Peak Hour Demand is expected to range from at least 33.12 MGD to as high as 39.2 MGD using PH/PD multipliers of 1.69 and 2 respectively. This translates to a peak hour demand range of about 22,985 gpm to as high as 27,205 gpm. This is in contrast to the average peak day demand of 20.95 MGD or 14,600 gpm. The difference between the Ultimate Peak Day demand and the Ultimate Peak Hour demand would require almost 10,000 to 14,500 gpm of additional pumping capacity at the Mesa del Sol Pump Station if the system will operate as a closed loop pump station. The maximum pump station capacity can be greatly reduced if some equalizing storage is included in the ultimate elevated storage.

Storage requirements necessary to meet the Peak Day demand using the Mesa del Sol Diurnal Curve were found to be about 13.6% of the total Peak Day demand. This equates to roughly 2.8 MG of equalization storage needed to satisfy the difference between the peak day and peak hour demand.

5A.4 System Supply Approach

The Mesa del Sol water supply will be designed to conform to the City of Albuquerque Water Resources Management Strategy. Under this strategy, average day supply on a city-wide basis will come from one treated surface water source. Any consumption in excess of average day will be supplied from groundwater sources. The implementation of this strategy was completed under the San Juan-Chama Drinking Water Project, designed first to determine then implement the most cost effective means of utilizing the San Juan-Chama surface water supply throughout the city. As a result of the program, San Juan-Chama water in varying quantities will be distributed throughout the City as defined by a combination of economics plus federally mandated water quality standards beginning in 2007.

The WUA is currently in process of constructing its new surface Water Treatment Plant (WTP) and distribution pipelines. Treated surface water from WTP will be distributed by way of two main pipelines, one serving the East Side of the WUA service area and the other serving the West Side of the WUA service area. One of the four East Side reservoirs that will receive water from the WTP is Burton Reservoir. From Burton Reservoir, water

can be dropped to lower zones or pumped by Burton Pump Station to Ridgecrest Reservoir which serves Pressure Zone 3E. Treated surface water from the WTP will be blended with the available groundwater well supply in the Ridgecrest Trunk during peak demand periods and will serve as a source of supply for Mesa del Sol. This is important because the Ridgecrest Trunk currently has very limited excess well supply that can be used to serve Mesa del Sol.

Because the Southwest experiences cyclic periods of rainfall, the surface water supply cannot be relied on as the sole supply for average day consumption requirements. Albuquerque's Water Resources Management Strategy recognizes that periods of drought will occur and has established a groundwater reserve as part of the overall water strategy for use during those periods. Consistent with that plan, the Mesa del Sol supply will be designed to be able to provide Average Day supply plus standby capacity from a groundwater well field. The proposed well field would most likely be located within the northern areas of Mesa del Sol.

Initial Water Supply

Initial water supply for Mesa del Sol is expected to come from Ridgecrest Reservoir and Burton Pump station. These facilities will provide water to Mesa del Sol using a new 24 inch water line in University Blvd. This line is capable of providing a maximum of 3,500 gpm of water to supply to the Mesa del Sol service area. This translates to roughly 5 MGD of water supply to the Mesa del Sol Service area.

Initial water service for the Mesa del Sol Level B area is expected to be supplied directly from the new 24 inch water line in University Blvd. In this configuration all system instantaneous demands, including Mesa del Sol Peak Hour water supply and fire flow, are supplied by the 24 inch waterline. Initial Water Service will be limited to the amount this pipeline can supply. The amount of available development will be highly dependent upon the water use of the initial water users during this phase.

Once the Mesa del Sol Ground Storage and Pump Station are constructed, the system will be capable of supporting a Peak Day demand of 3,500 gpm. Fire flow demands will be stored in the ground storage and will be pumped into the system as required. Mesa del Sol water use during this period cannot exceed 5 MGD or 3,500 gpm 24 hours per day. Additional future water supplies will be necessary to support continued development.

Future Supply

It is clear that additional sources of water supply will be necessary to achieve ultimate build out for Mesa del Sol. The initial system supply is expected to provide only about one fourth of the ultimate system demand. The future supply must be capable of satisfying the remaining projected ultimate Mesa del Sol peak day demand less the 5 MG of initial supply currently available. It is imperative that the WUA work with Mesa del Sol to identify future water supplies as soon as possible.

Additional water supply may come from onsite groundwater wells or from some new off site supply. Detailed plans regarding the source of future supply will depend upon further discussions with the WUA.

If local Mesa del Sol groundwater supply is used to augment the initial water supply, certain activities will need to commence as soon as possible. The permitting process for well applications requires public notification and can take considerable time. For that reason, it is strongly recommended that the well application process be pursued aggressively at the inception of Mesa del Sol by the WUA in order for the wells to be approved and permitted by the time they are needed within Mesa del Sol.

All new water supplies are expected to be directed to the Mesa del Sol Ground Storage tank. All system layouts are based upon this premise. Ground Storage should be designed to anticipate future water supply from additional sources.

Arsenic Regulations

New EPA requirements concerning maximum concentration levels (MCL's) and disinfection go into effect in 2006. Among the most important MCL's in terms of impact on groundwater in the metro area is the new arsenic regulation. With promulgation of the new arsenic MCL, some of the water within the Albuquerque area will require treatment above the current disinfection and fluoride treatment currently provided for well fields to meet this new standard. Preliminary water quality samples from the SEO well test field indicate the groundwater below Mesa del Sol will require arsenic treatment to meet the new standards, unless arsenic levels are mitigated sufficiently by the blending of the well water with anticipated San Juan Chama (SJC) Diversion waters or with water from other well fields. Any blending would require that all Mesa del Sol groundwater be collected at a single location such as the ground storage facility.

In addition, it is likely that a minimum chlorine contact time requirement will be created for groundwater supplies. The levels of MCL's contemplated, including the new arsenic regulation and chlorine contact time, would dictate centralized facilities. With this in mind, plus the fact that the Mesa del Sol groundwater well field must be sized for Average Day production, it may become prudent to collect all Mesa del Sol groundwater at a single location.

Existing System Extension

Service for all parts of Mesa del Sol in Zone 1E west of I-25 is expected to come from Miles Reservoir located in the Ridgecrest Trunk, with possible back up from Mesa del Sol. This area should be able to connect to the new 42 inch water line being installed to provide service to Phase 1 of the South Valley Area in the Pajarito Trunk. This line will extend Zone 1E water service south on Broadway Blvd up to Desert Road where the water line will turn west. This line can be tapped to provide service to all Mesa del Sol Lands west of I-25 and will greatly minimize the expense associated with extending waterlines across I-25. All Mesa del Sol land west of I-25 is expected to be serviced this way.



5A.5 General System Configuration Criteria

System Pressure Zones

The WUA water system configuration is based on providing gravity service from service storage. Typical WUA Pressure Zones are designed to provide a minimum static pressure of 50 pounds per square inch (psi) and a maximum static pressure of 100 psi to customers within the zone. One psi of water pressure in a gravity system is derived from an elevation differential of 2.31 feet. Using this guideline, the high water elevation of a storage facility serving a pressure zone is 115 ft above the highest elevation in the zone and no more than 231 ft above the lowest elevation in the zone.

The highest elevation in the Mesa del Sol boundary is about 5,340 feet, and the lowest elevation is 4,910 feet. These elevation boundaries fall into three of the existing WUA Pressure Zones: Zone 1E, Zone 2E, and Zone 3E. The existing WUA Zone 1E provides service to land with elevations between 4948 ft and 5063 ft. Static pressure in Zone 1E ranges from 50 to 100 psi. The existing WUA Zone 2E provides service to land with elevations between 5063 ft and 5210 ft. Zone 2E is a bit unusual because the static pressure in Zone 2E ranges from 50 to 113 psi instead of 50 to 100 psi. The existing WUA Zone 3E provides service to land with elevations between 5210 ft and 5365 ft. Zone 3E is also a bit unusual because the static pressure in Zone 3E ranges from 50 to 114 psi instead of 50 to 100 psi. Existing WUA Pressure Zone elevation data and pressure ranges can be seen in Table A-4.

Proposed Pressure Zone boundaries for Mesa del Sol can be seen in Figure 5A-4. The existing WUA has stated that the Mesa del Sol pressure zones should match the existing WUA Pressure Zone service boundaries for Zone 1E and Zone 2E by providing the same maximum HGL for these pressure zones. Direct gravity or pumped water supply will be used to serve Hubbell Springs Zone 3E. Hubbell Springs Zone 2E will be a reduced pressure zone supplied from Hubbell Springs Zone 3E by use of Pressure Reducing Valves (PRVs). A small portion of Hubbell Springs Zone 1E is located East of I-25. This area may be supplied as an additional reduced Zone from Hubbell Springs Zone 2E or may simply provide individual PRVs for customers within Zone 1E.

The WUA is not requiring the Mesa del Sol water system match the existing Pressure Zone boundaries for Zone 3E but rather meet the system minimum pressure requirements. The WUA existing Zone 3E provides service up to elevation 5,365 ft, but the highest elevation in Mesa del Sol that will receive water service will only be about 5,340 ft because of the land buffer provided by La Semilla. This means that the maximum HGL required in Zone 3E for Mesa del Sol could be as low as 5455 ft and still provide 50 psi static pressure at the highest elevation (5,340 ft plus 115 ft (50 psi) = 5,455 ft). Table A-5 lists the proposed Mesa del Sol pressure zone delineation values.

Table 5A-4 Existing WUA Pressure Zone Delineation Values

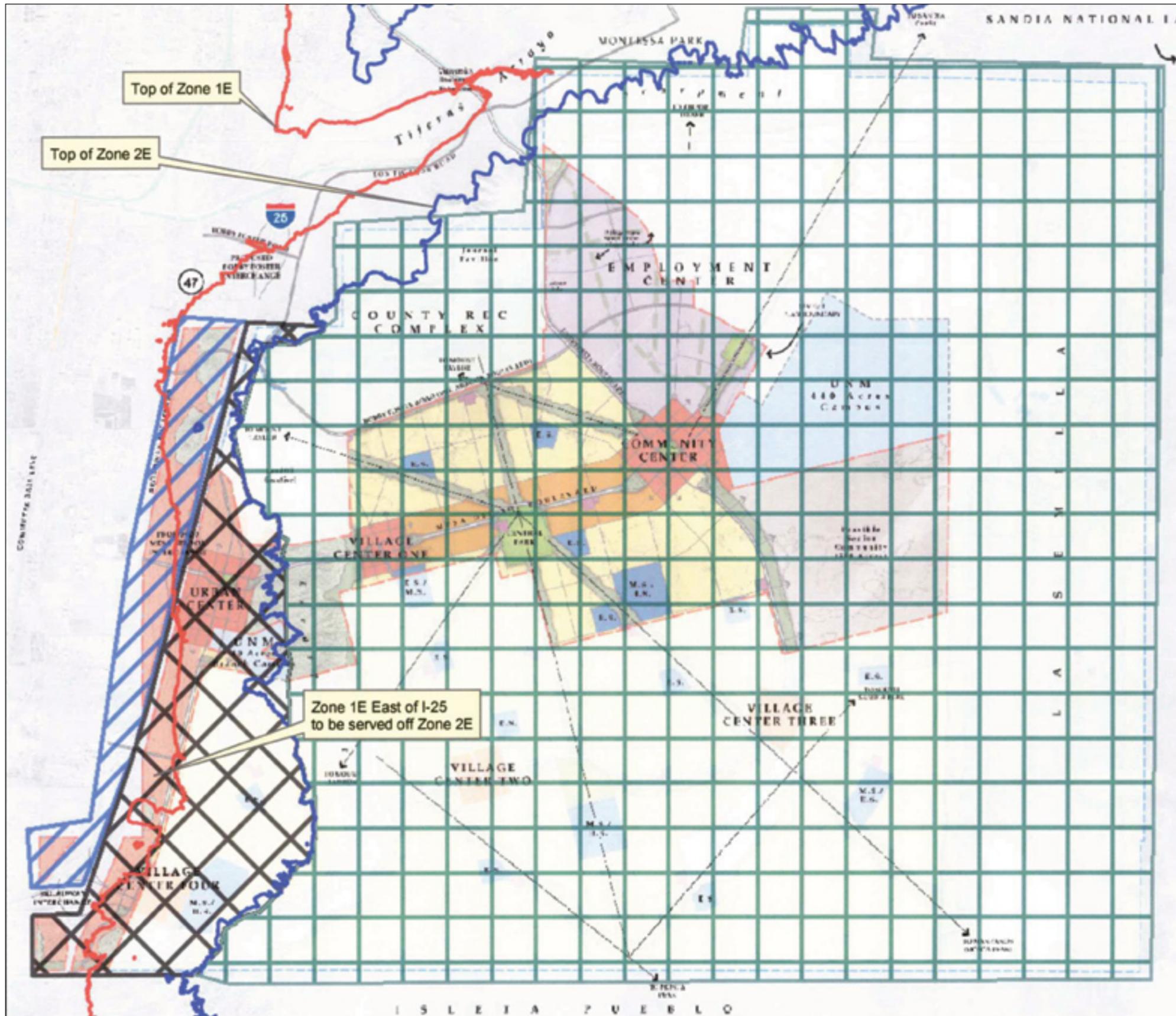
Existing WUA Pressure Zone Service Boundary Values

		Value (FT)	Static Pressure (psi)
Existing WUA Zone 1E	Zone Max HGL	5178	0
	Highest Elevation	5063	50
	Lowest Elevation	4948	100
Existing WUA Zone 2E	Zone Max HGL	5325	0
	Highest Elevation	5210	50
	Lowest Elevation	5063	113
Existing WUA Zone 3E	Zone Max HGL	5473	0
	Highest Elevation	5365	47
	Lowest Elevation	5210	114

Table 5A-5 Proposed Mesa del Sol Pressure Zone Values

Proposed Hubbell Springs (Mesa del Sol) Pressure Zone Service Boundary Values

		Value (FT)	Static Pressure (psi)
Hubbell Springs Zone 1E (Mesa del Sol)	Zone Max HGL	5178	0
	Highest Elevation	5063	50
	Lowest Elevation	4948	100
Hubbell Springs Zone 2E (Mesa del Sol)	Zone Max HGL	5325	0
	Highest Elevation	5210	50
	Lowest Elevation	5063	113
Hubbell Springs Zone 3E (Mesa del Sol)	Zone Max HGL	5455	0
	Highest Elevation	5340	50
	Lowest Elevation	5210	106



**MESA DEL SOL
PRESSURE ZONE
BOUNDARIES**

Figure 5A-4

Legend

— 5060 Contour

— 5210 Contour

Pressure Zones

 1E

 2E

 3E



System Pressure

System pressure is used to set pressure zone boundaries and configuration, and size transmission and distribution system piping. System pressure requirements are divided into two distinct categories: 1) static pressure or the pressure within the system under system demand conditions; and 2) residual pressure or the pressure that will occur within the system under the full range of system demands that is predicted. The general criteria used for the Mesa del Sol system configuration include the following:

- Static: 100 pounds per square inch (PSI) maximum to 50 PSI minimum pressure
- Residual: 110 PSI maximum to 35 PSI minimum under any system condition other than fire demand. Minimum residual pressure of 20 PSI during a fire demand situation

Fire Flow Requirements

Fire Flow Requirements for Mesa del Sol were developed in coordination with the WUA. The proposed Mesa del Sol water system will be designed to provide a minimum Fire Flow of 3,500 gpm for 3 hours for any customer within the Industrial, Commercial, and Institutional land use areas. The system must be capable of providing fire flow service while maintaining a minimum system pressure of 20 psi to all customers in the system. This value is based upon the latest WUA Fire Flow criteria used for other proposed APS High Schools in the WUA service area. This Fire Flow criteria is less than the 6,000 gpm for 6 hour requirement that most of the WUA water system is required to provide, and will result in significant water infrastructure savings. Accordingly, buildings within the Industrial, Commercial, and Institutional land use areas will be required to install sprinkler systems, use building materials, and zone breaks such that the maximum building fire flow will not exceed 3,500 gpm.

The proposed Mesa del Sol water system is expected to be able to provide a minimum Fire Flow of 2,500 gpm for 2 hours for all residential land use areas. The system must be capable of providing fire flow service while maintaining a minimum system pressure of 20 psi to all customers in the system.

Some areas in the system may be capable of providing a greater amount of fire flow than the identified minimum values. Buildings or homes within these areas will likely be required to limit their fire flow demand to 3,500 gpm for 3 hours because increasing the fire flow capability would also require a greater amount of reservoir Fire Storage in the system.

System Storage Criteria

Two distinct types of storage are required for the Mesa del Sol ultimate development; Ground Storage (or Primary Storage) and Elevated Storage. These two storage elements are somewhat unique types of storage in the WUA water system but are required due to the unique location of the Mesa del Sol service area. Details regarding these types of storage will be discussed in the following sections.

Ground Storage

Ground Storage is storage that will not be used for direct water supply but will be used to provide key system storage to the water system. Ground Storage is very similar to Primary Storage facilities located within the WUA water system because it provides no gravity service and will only supply water to the Mesa del Sol service area by use of booster pumps and/or fire pumps.

The proposed Mesa del Sol Ground Storage location was identified in the Level A report and will remain in this location. The proposed Ground Storage will be located in the Employment Center as shown in Figure 5A-5.

The initial Ground Storage selected for the Level B area is 2 MG based upon economic considerations and discussions with the WUA. The Ultimate size of the Ground Storage will depend upon how the system is proposed to operate and may also depend on the nature of the future water supply. It is likely that the ultimate development will require between 6 to 8 MG of additional Ground Storage. Initial discussions with the WUA indicate that the minimum requirements for the proposed Ground Storage will be:

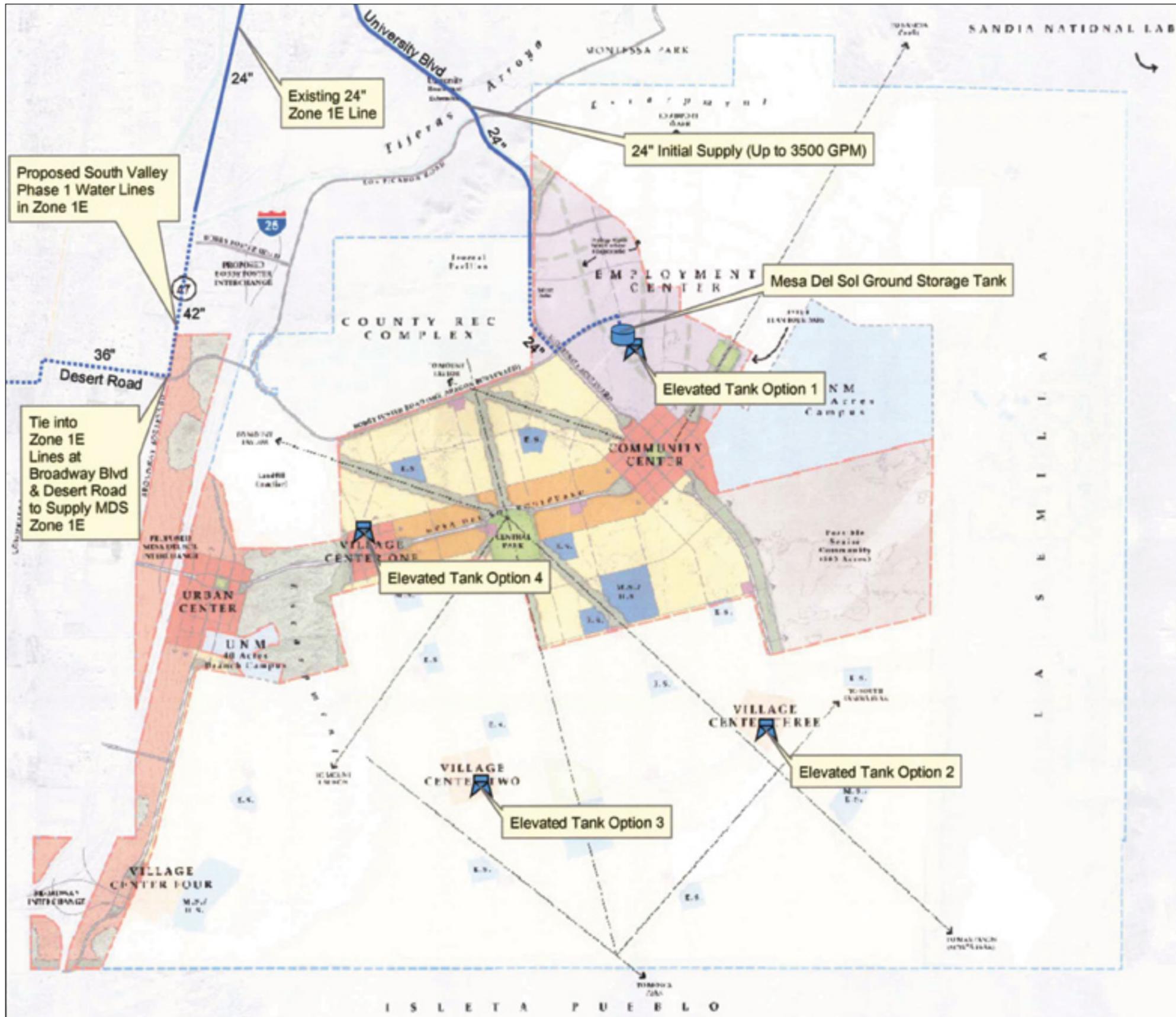
Fire Storage – Ground storage will supply all of the required fire storage for Mesa del Sol in the event of a fire during a Peak Day event. At present the fire storage designed for Mesa del Sol is 3,500 gallons per minute (gpm) for a total of three-hours. This is equivalent to 0.63 millions gallons per day (MGD).

Equalizing Storage – Equalizing Storage for Mesa del Sol will be provided primarily through use of Ground Storage. Equalizing storage is intended to provide the difference between peak day usage and peak hour (PH) usage. Equalizing storage for WUA facilities is currently defined as 36 percent of expected Peak Day

- Demand, a value based on a combination of previous water system demands, time of day electric power rates, and ground service storage.
- *Control Storage* - Control storage is used to avoid cycling of production facilities. Control storage for WUA facilities is currently defined as 10% of the combined Peak day demand and equalization storage. Using the current equalization storage criteria, this equals 13.6% of the Peak Day Demand.

Elevated Storage

Only one location in the entire WUA service area is currently serviced by the use of elevated storage, the Metropolitan Detention Center. Elevated storage is preferred for Mesa del Sol because there is no location within Mesa del Sol with sufficient elevation to provide a minimum of 50 psi static pressure to the customers at the highest elevation in the service area. Elevated storage tanks overcome this difficulty by raising the storage tank off the ground to an elevation that will provide a minimum of 50 psi static pressure at the top elevation of the service area. 50 psi of static water pressure is equal to 115 ft of elevation. This means that the overflow of the elevated storage should be at least 115 ft above the

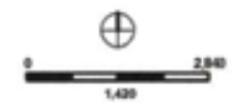


LOCATION OPTIONS FOR ELEVATED STORAGE TANKS AND WATER SUPPLY

Figure 5A-5

Legend

-  Ground Storage Tank
-  Elevated Tank
-  Existing Waterline
-  Planned Waterline



highest elevation served. As discussed previously, the proposed elevated storage for Mesa del Sol will have an overflow of 5,455 ft.

Because of the large size of the Mesa del Sol service area and the limited WUA experience with elevated storage within the WUA service area, some uncertainty still exists in what the final elevated storage size requirements will be. Initial discussions with the WUA indicate that the minimum requirements for the proposed Elevated Storage will be:

- *Fire Pump E-power Emergency storage:* Satisfy 30 minutes to 1 hour of Fire Demand in case of power loss at the pump station. 1 hour of 3,500 gpm fire flow is 0.21 MG.
- *Control Storage:* One hour of supply from the largest pump in the Mesa del Sol Pump Station. Initial estimates indicate pumps will be rated around 3,500 to 4,000 gpm which would require about 0.21 to 0.24 MG of control storage.

Equalization Storage is not specifically required by the WUA if system is operated as a closed loop pumping system with Variable Speed Pumps. However, the very large size of the Mesa del Sol Service area will make it difficult to serve the entire service area as a closed loop pumping system. Inclusion of some equalization storage in the elevated storage will significantly reduce the maximum pump station capacity and minimize system pipe size, reduce operational costs, provide some backup supply for the system, and can simplify operation of the large closed loop pumping system proposed for Mesa del Sol. Initial estimates indicate that between 2.5 to 4 MG of total elevated storage for Mesa del Sol will provide the best mix of control, E power emergency storage, and equalization storage for the ultimate Mesa del Sol system. A combination of two 1.5 MG tanks with 40 ft of head range in the tank appears to be the best mix of elevated Storage for Mesa del Sol.

Potential Elevated Storage Sites for Mesa del Sol are considered at the Ground Storage site or near one of the three Village Centers due to limits placed by Resolution R-328. This limits the available locations for elevated storage in the system to essentially four locations. Some elevated tanks will be taller than others because the required Overflow Elevation (OFE) is 5,455 ft and the land elevation varies across all of Mesa del Sol. Elevated tank locations in the lower elevations will require taller tanks than elevated tanks placed at higher elevations. Brief descriptions of the possible locations for elevated storage are described below:

- *Elevated Tank Option 1:* This location would be right next to the Ground Storage Facility. This tank would be at elevation 5,281 ft and would be 166 ft tall.
- *Elevated Tank Option 2:* This would place an elevated storage tank at Village Center 3. This tank would be placed near elevation 5,274 and would be 181 ft tall.

- *Elevated Tank Option 3:* This would place an elevated storage tank at Village Center 2. This tank would be placed near elevation 5,330 and would be 125 ft tall.
- *Elevated Tank Option 4:* This would place an elevated storage tank at Village Center 1. This tank would be placed near elevation 5,331 and would be 124 ft tall.

The location of elevated storage will have a direct effect on the required system pipe sizes especially if the elevated storage will contain a significant amount of equalization storage. Locations for elevated storage that are located most distant from the Ground Storage Site will result in the greatest pipe size reductions. If little or no equalization storage is placed in the elevated storage, pipes must be upsized to handle the increased flow necessary to provide Peak Hour Supply regardless of tank location. Use of multiple elevated tanks with equalization storage can also minimize system pipe requirements by spreading the equalization storage plus providing Hydraulic Grade Line (HGL) throughout the system.

5A.5 Proposed Level B Water System Master Plan Ultimate System — Design Alternatives

Several options are considered for the Mesa del Sol ultimate water system, based on varying the elevated storage locations. Water system operation is greatly effected by the location and amount of elevated storage in the system.

System Storage

Several combinations of elevated storage were examined for the Ultimate system. Nearly all scenarios assumed that the Mesa del Sol Pump Station would operate at roughly a Peak Day Rate and provide the Peak Hour demand using equalization storage in the elevated storage tanks. Several key observations were made:

- Significant additional cost will be associated with operating the Mesa del Sol ultimate system as a closed loop pumping system with little or no equalization storage in the Elevated Tanks.
- Use of two Elevated Storage Tanks located away from the ground storage site, and that have equalization storage, results in significant infrastructure savings.
- Operational difficulties arise when multiple Elevated Tanks are used if the system cannot equalize the headloss between the Mesa del Sol Pump Station and each of the elevated storage tanks
- Locating an Elevated Storage Tank next to the Mesa del Sol Pump Station is most cost in terms of system piping, but will minimize the required pump station lift required.

- Locating an Elevated Tank near to the Mesa del Sol Pump Station and one far from it will provide operational difficulties if both tanks have a large amount of equalization storage. The tank near the Pump Station will draft very little and the distant tank will be difficult to keep full. This mode of operation should be avoided.
- The best location for Elevated Storage with equalization storage appears to be at Village Center 1 (Option 4) and Village Center 3 (Option 2)

Preferred Approach – Elevated Storage using Options 2&4 Reservoir Locations

The preferred approach, subject to final WUA reviews, for the Ultimate Mesa del Sol system will include the use of at least two separate elevated storage tanks located at roughly equal distances from the Mesa del Sol Pump Station and Ground Storage site. The two elevated storage tanks would contain about 1.5 MG of storage each with about 1.2 MG in each tank serving as equalization and operational storage. The required 0.42 MG of control and emergency E-power storage would be split between both tanks. The remaining 0.1 MG of extra storage can be used for emergency storage or additional equalization storage.

The best locations for the elevated tanks are at Option 2 and Option 4 sites. These locations are the most equidistant from the Mesa del Sol Pump Station and are will optimally spread the equalization storage for the entire system. This layout of elevated tanks also appears to minimize the pipe size requirements for the entire system and simplifies the proposed phasing because Elevated Tank Option 4 is located within the Level B area. The proposed layout for the system using the Option 2 and Option 4 Tanks can be seen in Figure 5A-6.

In this mode, the Mesa del Sol Pump Station would supply water at the Peak Day rate and would allow the equalization storage in the elevated tanks supply the peak hour demand. This mode of operation provides operational flexibility and provides the most efficient system piping.

High Security Site

Special service considerations are proposed for the 40-acre “high security” site located in the northeast corner of the Level B Master Plan area. Subject to WUA considerations, this isolated area will be served by either; a) small private metered water line extensions from the existing public water system in University Blvd., or b) by public water line extensions to the site. Fire storage may be private onsite storage facilities.

Alternatives

- *Elevated Tanks at Option 2 and 3 Reservoir Locations:* This is a slight variation on Option 2 and Option 4 that would also use two 1.5 MG elevated storage tanks. This scenario uses elevated tanks with equalization storage at Option 2 and Option 3. These locations are not as equidistant from the Mesa del Sol Pump Station but do spread the equalization storage for the entire system out somewhat. System pipe size is a bit larger than the preferred approach because of the location of the elevated tanks. The proposed layout for the system using the Option 2 and Option 3 Tanks can be seen in Figure 5A-7.

In this mode, the Mesa del Sol Pump Station would also supply water at the peak day rate and would allow the equalization storage in the elevated tanks supply the peak hour demand. This mode of operation provides operational flexibility and greatly requires Peak Day firm capacity at the Mesa del Sol Pump Station.

System phasing for this option is slightly complicated because no elevated tank is within the Level B area. Using this option would require the construction of the Option 2 elevated tank and some major waterlines outside the Level B area. The increased pipe cost and the slight challenges for system phasing make this less preferred than the preferred approach.

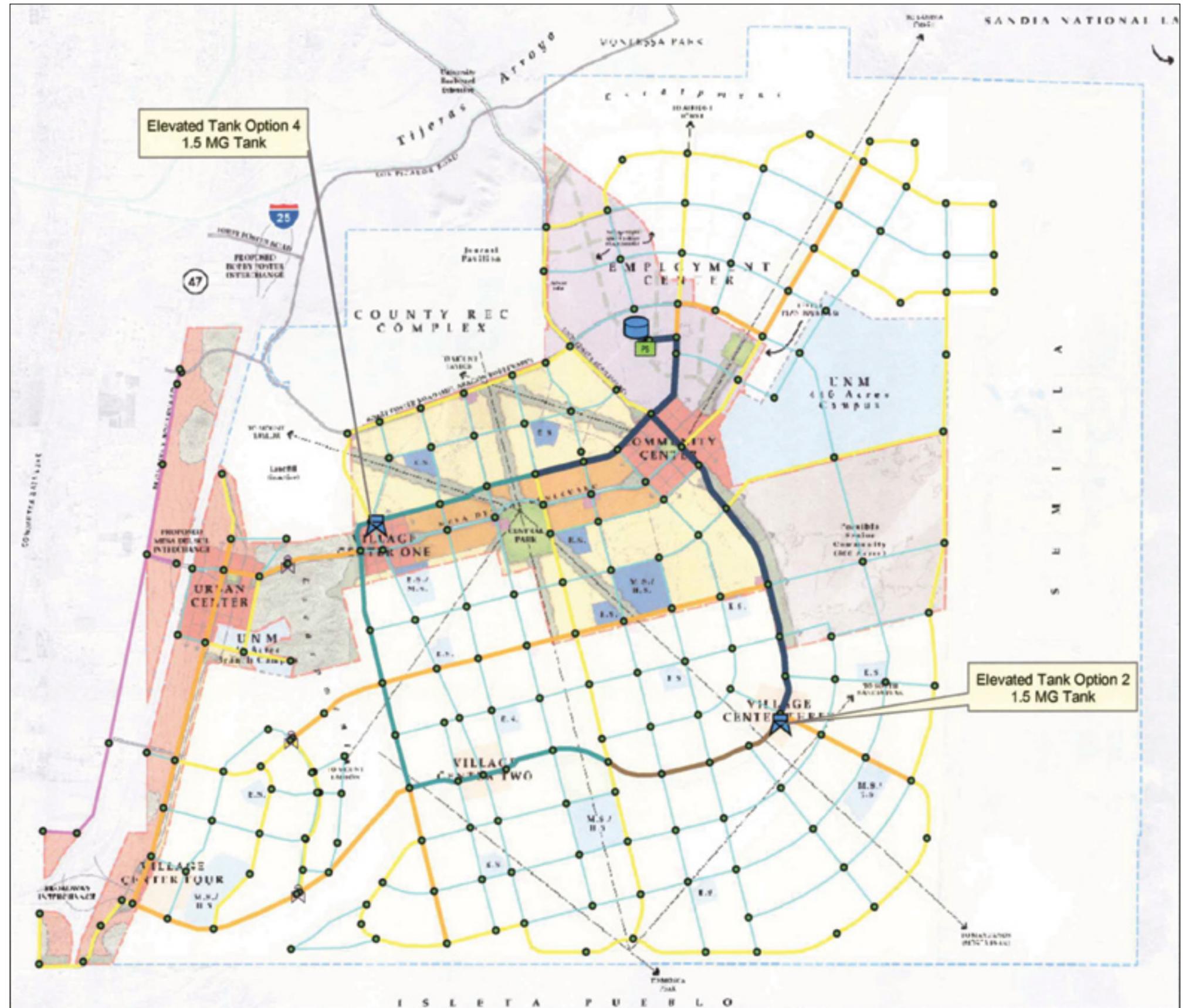
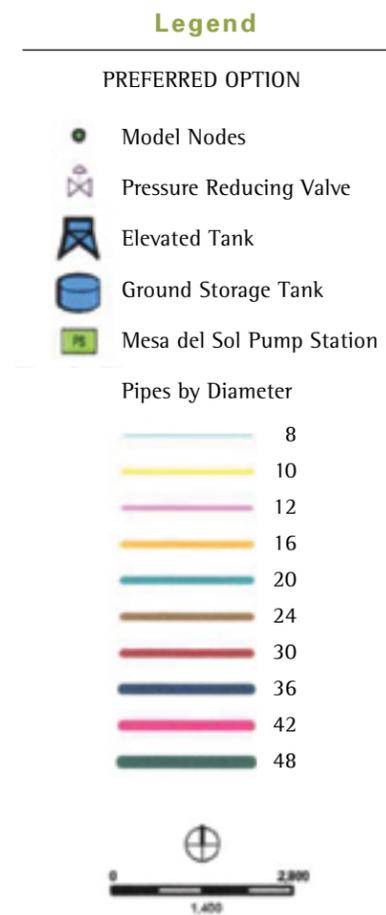
- *Elevated Tanks at Option 1&3 Reservoir Locations:* This layout is a significant change from the previous options. In this scenario, two elevated storage tanks are used, but one is adjacent to the Mesa del Sol Pump Station and one is located distant from the pump station. In this layout, Option 1 tank is reduced from 1.5 MG to only 0.5 MG and Option 3 is upsized from 1.5 MG to 2.5 MG. This is necessary because the Option 1 Tank cannot supply more than about 0.25 MG during any given day simply because of the discharge head imposed by the Mesa del Sol Pump Station and the Option 3 Tank limits how low the Option 1 Tank can ever drop. Because the Option 1 Tank is so close to the Mesa del Sol Pump Station, it will stay full or at overflow elevation when the pump station is operating. To avoid overflow of the Option 1 Tank, an altitude valve or similar device must be installed on the inlet-outlet line.

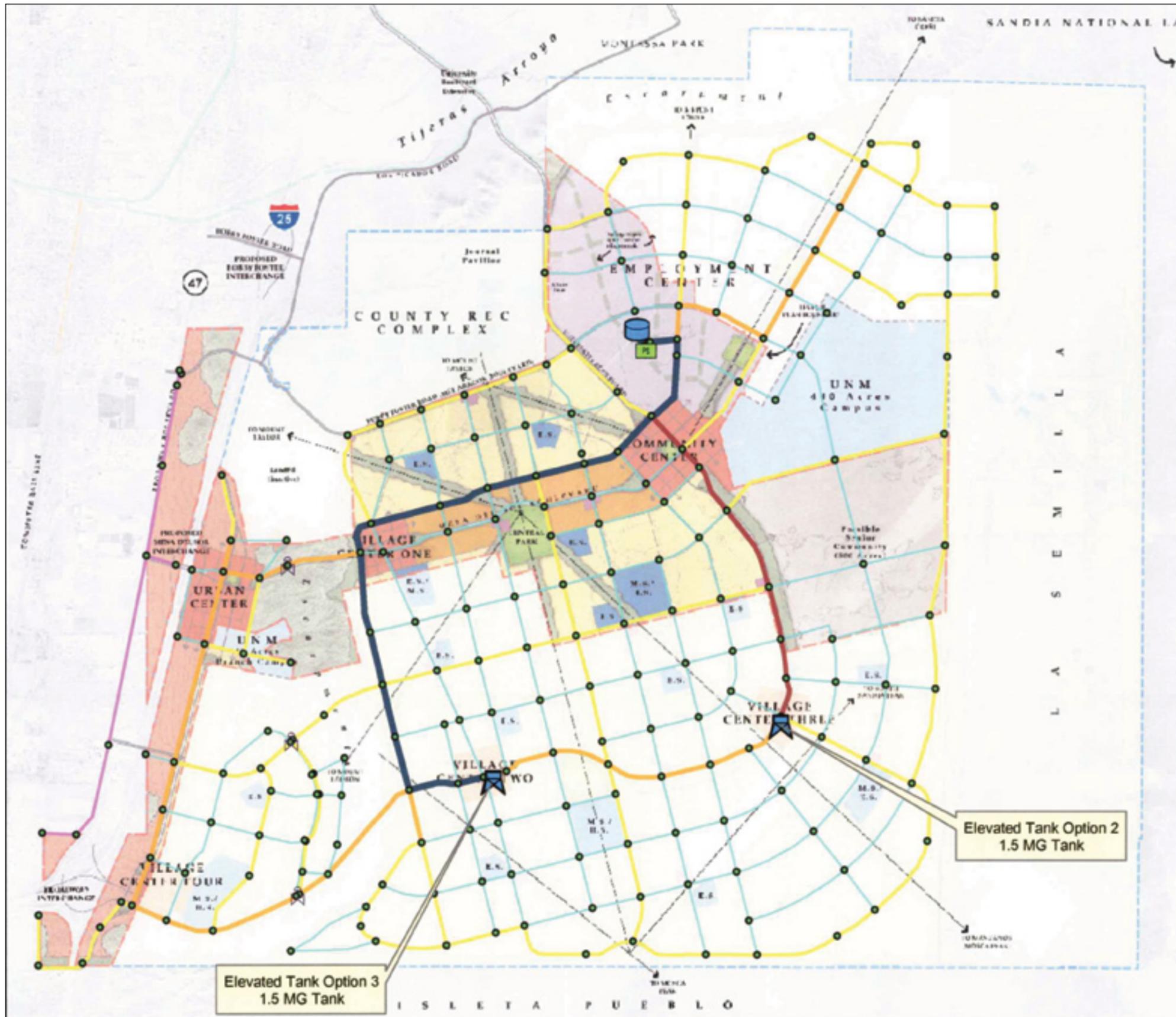
Because of the limited size of the Option 1 Tank, nearly all of the remaining equalization storage will be located at the Option 3 Tank. The Option 3 Tank is the farthest location available for an elevated tank and will provide some equalization storage where it will best help the system. However, this type of tank layout will cause the system pipe size to be a bit larger than the preferred approach. The proposed layout for the system using the Option 1 and Option 3 Tanks can be seen in Figure 5A-8.



**SYSTEM CONFIGURATION
FOR ELEVATED TANK
OPTIONS 2 AND 4
(PREFERRED OPTION)**

Figure 5A-6





**SYSTEM CONFIGURATION
FOR ELEVATED TANK
OPTIONS 2 AND 3**

Figure 5A-7

Legend

- Model Nodes
- ⊗ Pressure Reducing Valve
- ⬆ Elevated Tank
- ⊕ Ground Storage Tank
- ⊞ Mesa del Sol Pump Station

Pipes by Diameter

- 8
- 10
- 12
- 16
- 20
- 24
- 30
- 36
- 42
- 48



In this mode, the Mesa del Sol Pump Station would also supply water at the Peak Day rate and would allow the equalization storage in the elevated tanks supply the peak hour demand. This mode of operation provides the most operational flexibility and greatly reduces the required pumping capacity at the Mesa del Sol Pump Station.

This option allows for the installation of an initial tank at the ground storage site for phasing, but that tank would have very little equalization storage capacity. The increased pipe cost and the slight challenges for system phasing make this less preferred than the preferred approach.

- *Elevated Tank Option 1:* This layout is a significant change from the previous options. In this scenario, only one elevated storage tanks is used and it is adjacent to the Mesa del Sol Pump Station. In this layout, Option 1 tank is upsized from 1.5 MG to 3 MG. The Option 1 Tank will not have the same difficulties observed using Option 1 and 3 Tanks because the Mesa del Sol Pump Station does not have to supply enough head to fill an elevated tank distant from the pump station. In light of this no altitude valve would be required to be installed on the inlet-outlet line of Option 1 Tank.

In this scenario, all of the elevated tank equalization storage will be located at the Option 1 Tank. Unfortunately, the system HGL is provided only at the Mesa del Sol Pump Station site, requiring significantly larger system piping to minimize system friction losses and maintain sufficient system pressure. The proposed layout for the system using the Option 1 Tank can be seen in Figure 5A-9.

In this mode, the Mesa del Sol Pump Station would also supply water at the peak day rate and would allow the equalization storage in the elevated tank supply the peak hour demand. This mode of operation provides operational flexibility and requires only Peak Day firm capacity at the Mesa del Sol Pump Station.

This option allows for the installation of an initial elevated tank at the ground storage site that can be used right away. In addition the large pipe diameters required for ultimate development will be greatly oversized for the initial development and will increase the initial system cost for the Level B area. The increased pipe cost and the challenges for system phasing make this less ideal than the preferred approach.

- *Elevated Tank Option 3:* This layout is similar to the previous option in that it also uses only one elevated tank. However in this scenario the elevated tank is located far away from the Mesa del Sol Pump Station so as to minimize the system pipe size. In this layout, Option 3 tank is upsized from 1.5 MG to 3 MG. and it contains all of the system elevated tank equalization storage. Moving the equalization storage out into

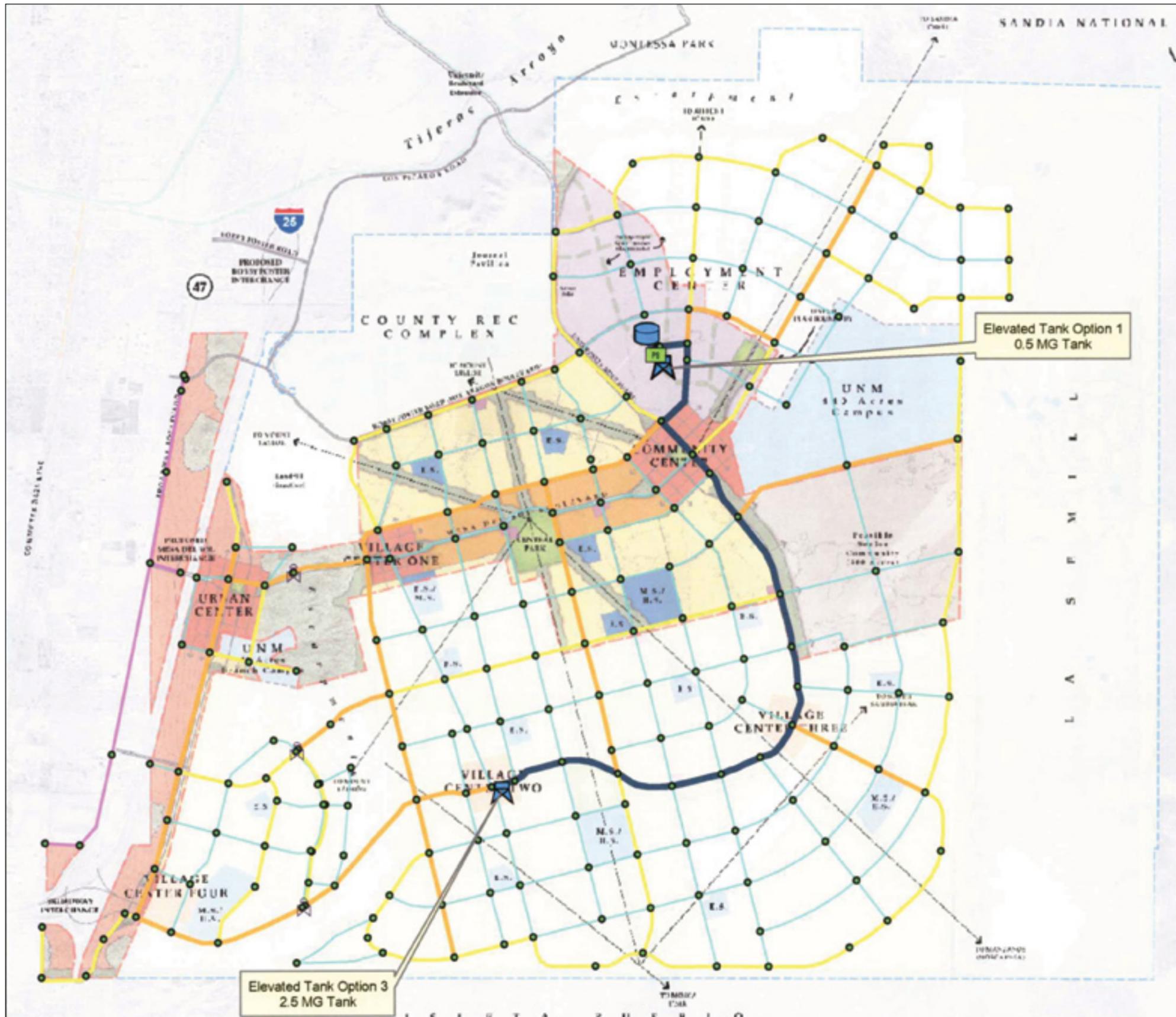
the system results in some reduction in the required pipe size but not as much as the preferred approach. As a result, this type of tank layout will cause the system pipe size to be a bit larger than the preferred approach. The proposed layout for the system using the Option 3 Tank can be seen in Figure 5A-10.

System phasing for this option is somewhat more straightforward, in that it will only require pumps necessary to serve the initial Level B area. This mode of operation is not concerned with the location of the elevated tanks either because the only tank will be built next to the Mesa del Sol Pump Station. Pipe cost for the Level B area will be higher than the preferred option because of the larger pipe size required for the ultimate system. Construction of the elevated tank would be completed to allow for the required control storage desired by the WUA. The increased pipe cost, the challenges for system phasing, and operation, and the increased operational cost make this less desirable than the preferred approach.

In this mode, the Mesa del Sol Pump Station would also supply water at Peak Day rate and would allow the equalization storage in the elevated tanks supply the peak hour demand. This mode of operation provides the most operational flexibility and greatly reduces the required pumping capacity at the Mesa del Sol Pump Station.

System phasing for this option is complicated because there is no elevated storage tank in the Level B area. While the proposed Mesa del Sol Pump Station would have enough capacity to serve the system demand in the Level B area, the system would not have the required 0.5 MG minimum storage capacity desired for the system in an elevated storage tank. Therefore significant off-site costs would be incurred near the build out of the Level B area. The use of only one elevated storage tank may also limit the flexibility associated with the additional phases of system development because there is only one elevated storage tank site. The increased pipe cost and the challenges for system phasing make this less practical than the preferred approach.

- *Closed Loop Pumping without Elevated Tank Equalization Storage:* This layout is a significant change from all previous options. In this scenario, only one very small elevated storage tank of 0.5 MG is used and it is located adjacent to the Mesa del Sol Pump Station. In this layout, there is no equalization storage associated with the elevated tanks. As a result the system operates like a very large closed loop pumping system and the Mesa del Sol Pump Station must have enough pumping capacity to supply the peak hour and peak minute demand. This mode of operation has very little operational flexibility and greatly increases the required pumping capacity at the Mesa del Sol Pump Station.



**SYSTEM CONFIGURATION
FOR ELEVATED TANK
OPTIONS 1 AND 3**

Figure 5A-8

Legend

- Model Nodes
- Pressure Reducing Valve
- Elevated Tank
- Ground Storage Tank
- Mesa del Sol Pump Station

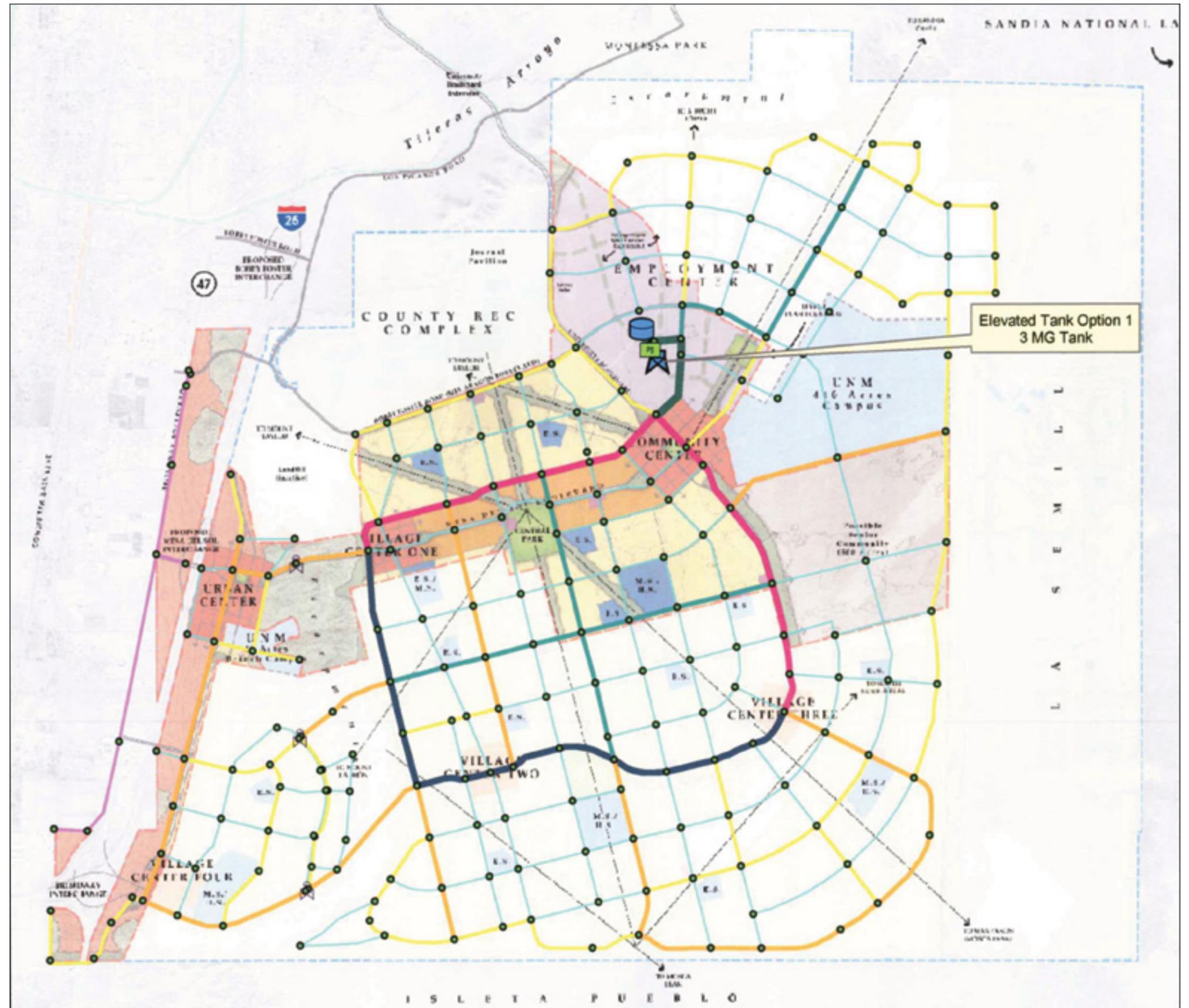
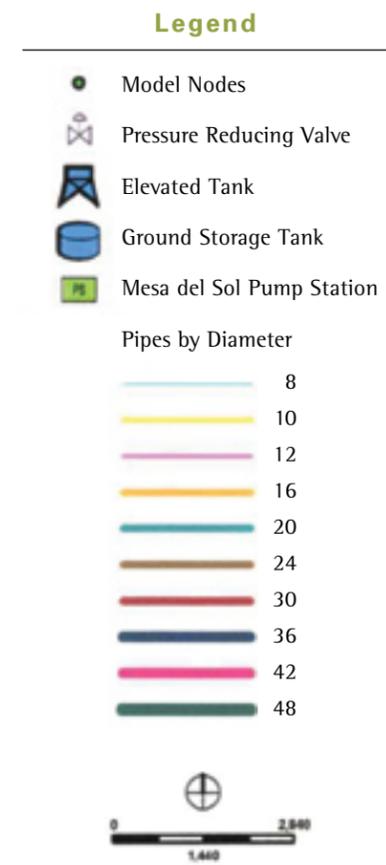
Pipes by Diameter

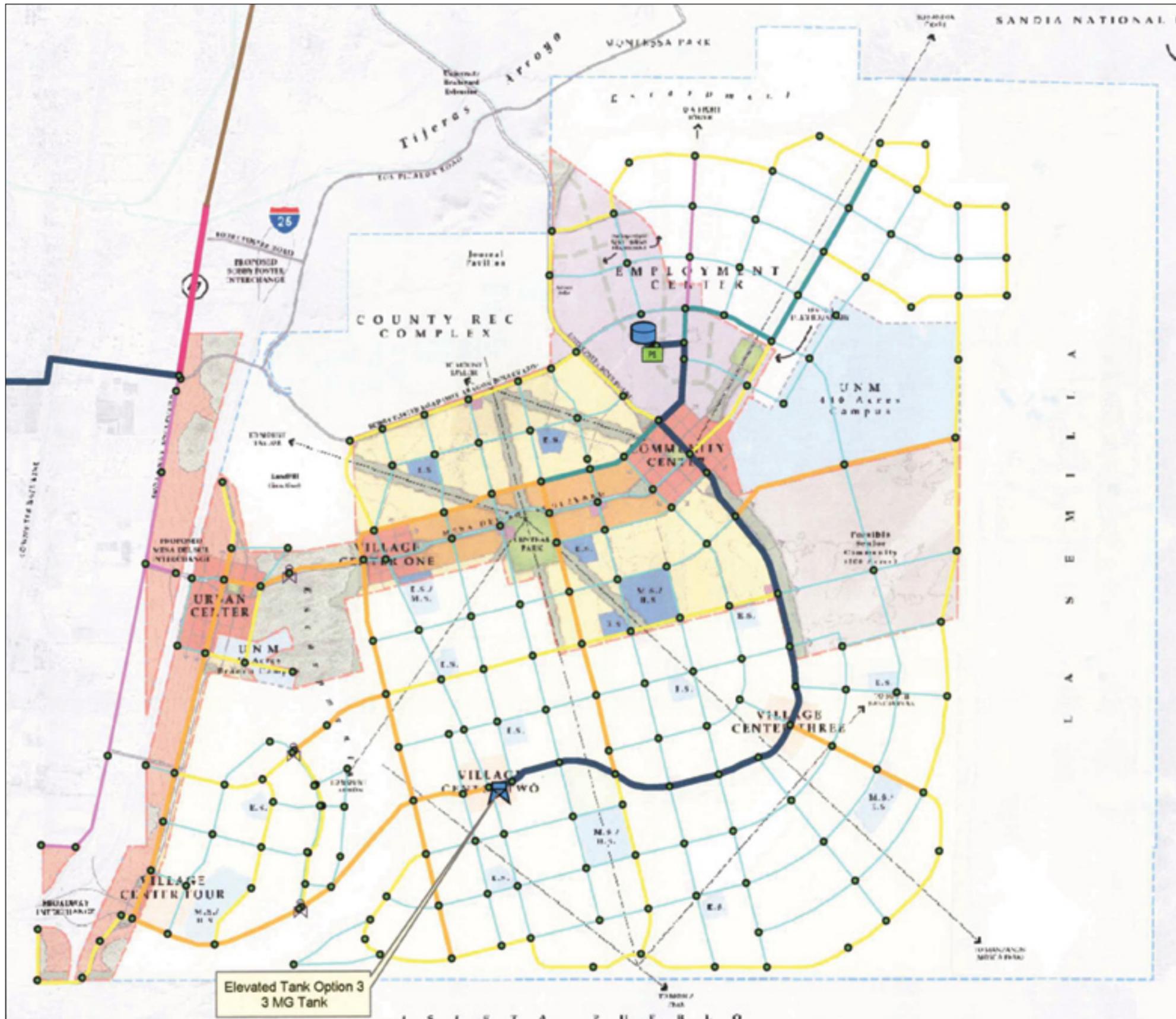
- 8
- 10
- 12
- 16
- 20
- 24
- 30
- 36
- 42
- 48



**SYSTEM CONFIGURATION
FOR ELEVATED TANK
OPTION 1**

Figure 5A-9





**SYSTEM CONFIGURATION
FOR ELEVATED TANK
OPTION 3**

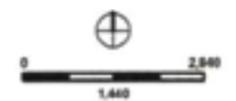
Figure 5A-10

Legend

- Model Nodes
- ⊗ Pressure Reducing Valve
- ⊕ Elevated Tank
- ⊕ Ground Storage Tank
- ⊕ Mesa del Sol Pump Station

Pipes by Diameter

- 8
- 10
- 12
- 16
- 20
- 24
- 30
- 36
- 42
- 48



Elevated Tank Option 3
3 MG Tank



The required pumping capacity for this scenario is nearly double the capacity required for scenarios using equalization storage in the elevated storage tanks. It is estimated that this type of system would require at least 3 to 4 more 3,500 gallon per minute (gpm) pumps in order to meet the expected peak hour demand. The additional pumping will increase the required operating cost associated with this scenario significantly over any other option. This cost will be incurred every year for the life of the system.

In this scenario there is no elevated tank equalization storage so the pump station must provide Peak Hour flows. As a result, system pipe size is quite a bit larger than the preferred approach. The proposed layout for the system using the closed loop pumping without elevated tank equalization storage can be seen in Figure 5A-11.

Using this type of elevated tank layout for the Option 1 Tank will not have the same difficulties observed using Option 1 and 3 Tanks because the Mesa del Sol Pump Station does not have to supply enough head to fill an elevated tank far away from the pump station. In light of this no altitude valve would be required to be installed on the inlet-outlet line of Option 1 Tank.

Phasing

Initial system operation will be supplied directly from the new 24 inch waterline in University Blvd and from Ridgecrest Reservoir. Water usage is constrained because the WUA is limiting the maximum supply through this line to no more than 3,500 gpm. The 3,500 gpm max flow must include all fire flow and normal demands. To account for this, initial users are limited to 2,300 gpm of maximum fire flow and a maximum of 1,200 gpm of Peak Hour demand. Initial analysis shows that a slightly lower peak hour demand of 1000 gpm shows little effect on current Zone 3E customers and will still allow the 24 inch line in University to provide 2,300 gpm of fire flow to customers in the Mesa del Sol Service Area. In addition, these initial conditions will provide the initial users with similar operating pressures as will be experienced under ultimate development.

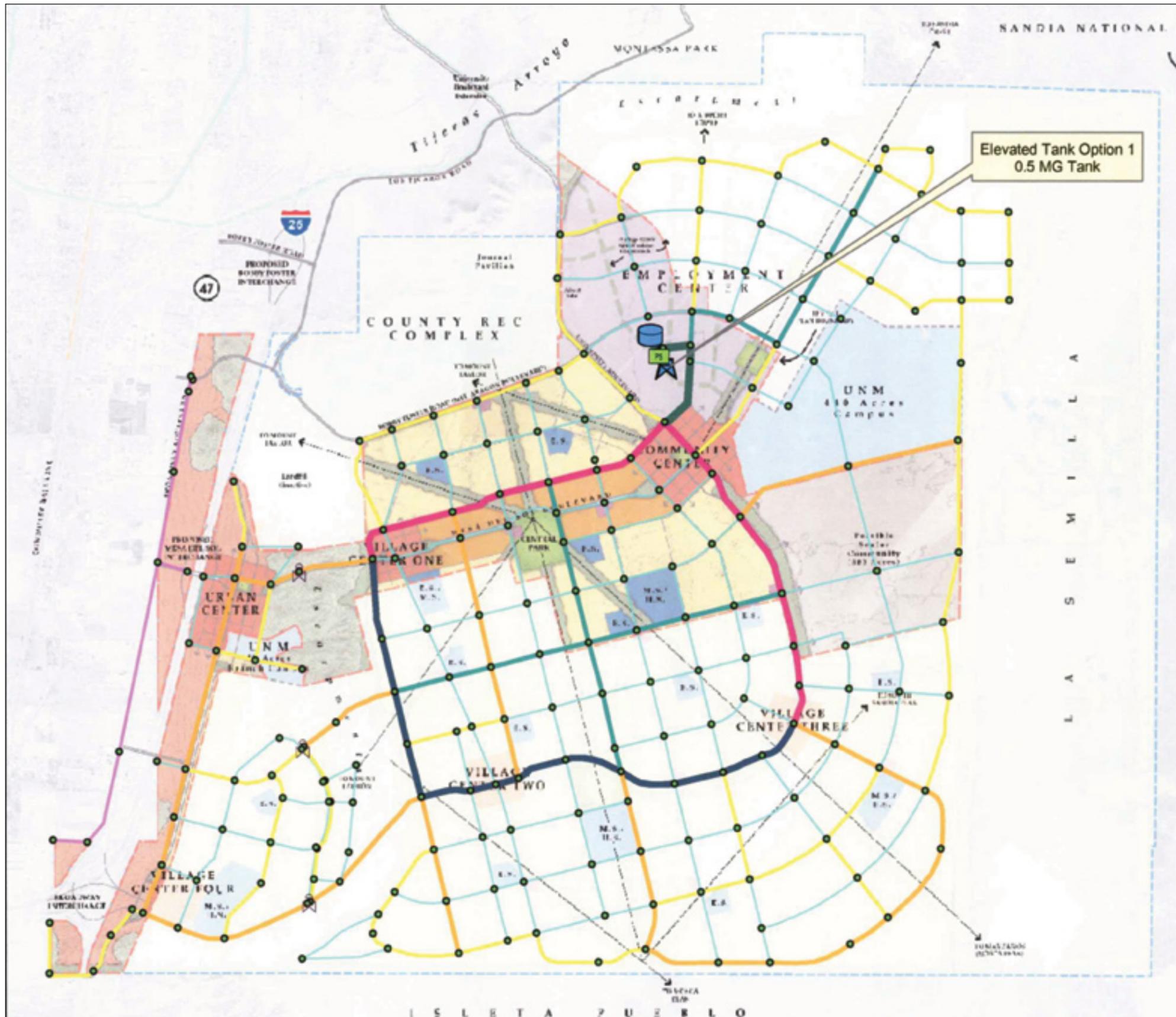
Advent Solar and Culver City are estimated to have peak hour demands of 270 gpm and 350 gpm respectively. This leaves about 380 gpm of additional peak hour demand for other users. Assuming a conservative PH/PD ratio of 2 this would allow for either 105 acres of commercial development or about 845 DUs assuming average use for DUs and additional commercial development. In no case should the peak hour demand of all users ever exceed 1,200 gpm. Acceptance of any new development would require that the proposed peak hour demand be checked to make sure adequate service can be maintained. Operation under these conditions should be limited as much as possible to avoid concerns over low water pressure. These concerns can be resolved by proceeding quickly to the design and construction of the 2 MG Ground Storage Tank and the Mesa del Sol Pump Station.

The next phase of development will occur once the Mesa del Sol Ground Storage and Pump Station are constructed. These facilities will support up to 3,500 gpm of peak day demand in Mesa del Sol in Zone 2E and Zone 3E and will eliminate the fire flow concerns because all fire flow will be stored in the Ground Storage and supplied when needed from the Mesa del Sol Pump Station. The proposed Level B area will have about 6.05 MGD or a rate of about 4,200 gpm of total demand. The proposed Level B area will have about 267 gpm rate of Peak Day demand that will be served from the Ridgecrest Trunk Zone 1E directly (versus the 24-inch line acting alone). Thus a total rate of 3,933 gpm of demand will be needed to serve all of Zone 2E and Zone 3E in the Level B area. The available 3,500 gpm of water supply in the 24-inch University Boulevard line can serve roughly 89% of the anticipated Zone 2E and Zone 3E demand for the Level B area. Maximum development in Zone 2E and Zone 3E of the Level B area will be limited to the capacity of the initial 24-inch water source. Additional development will not be allowed until additional water sources are developed for Mesa del Sol.

The first elevated tank must be constructed at some point during build out of the Level B area. In the preferred option, the full Level B would include construction of the Option 4 Tank located in Village Center One. Construction of the Option 4 Tank should be completed before the Level B area reaches full build out, but may be delayed for a short period of time. The WUA wants to have at least 0.5 MGD of elevated storage for the closed loop pumping facility, but may allow initial development to be served without constructing the elevated tank.

Initial development could include a PRV connecting the 24 inch University Blvd supply line directly to the distribution system that could open to provide emergency water service that could be limited to 3,500 gpm in case of loss of power at the Mesa del Sol Pump Station. This would at least ensure that the Mesa del Sol water lines would have positive pressure even if the Mesa del Sol Pump Station lost power for an hour and was in transition to using its backup E-power. The WUA may allow this mode of operation for at least some portion of the Level B area before the elevated water tank was constructed. This could result in significant cost savings for the second phase of development by pushing back the construction of the first elevated storage tank. If the WUA does not allow this mode of operation, the Option 4 tank would need to be constructed at the same time as the Ground Storage Tank and the Mesa del Sol Pump Station.

The 1.5 MG Option 4 tank will have enough equalization storage to support about 50% or 10.5 MGD of the Ultimate Mesa del Sol demand. Once the Mesa del Sol development exceeds this demand, the second elevated storage tank would need to be constructed. In the preferred option, this would mean construction of the Option 2 Tank located at



**SYSTEM CONFIGURATION
FOR CLOSED LOOP
OPERATION**

Figure 5A-11

Legend

- Model Nodes
- Pressure Reducing Valve
- Elevated Tank
- Ground Storage Tank
- Mesa del Sol Pump Station

Pipes by Diameter

- 8
- 10
- 12
- 16
- 20
- 24
- 30
- 36
- 42
- 48



Table 5A-6 Demand Calculations

Layer	Description	Cnt_Layer	Area (ft^2)	Area (ac)	Avg Day Demand (gpm/ac)	Avg Day Demand (MGD)	PD/AD Factor (l)	PD Demand (MGD)
N-B-APS-SCH	APS Schools	33	12107455.56	277.95	1	0.000	1.8	0.72
N-B-COMMUNITY_CTR	Community Centers	16	747798.91	17.17	1	0.025	1.8	0.04
N-B-EMPLOY_CTR	Employment Center	62	59693478.71	1370.37	1	1.973	1.8	3.55
N-B-ESCARPMENT	Escarpment - (Open Space)	93	49342696.34	1132.75	0	0.000	1.8	0.00
N-B-GRNWY	Green Space (Reuse Water)	247	185411774.73	4256.47	0	0.000	1.8	0.00
N-B-INDUST_COMMER	Industrial / Comm Center	16	19698645.50	452.22	1	0.651	1.8	1.17
N-B-MIXED_USE_COMMER	Mixed Use Comm Centers	55	11951852.58	274.38	1	0.395	1.8	0.71
N-B-MULTI-FAM_RES	Multi Family Residential	14	5114071.82	117.40	0	0.000	1.8	0.00
N-B-SENIOR_COMM	Senior Community Center	18	21001795.89	482.13	0	0.000	1.8	0.00
N-B-SF_RES	Single Family Residential	206	142759139.71	3277.30	0	0.000	1.8	0.00
N-B-UNM-SCH	MDS UNM Campus	2	20981606.08	481.67	1	0.694	1.8	1.25
ROW	Major Road Right of way	1	32713954.13	751.01	0	0.000	1.8	0.00
ROWS	Right of way (Highway)	4	1127874.27	25.89	0	0.000	1.8	0.00
Total Non-residential Demand						4.14	1.8	7.45
Layer	Description	DU/ac	Area (ft^2)	Total DU (du)	Avg Day Demand (gpdu/day)	Avg Day Demand (MGD)	PD/AD Factor (l)	PD Demand (MGD)
N-B-MULTI-FAM_RES	Multi Family Residential	30.64	5114071.822	3597.00	180	0.65	1.8	1.17
N-B-SENIOR_COMM	Senior Community Center	4.15	21001795.89	2000.00	180	0.36	1.8	0.65
N-B-SF_RES	Single Family Residential	9.73	142759139.7	31903.00	180	5.74	1.8	10.34
Total Residential Demand			168875007.4	37500.00	180	6.75	1.8	12.15
Total System Demand						10.89		19.60

Cap/du	total pop
2.4	90000

Village Center Three. This second 1.5 MG tank would contain the remaining equalization storage necessary to allow the system to continue to develop until full build out is achieved. Major backbone water pipes would be constructed as required to support additional development.

5A.6 Water Facilities Planning Summary

- *Elevated Tank Option 2:* This would place a 1.5 MG elevated storage tank at Village Center 3. This tank would be placed near elevation 5,274 and would be 181 ft tall. This is expected to be a Fluted or Composite type tank with a head range of 40 ft.
- *Elevated Tank Option 4:* This would place a 1.5 MG elevated storage tank at Village Center 1. This tank would be placed near elevation 5,331 and would be 124 ft tall. This is expected to be a Fluted or Composite type tank with a head range of 40 ft.
- *MDS Ground Storage:* Initial size of 2 MG. Ultimate size may be as great as 10 MG. Both tanks are expected to be at grade steel tanks between 24 and 32 ft tall.
- *Mesa del Sol Pump Station:* For all but the Closed Loop system (0.5 MG total elevated storage) facility is expected to have 5 total pumps (four firm capacity pumps plus one standby) rated at 3,500 gpm flow and 150 ft of Total dynamic head. For the closed loop system the facility is expected to have 9 total pumps (eight firm capacity plus one standby).

5B Sanitary Sewer – Water Reclamation Component

5B.1 Introduction

This Level B Sanitary Sewer Plan follows on from the Level A Sanitary Sewer Master Plan included in the Mesa del Sol Community Master Plan dated June 2005. More specific detailed planning information is provided herein for the Level B area portion of the sanitary sewer system. Some Level A concepts have been revised; therefore, revised Level A planning is also provided herein.

The Mesa del Sol Sanitary Sewer and Water Reclamation system will become part of the Albuquerque Bernalillo County Water Utility Authority (WUA). The WUA assets are currently operated by the City of Albuquerque Water Utility Department pursuant to a memorandum of understanding between the City of Albuquerque (COA) and the WUA. Employees of this Department will eventually be transferred to and become employees of the WUA. The current schedule for this transfer is July 1st of 2007.

Development of the Level B Sanitary Sewer Plan was a cooperative process between Mesa del Sol and the WUA. In this process, significant modifications were made to the Level A Sanitary Sewer Plan regarding:

- Proposed flow rates.
- Maximum sewer line depths.
- Location and function of the proposed Water Reclamation Plant.
- Number and location of Pump Stations.

5B.2 Design Criteria

Sanitary sewer design criteria is contained in Chapter 24 of the COA's Development Process Manual (DPM). This criteria guides the analysis in this Level B report and will guide the future development of construction plans.

Some exceptions to standard design criteria are proposed for Mesa del Sol. These exceptions have been discussed with WUA staff and are considered acceptable. These exceptions relate to:

- Population per dwelling unit. The population per dwelling unit reflects the planned philosophy of Mesa del Sol. See Land Use and Population Density below.
- Per capita flow rates. The per capita flow recognizes increased water conservation efforts and the planned philosophy of Mesa del Sol. The proposed criteria is a significant reduction in residential flow rates versus the current DPM standards. MdS intends to demonstrate even greater reductions and to then implement reduced design criteria for the remaining infrastructure. See Design Flows below.

- Sanitary sewer line depths. Increased depths allow a more effective system design. See Sanitary Sewer Line Depths below.

Land Use and Population Density

The land use is per the current Mesa del Sol Master Plan. Per the Level A Master Plan, the total projected population is 90,000. The following densities were utilized in projecting flows for the sanitary sewer system:

- Residential at 7 dwelling units per acre and 2.4 people per dwelling unit.
- Senior Community Area at 4 dwelling units per acre and 2 people per dwelling unit.
- Multi-family residential at 20 dwelling units per acre and 2 people per dwelling unit.

Design Flows

Flow calculations are based on equations and rates from the DPM. The following abbreviations are used:

- Million gallons per day = MGD
- Gallons per capita day = gpcd
- Gallons per day per acre = gpd/ac

For residential areas, flow calculations are based on the following equations from the DPM Section 24.2.A.2:

- Average Flow = $75^* \times \text{Population} / 10^6$, in MGD
- Peak Flow = $2.5 \times (\text{Average Flow})^{0.8875}$, in MGD
- Design Flow = $1.2 \times \text{Peak Flow}$, in MGD

For Commercial, Employment, and UNM areas the following flow rates are assumed based on DPM Light Commercial values per DPM Section 24.2.A.4:

- Average Flow = 1230 gpd/ac**
- Peak Flow = 1621 gpd/ac
- Design Flow = $1.2 \times (\text{Peak Flow} / 10^6)$, in MGD

* Residential water usage for Mesa del Sol is projected at 75 gpcd; therefore, the average residential sewer flow rate is reduced above from DPM standard of 110 to 75 gpcd. This is conservative as no allowance is taken for the consumptive use portion of the residential water usage.

** The water system analysis is based on 1,440 gpd/Ac, which is a reasonable agreement presuming some consumptive use on-site.



The Design Flow is determined for the Residential and Commercial/Employment/UNM areas and totaled to determine the design flow for a specific pipe. This is more conservative than required by the DPM, in which Section 24.2.A.2 states that the non-residential flow component can be ignored in many cases. However, given the significant (32%) reduction in residential flow rate utilized in this analysis, inclusion of the non-residential flow component is considered prudent. Per the DPM, the sewers will be designed to run full under Design Flow.

Minimum Sanitary Sewer Line Slopes

Minimum sewer line slopes are per DPM Sections 24.C.3 and 24.D.5.

Sanitary Sewer Line Depths

An exception to the maximum sewer depth criteria is proposed for Mesa del Sol. While the DPM does not specify a maximum depth, the COA has typically held to a maximum depth of 20 feet. An exception is proposed to allow substantially greater depths, as much as 39 feet, rim to invert. This will provide the WUA with substantial operational advantages and is further discussed below in Pumped Flow Area – Mesa Top.

5B.3 Sanitary Sewer System Layout

The proposed ultimate sewer system layout for the Level A area is shown in Figure 5B-1. In addition, Figure 5B-1 shows the 12-inch and larger sewers serving the Level B area. The attached Sewer Flow Rate and Pipe Sizing Calculations Section provides ultimate flow rate and sizing calculations for these lines.

Water Reclamation Treatment Plant Location

The WUA has proposed that the Water Reclamation Plant proposed under the Level A plan be located north of Mesa del Sol in the Tijeras Arroyo. For clarity, this treatment plant will be referred to as the Montessa Park Water Reclamation Plant (MPWRP).

A siting study was performed that showed that the MPWRP could be located north of Mesa del Sol and intercept the Tijeras Interceptor and the Mesa Top flows from Mesa del Sol. The WUA will need to perform further studies regarding the viability of the future MPWRP. The design and construction of the MPWRP will be the responsibility of the WUA. The MPWRP could possibly be on-line by 2020.

Future construction of the MPWRP is presumed in this Report. However, development of Mesa del Sol is not dependant on the MPWRP. In the event that the MPWRP is not constructed, service would be taken from the Tijeras Interceptor.

The proposed location of the MPWRP has significant advantages that are further discussed in Section 5B.6.

Gravity Flow Area – Mesa Top

A gravity interceptor has been constructed to the Mesa Top along the University Boulevard to provide service to the Advent Solar and Culver sites. As described in the Level A Plan, gravity service will be extended to the west portion of the Mesa Top from this line.

The Level A concepts have been retained with modifications for modified street alignments.

Pumped Flow Area – Mesa Top

As described in the Level A Plan, a portion of the Mesa Top cannot be served by gravity and must be pumped. Based on discussions with the WUA, two alternate systems were developed: one adhering to the maximum 20 feet sewer line criteria and another with substantially deeper sewers. Five permanent pump stations were found to be necessary to adhere to the maximum 20 feet criteria, with the same flow being pumped multiple times. The alternative with substantially deeper sewer lines was found to allow a single pump station. In addition to lower projected construction costs for the proposed single pump station system, substantial energy and O&M savings will be recognized.

Per discussions with the WUA, the single pump station with deep sewers is recommended.

Pump Station Locations – Mesa Top

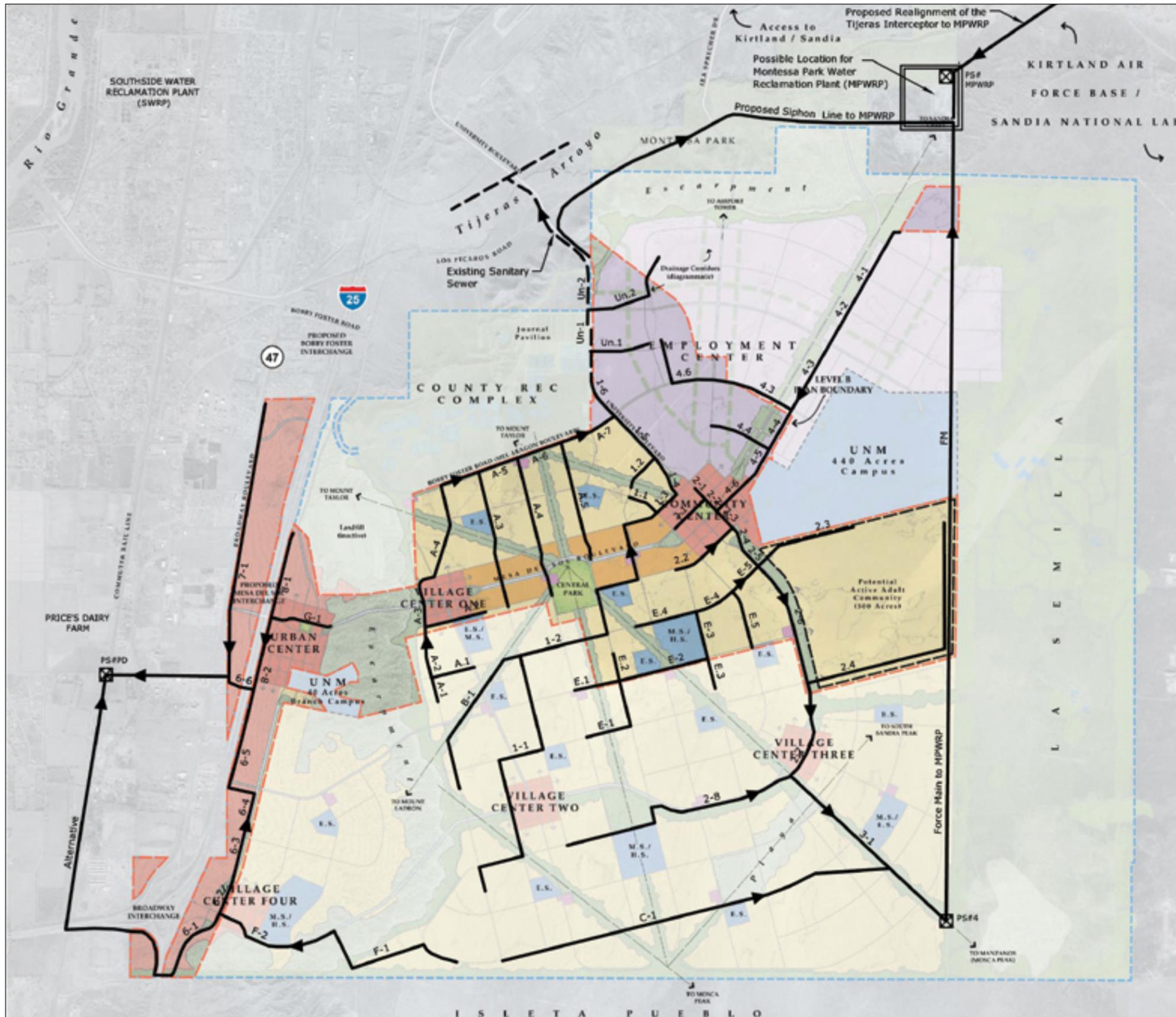
A single permanent pump station will ultimately be provided at the southeast corner of the Mesa Top. This station will be installed when required by development, but is not expected to be required for the Level B development. The force main outfall from this station will run along the east edge of development and discharge to the future MPWRP. The station will be the third largest in the WUA system and will be built as a permanent facility.

Two temporary pump stations will be provided to allow development until construction of the permanent pump station is possible. These stations will be located as shown in Figure 5B-2. Less expensive, manhole type stations will be utilized.

I-25 Corridor Area

As described in the Level A Plan, no current gravity outfall capacity exists for the I-25 corridor area. Based on discussions with the WUA, three alternatives exist:

- The Level A Plan called for pump stations that would pump to a gravity main at the top of the Mesa Top. This alternative is still available as a temporary expediency; however, gravity capacity at the Mesa Top will not be available under ultimate flow conditions or for the 2025 build out. Capacity does exist through the 2020 build out.



**SANITARY SEWER
MASTER PLAN
INCLUDING
LEVEL A AREA**

Figure 5B-1

Legend

- A-1** Sewer Line (Trunk Line) and Identifier
- A.1** Sewer Line (Level B Collector) and Identifier
- FM** Force Main
- PS#1** Pump Station and Identifier



- The owners of the old Price's Dairy are expected to request water and sewer service in the relatively near future. This area will require a new pump station and force main to the existing Southside Water Reclamation Plant (SWRP). Gravity flow from the I-25 corridor is possible to a new pump station serving the Price's Dairy property. Also, Bernalillo County may be providing service in the near future to the Shirk-Lagunitas area north of Price's Dairy and south of the SWRP. Likewise, this area will require a new pump station that may be sited to provide mutual benefit and service to the Shirk-Lagunitas area and to MdS.
- Alternately, pump stations at the I-25 corridor could pump north to the Tijeras Interceptor.

Further coordination with the Price's Dairy owners and the WUA will be required to determine the preferred alternative. Gravity flow to a pump station at Price's Dairy (exact location to be determined) is currently seen as the most likely outcome and is therefore shown on the attached Figures. Use of a new downstream pump station makes the most economic and operational sense as the I-25 Corridor flow would not need to be pumped to the Mesa Top or the Tijeras Interceptor, but would be a component of the ultimate area sewer system. A lift station will be required to serve Price's Dairy or Shirk-Lagunitas, and directing the I-25 corridor flows to a needed pump station recognizes the economy of scale in both capital and energy costs.

Flow Rates and Sizing

A total Design Flow of approximately 22 MGD is anticipated for the Mesa del Sol service area while an Average Daily Flow of approximately 10 MGD is anticipated.

Trunk Gravity Mains

Table 5.4-1 shows the Trunk Gravity Main Lines. The attached Sewer Flow Rate and Pipe Sizing Calculations Section provides detail flow rate and pipe sizing calculations. Land use areas were calculated and flows computed per Land Use and Population Density. Minimum slopes were determined and resulting pipe sizes computed. Sizes and slopes are shown in Table 5.4-1 for all trunk sewer lines and selected Level B collector lines. See Figure 5B-1 for the line locations. All gravity line sizing is based on ultimate design flows and system configuration.

Table 5B-1 Trunk Gravity Main Lines

Line ID	Size (inches)	Minimum Slope (%)	Comment
SAS 1-2 and 1-3	21	0.10	
SAS 1-4	24	0.125	
SAS 1-5	24	0.125	Size for interim condition – 2025 before PS #4.
SAS 1-6	24	0.25	Size for interim condition – 2025 before PS #4.
SAS 2.4	12	0.28	
SAS 2-3 – 2-5	24	0.08	
SAS 2-6	30	0.07	
SAS 2-7	30	0.07	
SAS 2-8	18	0.12	
SAS 3-1	42	0.08	
SAS 4.3	15	0.15	
SAS 4-3	15	0.14	
SAS 4-4 – 4-6	21	0.12	
SAS 6-2	12	0.19	
SAS 6-3	15	0.16	
SAS 6-4	18	0.15	
SAS 6-5	21	0.15	
SAS 6-6	24	0.15	
SAS 7-1	10	0.40	
SAS 8-2	10	1.02	
SAS A.3	10	0.53	
SAS A.4	10	0.23	
SAS A.5	10	0.28	
SAS A-4 – A-7	24	0.08	
SAS B-1	12	0.28	
SAS C-1	21	0.12	
SAS E-3	18	0.14	
SAS E-4	18	1.07	
SAS E-5	18	0.12	
SAS F-2	10	0.40	
SAS G-1	10	0.28	
SAS 2.1	8	1.64	
SAS 2.2	8	0.40	
SAS 2.3	8	0.40	

Pump Stations and Force Mains

The only permanent pump station proposed for Mesa del Sol takes flow from SAS 3-1. Per The attached Sewer Flow Rate and Pipe Sizing Calculations Section, the Average Flow for SAS 3-1 is 5.6 MGD and the Design Flow is 12.3 MGD. See Pump Station Facilities for discussion of the pump station design.

Based on a maximum force main velocity of 10 feet per second (fps), an 18- to 20-inch force main is likely. Alternately, parallel 10-inch and 16-inch force mains may be preferred for phasing purposes to maintain minimum velocities during initial operations. The depth of inflow line to this pump station is approximately 16 feet below grade with an invert of 5244.5.

5B.4 Phasing of Sanitary Sewer System Construction

Gravity mains sized for ultimate development will be extended when service is required in a particular area. A portion of the Level B area ultimately will drain to pump station PS #4. PS #4 will not be available until after 2025; therefore, at least two temporary pump stations are proposed for development of the Level B area. The anticipated sewer system components at 2015, 2020, and 2025 are shown in Figures 5B-2, 5B-3 and 5B-4 respectively.

Pump station PS #1 will serve the Community and Employment Centers. Pump station PS #2 will serve the Active Adult Senior Community area. A gravity trunk will be laid from PS #1 to PS #2, allowing PS #1 to be abandoned when PS #2 is put into service. The future extension of the same gravity main to the future pump station PS #4 will eventually allow PS #2 to be abandoned.

Based on a maximum force main velocity of 10 feet per second (fps), a 10-inch force main is likely. Alternately, parallel 6-inch and 8-inch force mains may be preferred for phasing purposes to maintain minimum velocities during initial operations. The depth of inflow lines to PS #1 and PS #2 will be approximately 26 feet and 30 feet below grade with inverts of 5269.5 and 52352.6 respectively.

Coordinate Phasing with Absorption Planning

Per Figures 5B-2 5B-3 and 5B-4, absorption rate development has been projected for 2015, 2020, and 2025. Based on these projections and per the procedure described above, land use loadings were developed and flow rates were projected at critical locations. These locations are:

- Flow from the I-25 Corridor.
- Flow in University Boulevard downstream of Bobby Foster. (SAS 1-6)
- Flow in University Boulevard upstream of Bobby Foster. (SAS 1-5)
- Flow to PS #2.

The following Design Flow Rates in MGD are projected at these points in Table 5.4-2:

Table 5B-2 Critical Design Flow Rates

Location	Year		
	2015	2020	2025
I-25 Corridor	0.42	0.97	1.18
SAS 1-6	2.67	4.38	6.51
SAS 1-5	2.17	3.38	4.50
PS #2	1.57	2.63	3.68

The I-25 Corridor and PS #2 systems will be designed in the future. SAS 1-6 and 1-5 are 24-inch lines and will be constructed in 2006. The slopes of SAS 1-6 and 1-5 will be set to meet the above flows.

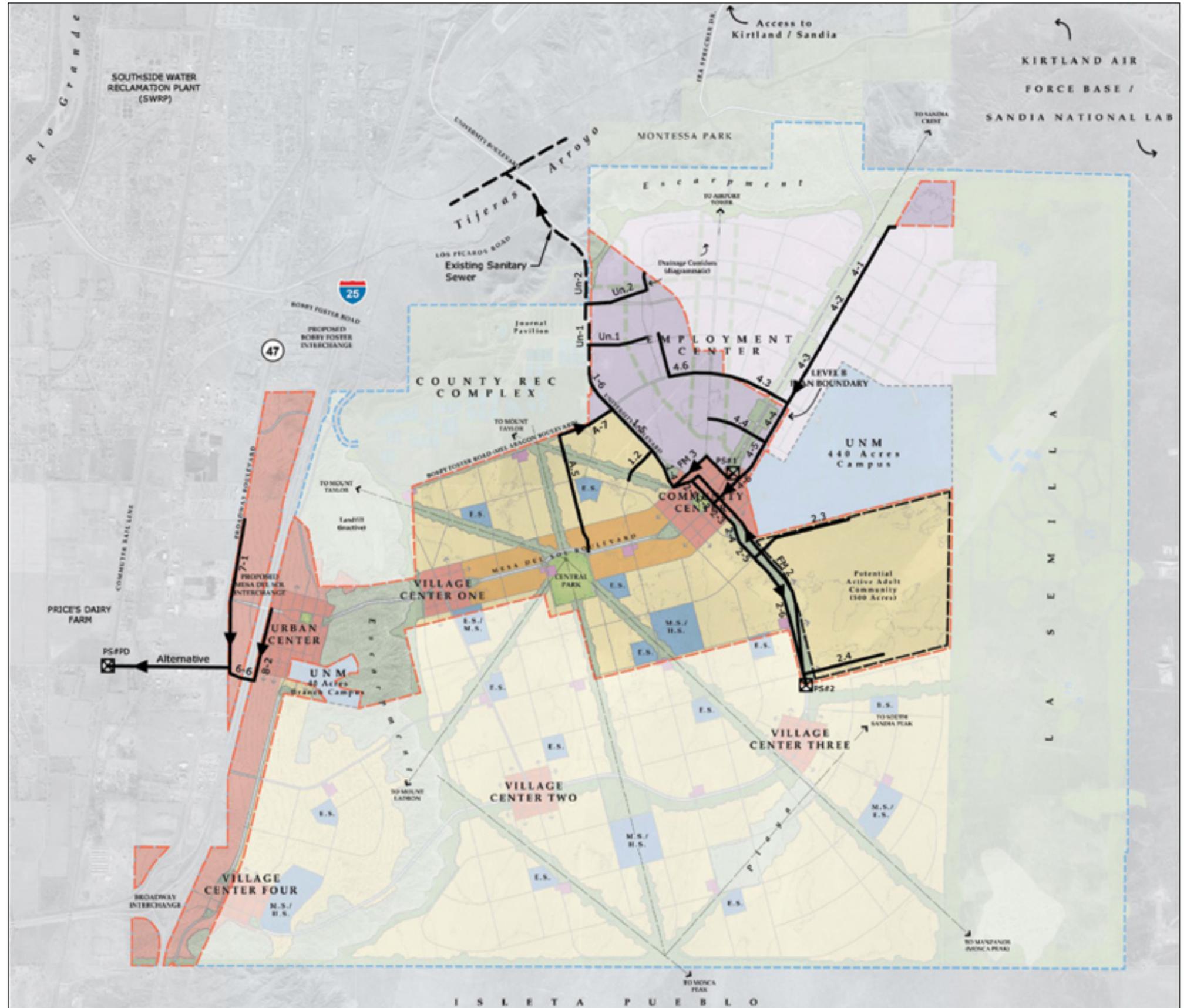


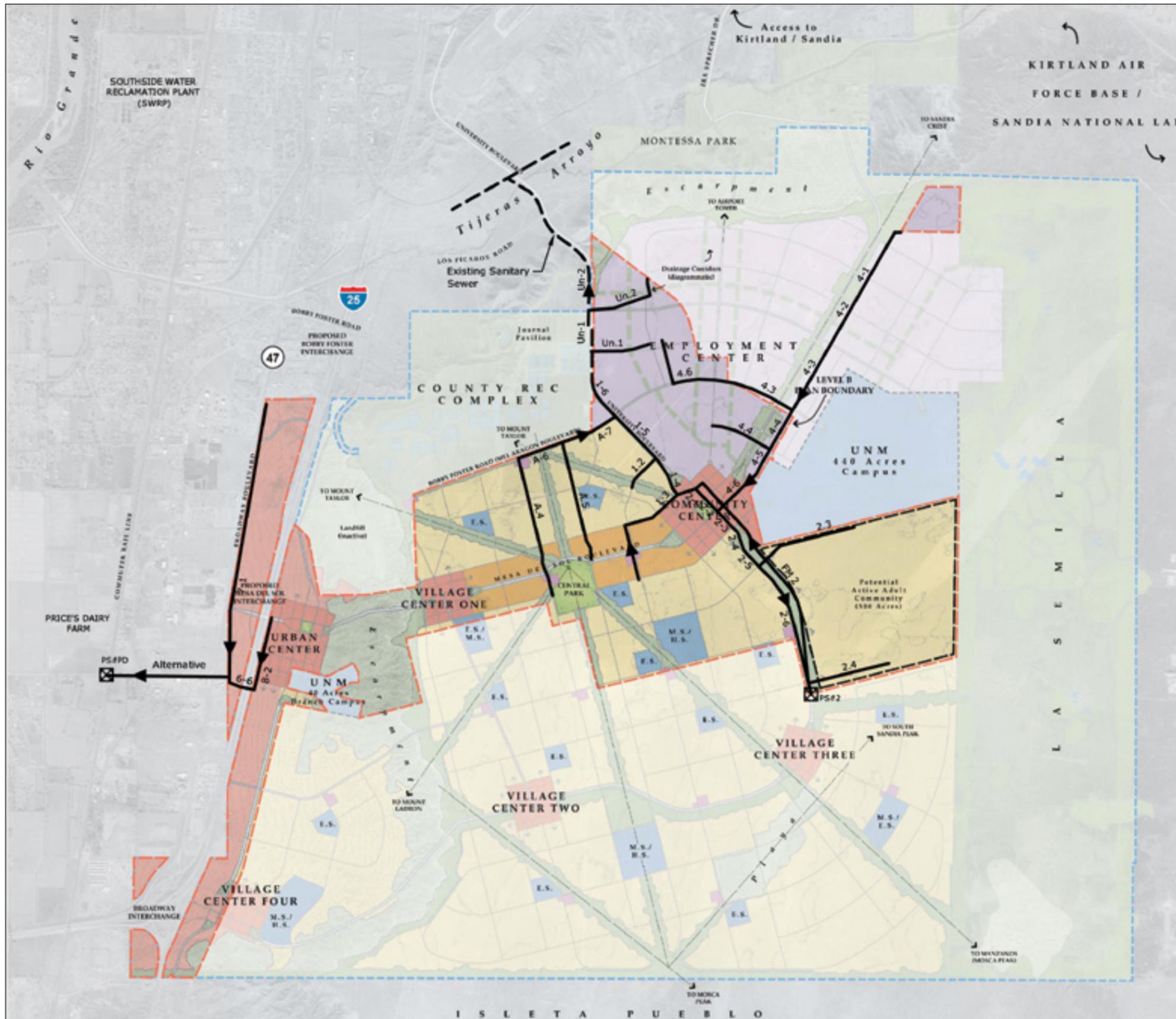
**SANITARY SEWER
MASTER PLAN
AND ABSORPTION
2015**

Figure 5B-2

Legend

-  Sewer Line (Trunk Line) and Identifier
-  Sewer Line (Level B Collector) and Identifier
-  Force Main
-  Pump Station and Identifier





**SANITARY SEWER
MASTER PLAN
AND ABSORPTION
2020**

Figure 5B-3

Legend

-  Sewer Line (Trunk Line) and Identifier
-  Sewer Line (Level B Collector) and Identifier
-  Force Main
-  Pump Station and Identifier

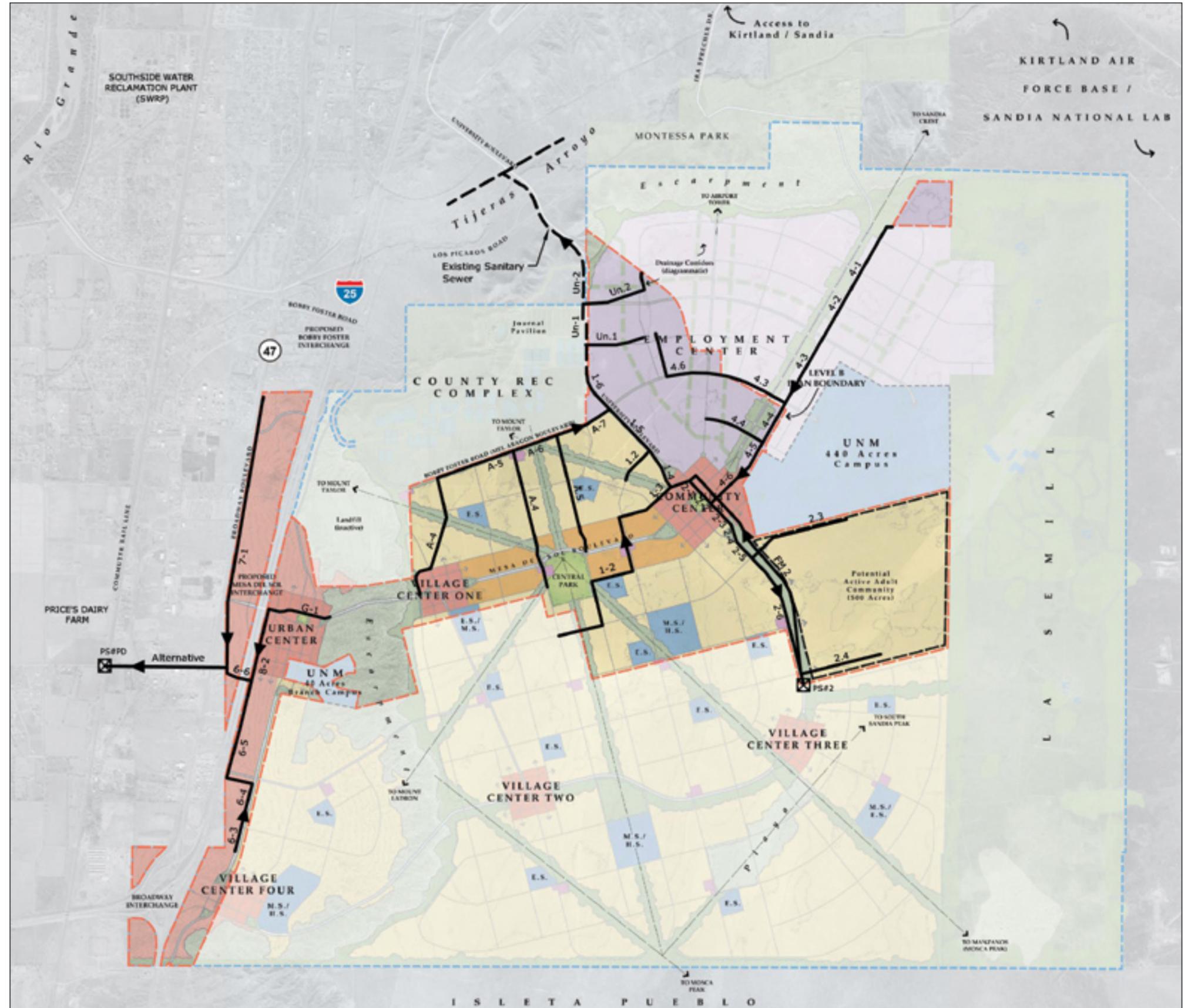


SANITARY SEWER MASTER PLAN AND ABSORPTION 2025

Figure 5B-4

Legend

-  Sewer Line (Trunk Line) and Identifier
-  Sewer Line (Level B Collector) and Identifier
-  Force Main
-  Pump Station and Identifier



5B.5 Sanitary System Component Design

Depth and Construction Criteria for Major Interceptors

Design and construction criteria will be in accordance with the DPM and the latest update of the City of Albuquerque Standard Specifications for Public Works Construction.

Where feasible, the deeper lines will be run in wide ROW streets and / or open space areas. The lines anticipated being deeper than 20 feet are SAS-1, SAS-2, SAS-3, SAS-4, SAS-A and SAS-C.

Pump Station Facilities

- **Temporary Pump Stations:** Temporary Lift Stations will be placed at the downstream side of development areas at locations suited to serve large segments of area that will develop over numerous years. The lift station wet wells will be constructed with manhole barrels and will use submersible pumps that can be raised and lowered on pump rails by means of a crane. Sites chosen will have adequate space for additional manhole wet wells to accommodate growth, and pump systems chosen will be easily replaceable with larger pumps to accommodate increased flows. Electrical supply, motor control, and telemetry will be chosen and designed with an eye for easy expansion. Sufficient space must be allocated for easy access and expansion.

Force mains from the temporary lift stations will be temporary, as well. To accommodate increasing flows, two different size force mains can be installed in the same corridor: the smaller main being used during initial stages of development, the larger used when development has reached a point to warrant the larger size because of increased flows, and both used to handle the ultimate design flow for the particular development stage.

Constructing both force mains at once will require infrastructure investment in advance of its utilization. If this is deemed unacceptable, then allowances for future construction will be required in the form of unhindered corridors that allow easy access for construction or increased construction costs to place force mains through improved and cluttered corridors.

- **Permanent Pump Station:** Ultimately, one large permanent lift station will serve the entire Mesa del Sol Mesa Top area that cannot be served by gravity with outfall to the Tijeras Arroyo Interceptor. This facility will be located in the southeast corner of Mesa del Sol. Its size and location can be determined based upon ultimate built out flows; however, construction of the facility would not occur until contributing flows reached a cumulative amount large enough to justify gravity line extensions, force main, and first stage construction of such a permanent facility.

Construction of the permanent facility can be phased just like the temporary lift stations, although use of temporary lift stations may be more economical until a major portion of the permanent facility can be built. The ultimate wet well capacity could be

constructed, but smaller than ultimate pumps and controls would be provided initially. Force main sizing could also follow the same design philosophy as described for the temporary force mains.

5B.6 Discussion of Montessa Park Water Reclamation Plant (MPWRP) Concept

As discussed in the Level A Report, the WUA is considering future satellite treatment plants at strategic locations to relieve demand at the existing Southside Water Reclamation Plant (SWRP). The Level A Plan proposed a new treatment plant in the southeast portion of Mesa del Sol. Subsequent consultation with the WUA led to the relocation of this plant north of Mesa del Sol in the Tijeras Arroyo in the area of the old Montessa Park. Advantages of this location are:

- A major portion of the City's sewage flows in the Tijeras Interceptor, which is located in the Tijeras Arroyo (average flow of 26.6 MGD per the Facilities Plan). The Tijeras Interceptor would be routed to the new MPWRP in the Tijeras Arroyo. This would provide significant relief to the existing SWRP on 2nd Street.
- The MPWRP would benefit from economy of scale in both initial construction and operation and maintenance.
- The reuse water generated at the MPWRP would be approximately 240 feet higher than the similar facilities at the SWRP, providing a significant energy cost advantage in the future pumping of reuse water to facilities in the East Heights.
- Perceived to have fewer siting issues regarding land use and current and future neighbors.
- Preferred location for surface injection of a possible future ASR system. A major zone of depression in the aquifer has been documented just north of this proposed MPWRP site.
- Close proximity to the existing SWRP so exchange of personnel and equipment between the two sites will be relatively convenient.

The proposed location has not been finalized and will be the subject of substantial study. A possible location is shown on Figure 5B-1 based on:

- Location outside the proposed 500-year floodplain.
- Rerouting of the existing gravity Tijeras Interceptor to the MPWRP.
- Diversion of flow from the University Boulevard outfall sewer via a gravity siphon line.
- Discharge of the future force main from PS #4.

The WUA is considering the MPWRP to be a full treatment facility, including solids treatment. The WUA may pursue innovative technology grants and possible a cooperative approach involving Sandia National Labs, specifically involving solids treatment.



5B.7 Sewer Flow Rate and Pipe Sizing Calculations

Assumptions

Adjustment factor to reach 90,000 total population = 1.129587 applied to Residential and Multi-family population densities.
This factor is applied to the calculated population and therefore flow rate for each basin.

For Residential areas the following assumptions were made:

- 7 = number of dwelling units per acre (du/ac)
- 2.4 = number of people, capita, per dwelling unit (cpu)
- 75 = gallons used per day per capita (gpcd)
- 1284 = gallons per day per acre (gpd/ac)

For the Senior Community area the following assumptions were made:

- 4 = number of dwelling units per acre (du/ac)
- 2 = number of people, capita, per dwelling unit (cpu)
- 75 = gallons used per day per capita (gpcd)
- 600 = gallons per day per acre (gpd/ac)

For the multi-family area along MdS Blvd the following assumptions were made:

- 20 = number of dwelling units per acre (du/ac)
- 2 = number of people, capita, per dwelling unit (cpu)
- 75 = gallons used per day per capita (gpcd)
- 3000 = gallons per day per acre (gpd/ac)

For Commercial areas the following assumptions were made:

- The Employment Center will be treated as commercial.
- The UNM area will be treated as commercial.
- 100% = percent of overall commercial area presumed to be light commercial
- 1230 = average gpd/ac for light commercial
- 1621 = peak gpd/ac for light commercial

For Residential areas the flow calculations are based on the following equations from the City of Albuquerque DPM:

- Average Flow = $75^* \times \text{Population} / 10^6$, in MGD
- Peak Flow = $2.5 \times (\text{Avg.})^{0.8875}$, in MGD
- Design Flow = $1.2 \times \text{Peak}$, in MGD

* Value changed from 110 to 75 based on City of Albuquerque required water restrictions.

For Commercial areas the flow calculations are based on the following equation and flow values from the City of Albuquerque DPM.

- Design Flow = $1.2 \times (\text{Peak} / 10^6)$, in MGD

Overall

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	4031.25	77988	5.85		
Senior Community	503.21	4026	0.30	13.81	16.34
Multi-Family	176.77	7987	0.60		
Commercial	2727.06	NA	3.35	4.42	5.30
TOTAL	7438	90000	10.10	18.03	21.64

Notes

1. See Assumptions sheet for values used in calculations.

Area Calc

Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	4520243	103.77
Employment Center	Commercial	66482048	1526.22
Village Centers	Commercial	6920243	158.87
Urban Center	Commercial	4073953	93.53
Interchange	Commercial	15968605	365.59
MdS Blvd	Multi-Family	7700074	176.77
Residential	Single Family	175601400	4031.25
Senior Community	Senior Community	21919622	503.21
UNM 440	UNM	19082128	438.07
UNM 40	UNM	1743470	40.02
TOTAL			7438.29

Drainage Area for SAS_1
Main gravity trunk line through center of MDS

SAS 1-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	20.23	391	0.03	0.11	0.13
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.00	0.00
Commercial	0.00	NA	0.00		
TOTAL	20	391	0.03	0.11	0.13

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	851212	20.23
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			20.23

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	523.68	10131	0.76	2.48	2.97
Senior Community	0.00	0	0.00		
Multi-Family	67.83	3055	0.23	0.05	0.06
Commercial	28.86	NA	0.04		
TOTAL	620	13196	1.03	2.52	3.03

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	256586	5.89
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	10819	0.25
Residential	Single Family	202910	4.66
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			10.80

SAS 1-2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	26.07	504	0.04	0.14	0.16
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.00	0.00
Commercial	0.00	NA	0.00		
TOTAL	26	504	0.04	0.14	0.16

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1135759	26.07
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			26.07

SAS 1-4 (includes flow from SAS 1-1 & 1-2 & 1-3 & 1-1 & SAS B)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	527.68	10212	0.77	2.49	2.99
Senior Community	0.00	0	0.00		
Multi-Family	67.83	3055	0.23	0.05	0.07
Commercial	28.86	NA	0.05		
TOTAL	633	13277	1.04	2.55	3.06

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	105992	2.48
Employment Center	Commercial	245403	5.52
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	182933	4.20
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			12.20

SAS 1-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	235.97	4565	0.34	0.97	1.16
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.04	0.04
Commercial	22.97	NA	0.03		
TOTAL	259	4565	0.37	1.00	1.20

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	1000524	22.97
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	10278659	235.97
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			258.93

SAS 1-5 (includes flow from SAS 1-1 & 1-2 & 1-3 & 1-4 & 1-1 & 1-2 & SAS B)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	580.78	11236	0.84	2.66	3.19
Senior Community	0.00	0	0.00		
Multi-Family	67.83	3055	0.23	0.11	0.13
Commercial	66.75	NA	0.06		
TOTAL	715	14301	1.15	2.77	3.32

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1302196	29.89
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1168331	26.82
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			56.72

SAS 1-2 (includes flow from SAS 1-1 & SAS B)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	438.80	9650	0.72	2.59	2.87
Senior Community	0.00	0	0.00		
Multi-Family	67.59	3054	0.23	0.04	0.04
Commercial	22.97	NA	0.03		
TOTAL	569	12703	0.98	2.63	2.92

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	2944040	67.59
Residential	Single Family	4917739	112.90
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			180.48

SAS 1-6 (includes flow from SAS 1-1 & 1-2 & 1-3 & 1-4 & 1-5 & 1-1 & 1-2 & SAS A & SAS B)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	1010.96	19556	1.47	4.71	5.65
Senior Community	31.37	171	0.01		
Multi-Family	166.11	7505	0.56	0.19	0.23
Commercial	116.77	NA	0.15		
TOTAL	1317	27234	2.19	4.90	5.89

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1447538	33.12
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	14210	0.33
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			33.44

Notes
1. See Assumptions sheet for values used in calculations



Drainage Area for SAS_2

Gravity line from University to southwest quadrant of mesa top.

SAS 2.1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.02	0.02
Senior Community	0.00	0	0.00		
Multi-Family	1.24	56	0.00		
Commercial	24.78	NA	0.03	0.04	0.05
TOTAL	25	56	0.03	0.06	0.07

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	1065874	24.24
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	53998	1.24
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			25.48

SAS 2.4

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.80	0.96
Senior Community	483.46	3708	0.28		
Multi-Family	0.00	0	0.00		
Commercial	82.51	NA	0.10	0.13	0.16
TOTAL	546	3708	0.38	0.94	1.12

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	20188421	483.46
UNM 440	UNM	3894158	82.51
UNM 40	UNM	0	0.00
TOTAL			545.97

SAS 2.2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	22.71	439	0.03	0.22	0.26
Senior Community	0.00	0	0.00		
Multi-Family	9.42	426	0.03		
Commercial	12.62	NA	0.02	0.02	0.02
TOTAL	45	865	0.08	0.24	0.29

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	549573	12.62
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	410285	9.42
Residential	Single Family	989265	22.71
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			44.75

SAS 2-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	116.47	NA	0.14	0.19	0.23
TOTAL	116	0	0.14	0.19	0.23

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	228094	5.24
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			5.24

SAS 2.3

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.09	0.10
Senior Community	38.09	305	0.02		
Multi-Family	0.00	0	0.00		
Commercial	3.41	NA	0.00	0.01	0.01
TOTAL	41	305	0.03	0.09	0.11

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	12686	0.29
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	1659067	38.09
UNM 440	UNM	135711	3.12
UNM 40	UNM	0	0.00
TOTAL			41.49

SAS 2-2 (includes flow from 2-1& 2-1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.02	0.02
Senior Community	0.00	0	0.00		
Multi-Family	1.24	56	0.00		
Commercial	144.50	NA	0.18	0.23	0.28
TOTAL	146	56	0.18	0.25	0.30

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	165143	3.79
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MCS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			3.79

SAS 2-3 (includes flow from 2-1, 2-2 & 2-1 & SAS 4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.02	0.02
Senior Community	0.00	0	0.00		
Multi-Family	1.24	56	0.00		
Commercial	1709.39	NA	2.10	2.77	3.33
TOTAL	1711	56	2.11	2.79	3.35

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	248824	5.71
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			5.71

SAS 2-6 (includes flow from 2-1, 2-2 & 2.1, 2.2, 2.3, 2.4 & SAS 4, SAS E)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	570.58	11090	0.93	2.87	3.45
Senior Community	503.21	4025	0.30		
Multi-Family	10.66	452	0.04		
Commercial	1922.60	NA	2.34	3.08	3.70
TOTAL	2990	15604	3.51	5.96	7.15

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	464790.7	106.70
Senior Community	Senior Community	56264	1.34
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			108.04

SAS 2-4 (includes flow from 2-1, 2-2 & 2.1, 2.2 & SAS 4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	24.72	480	0.04	0.24	0.29
Senior Community	0.00	0	0.00		
Multi-Family	10.66	482	0.04		
Commercial	1816.68	NA	2.23	2.94	3.53
TOTAL	1852	962	2.31	3.19	3.82

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	597396	13.71
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	91874	2.11
Senior Community	Senior Community	0	0.00
UNM 440	UNM	3526543	80.96
UNM 40	UNM	0	0.00
TOTAL			96.78

SAS 2-7 (includes flow from 2-1, 2-2 & 2.1, 2.2, 2.3, 2.4 & SAS 4, SAS E)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	608.11	11704	0.88	2.98	3.58
Senior Community	503.21	4025	0.30		
Multi-Family	10.66	452	0.04		
Commercial	1927.93	NA	2.37	3.13	3.75
TOTAL	3050	16272	3.59	6.11	7.33

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	1103491	25.33
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	1503660	34.53
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			59.86

SAS 2-5 (includes flow from 2-1, 2-2 & 2.1, 2.2, 2.3 & SAS 4, SAS E)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	406.88	9032	0.68	1.91	2.29
Senior Community	38.41	307	0.02		
Multi-Family	10.66	482	0.04		
Commercial	1820.09	NA	2.24	2.90	3.54
TOTAL	2356	9821	2.98	4.86	5.83

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	18664	0.43
Senior Community	Senior Community	13928	0.32
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			0.75

SAS 2-8

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	368.41	7127	0.53	1.43	1.72
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	18.96	NA	0.02	0.03	0.03
TOTAL	385	7127	0.56	1.46	1.75

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	738661	16.96
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
McS Blvd	Multi-Family	0	0.00
Residential	Single Family	16048150	368.41
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			385.37

Notes
1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS 3

Gravity line to main pump station in southeast quadrant of mesa area.

SAS 3-1 (includes flows from SAS 2 & SAS C)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	2401.77	46464	3.48	8.22	9.86
Senior Community	503.21	4026	0.36		
Multi-Family	10.86	482	0.04		
Commercial	1959.32	NA	2.41	3.15	3.81
TOTAL	4875	50971	6.23	11.39	13.67

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	628756	14.43
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	30452766	699.10
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			713.53

SAS 4 3-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	206.50	NA	0.25	0.33	0.40
TOTAL	206	0	0.25	0.33	0.40

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	8951797	206.50
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			206.50

Notes

1. See Assumptions sheet for values used in calculations.

Drainage Area for SAS 4

Gravity line along northwest quadrant.

SAS 4.1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	111.23	NA	0.14	0.18	0.22
TOTAL	111	0	0.14	0.18	0.22

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	4645146	111.23
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			111.23

SAS 4 3-2 (includes flow from 4.3.1 & 4.6)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	345.48	NA	0.42	0.56	0.67
TOTAL	345	0	0.42	0.56	0.67

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1651938	37.92
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			37.92

SAS 4 3-3 (includes flow from 4.3.1, 4.3.2 & 4.5, 4.6)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	593.66	NA	0.73	0.96	1.15
TOTAL	594	0	0.73	0.96	1.15

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1652336	37.93
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			37.93

SAS 4.2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	142.60	NA	0.18	0.23	0.28
TOTAL	143	0	0.18	0.23	0.28

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	5692791	130.46
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	526943	12.14
UNM 40	UNM	0	0.00
TOTAL			142.60

SAS 4.4

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	124.64	NA	0.15	0.20	0.24
TOTAL	125	0	0.15	0.20	0.24

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	400945	9.20
Employment Center	Commercial	5029467	115.44
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			124.64

SAS 4.5

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	210.24	NA	0.26	0.34	0.41
TOTAL	210	0	0.26	0.34	0.41

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	9158197	210.24
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			210.24

SAS 4-3 (includes flow from 4-1, 4-2 & 4.1 & 4.2)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	675.24	NA	0.83	1.09	1.31
TOTAL	675	0	0.83	1.09	1.31

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	2551908	58.58
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	6292070	144.45
UNM 40	UNM	0	0.00
TOTAL			203.03

SAS 4.6

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	102.06	NA	0.13	0.17	0.20
TOTAL	102	0	0.13	0.17	0.20

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	4445145	102.06
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			102.06

SAS 4-4 (includes flow from 4-1, 4-2, 4-3 & 4.1, 4.2+ 4.3 (incl 4.3-1, 4.3-2, 4.3-3, 4.5, 4.6))

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	1379.08	NA	1.70	2.24	2.68
TOTAL	1379	0	1.70	2.24	2.68

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1037067	23.61
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	3760219	86.32
UNM 40	UNM	0	0.00
TOTAL			110.13

SAS 4-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	193.20	NA	0.24	0.31	0.38
TOTAL	193	0	0.24	0.31	0.38

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	8415759	193.20
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			193.20

SAS 4-5 (includes flow from 4-1, 4-2, 4-3 & 4.1, 4.2+ 4.3 (incl 4.3-1, 4.3-2, 4.3-3, 4.5, 4.6)+4.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	1536.96	NA	1.89	2.49	2.99
TOTAL	1536	0	1.89	2.49	2.99

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	54600	1.48
Employment Center	Commercial	276266	6.34
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	1065127	24.45
UNM 40	UNM	0	0.00
TOTAL			32.28

SAS 4-2 (includes flow from 4-1 & 4.1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	329.61	NA	0.41	0.53	0.64
TOTAL	330	0	0.41	0.53	0.64

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	1090399	25.18
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			25.18

SAS 4-6 (includes flow from 4-1, 4-2, 4-3 & 4.1, 4.2+ 4.3 (incl 4.3-1, 4.3-2, 4.3-3, 4.5, 4.6)+4.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	1559.19	NA	1.92	2.53	3.03
TOTAL	1559	0	1.92	2.53	3.03

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	832422	19.11
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	179457	4.12
UNM 40	UNM	0	0.00
TOTAL			23.23

Notes
1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS_6

Gravity and force main line to SAS_7 in southern interchange area

SAS 6.1-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	93.77	1814	0.14	0.43	0.51
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	94	1814	0.14		

SAS 6.1-1

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	4084775	93.77
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			93.77

SAS 6.3

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	61.55	1191	0.09	0.29	0.35
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	62	1191	0.09		

SAS 6.3

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	2681060	61.55
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			61.55

SAS 6.1-2 (includes flow from 6.1-1 & 6.3)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	192.10	3715	0.28	0.80	0.97
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	192	3715	0.28		

SAS 6.1-2 (includes flow from 6.1-1 & 6.3)

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1602056	36.78
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			36.78

SAS 6.4

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	36.30	702	0.05	0.18	0.22
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	36	702	0.05		

SAS 6.4

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1501071	36.30
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			36.30

SAS 6.1-3 (includes flow from 6.1-1, 6.1-2 & 6.3, 6.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	254.67	4915	0.37	1.03	1.24
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	254	4915	0.37		

SAS 6.1-3 (includes flow from 6.1-1, 6.1-2 & 6.3, 6.4)

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	3138123	25.67
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			25.67

SAS 6.5

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	10.26	198	0.01	0.06	0.07
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	11.60	NA	0.01		
TOTAL	22	198	0.03		

SAS 6.5

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	505119	11.60
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	446664	10.26
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			21.86

SAS 6.2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	172.16	3331	0.25	0.73	0.88
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	172	3331	0.25		

SAS 6.2

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	7499246	172.16
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			172.16

SAS 6.1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	41.09	NA	0.05		
TOTAL	41	0	0.05		

SAS 6.1

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	32598	1.67
Urban Center	Commercial	0	0.00
Interchange	Commercial	1717227	39.42
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			41.09

SAS 6-2 (includes flow from 6-1 & SAS F)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	128.54	2487	0.19	0.55	0.68
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.15	0.17
Commercial	89.84	NA	0.11		
TOTAL	218	2487	0.30	0.71	0.85

SAS 6-2 (includes flow from 6-1 & SAS F)

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	501625	11.52	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	936116	21.49	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	0	0.00	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			33.01	

SAS 6-6 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5, 6.2 & SAS F, SAS G)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	658.34	12730	0.95	2.40	2.88
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.64	0.77
Commercial	397.75	NA	0.49		
TOTAL	1056	12730	1.44	3.05	3.65

SAS 6-6 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5, 6.2 & SAS F, SAS G)

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	344350	7.91	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	0	0.00	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			7.91	

SAS 6-3 (includes flow from 6-1, 6-2 & 6.5 & SAS F)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	161.33	3121	0.23	0.69	0.83
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.19	0.23
Commercial	118.62	NA	0.15		
TOTAL	280	3121	0.38	0.88	1.06

SAS 6-3 (includes flow from 6-1, 6-2 & 6.5 & SAS F)

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	3827	0.23	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	338707	16.96	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	981741	22.54	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			39.72	

Drainage Area for SAS 7

Gravity line in northwest interchange area

SAS 7-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.17	0.27
Commercial	141.28	NA	0.17		
TOTAL	141	0	0.17	0.23	0.27

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	6154344	141.28	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	0	0.00	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			141.28	

SAS 6-4 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5 & SAS F)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	422.49	8173	0.61	1.62	1.94
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.16	0.25
Commercial	127.43	NA	0.16		
TOTAL	550	8173	0.77	1.83	2.19

SAS 6-4 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5 & SAS F)

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	383738	8.81	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	309110	7.18	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			15.91	

Drainage Area for SAS 8

Gravity line to SAS_6 in northeast interchange area

SAS 8-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.07	0.12
Commercial	60.77	NA	0.07		
TOTAL	61	0	0.07	0.10	0.12

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	140295	3.22	
Interchange	Commercial	2506800	57.55	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	0	0.00	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			60.77	

SAS 6-5 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5, 6.2 & SAS F)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	852.45	12622	0.95	2.38	2.86
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.24	0.38
Commercial	193.98	NA	0.24		
TOTAL	846	12622	1.19	2.70	3.23

SAS 6-5 (includes flow from 6-1, 6-2, 6-3, & 6.1-1, 6.1-2, 6.1-3, 6-3, 6.4, 6.5, 6.2 & SAS F)

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	0	0.00	
Interchange	Commercial	2698585	66.54	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	2518243	57.81	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	0	0.00	
TOTAL			124.35	

SAS 8-2 (includes flow from SAS 8-1 & SAS G)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	5.87	114	0.01	0.04	0.04
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.24	0.38
Commercial	195.87	NA	0.24		
TOTAL	202	114	0.25	0.35	0.42

Area Calc				
Name	Type	Area (ft)	Area (ac)	
Community Center	Commercial	0	0.00	
Employment Center	Commercial	0	0.00	
Village Centers	Commercial	0	0.00	
Urban Center	Commercial	2359035	54.16	
Interchange	Commercial	200963	4.61	
MdS Blvd	Multi-Family	0	0.00	
Residential	Single Family	255808	5.87	
Senior Community	Senior Community	0	0.00	
UNM 440	UNM	0	0.00	
UNM 40	UNM	174370	40.02	
TOTAL			104.67	

Notes

1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS A

Gravity line to SAS 1 on northwest quadrant of mesa area.

SAS A.1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	32.36	626	0.05	0.17	0.20
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	32	626	0.05	0.17	0.20

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	1409692	32.36
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			32.36

SAS A.5

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	78.74	1523	0.11	0.61	0.73
Senior Community	0.00	0	0.00		
Multi-Family	26.54	1199	0.09		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	105	2722	0.20	0.61	0.73

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	1155978	26.54
Residential	Single Family	3429927	78.74
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			105.28

SAS A.2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	37.36	723	0.05	0.29	0.35
Senior Community	21.37	171	0.01		
Multi-Family	6.28	284	0.02		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	65	1177	0.09	0.29	0.35

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	273449	6.28
Residential	Single Family	1627608	37.36
Senior Community	Senior Community	930872	21.37
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			65.01

SAS A-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	12.62	244	0.02	0.07	0.09
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	13	244	0.02	0.07	0.09

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	549612	12.62
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			12.62

SAS A.3

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	75.61	1467	0.11	0.68	0.82
Senior Community	0.00	0	0.00		
Multi-Family	36.16	1634	0.12		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	112	3100	0.23	0.68	0.82

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	1575002	36.16
Residential	Single Family	3302455	75.61
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			111.97

SAS A-2 (Includes A.1 & A-1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	69.49	1344	0.10	0.33	0.39
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	69	1344	0.10	0.33	0.39

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	0	0.00
Residential	Single Family	1067719	24.51
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			24.51

SAS A.4

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	82.23	1591	0.12	0.61	0.73
Senior Community	0.00	0	0.00		
Multi-Family	25.20	1139	0.09		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	107	2730	0.20	0.61	0.73

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MoS Blvd	Multi-Family	1097887	25.20
Residential	Single Family	3581874	82.23
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			107.43

SAS A-3 (No new area. Includes SAS A-1 & A-2 & A.1 & A.2)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	106.86	2067	0.16	0.57	0.68
Senior Community	21.37	171	0.01		
Multi-Family	6.28	284	0.02		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	135	2522	0.19	0.57	0.68

SAS A-4 (Includes SAS A-1 & A-2 & A-3 & A.1 & A.2)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	193.88	3735	0.28	0.93	1.12
Senior Community	21.37	171	0.01		
Multi-Family	10.38	469	0.04		
Commercial	18.90	NA	0.02	0.03	0.04
TOTAL	244	4375	0.35	0.96	1.15

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	823449	18.90
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	178626	4.10
Residential	Single Family	3155752	86.72
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			109.22

Drainage Area for SAS B

Gravity line to SAS 1 on west mesa area.

SAS B-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	149.94	2901	0.22	0.65	0.77
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	150	2901	0.22	0.65	0.77

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	6531197	149.94
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			149.94

Notes

1. See Assumptions sheet for values used in calculations.

SAS A-5 (No new area. Includes SAS A-1 & A-2 & A-3 & A-4 & A.1 & A.2 & A.3)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	268.89	5202	0.39	1.50	1.80
Senior Community	21.37	171	0.01		
Multi-Family	46.54	2103	0.16		
Commercial	18.90	NA	0.02	0.03	0.04
TOTAL	356	7475	0.58	1.53	1.83

Drainage Area for SAS C

Gravity line to SAS 3 in southeast quadrant of mesa area.

SAS C-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	726.15	14048	1.05	2.62	3.14
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	726	14048	1.05	2.62	3.14

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	31631022	726.15
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			726.15

Notes

1. See Assumptions sheet for values used in calculations.

SAS A-6 (No new area. Includes SAS A-1 & A-2 & A-3 & A-4 & A-5 & A.1 & A.2 & A.3 & A.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	351.12	6793	0.51	1.97	2.37
Senior Community	21.37	171	0.01		
Multi-Family	71.74	3241	0.24		
Commercial	18.90	NA	0.02	0.03	0.04
TOTAL	463	10205	0.79	2.00	2.40

SAS A-7 (No new area. Includes SAS A-1 & A-2 & A-3 & A-4 & A-5 & A-6 & A.1 & A.2 & A.3 & A.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	429.86	8316	0.62	2.43	2.92
Senior Community	21.37	171	0.01		
Multi-Family	98.26	4440	0.33		
Commercial	18.90	NA	0.02	0.03	0.04
TOTAL	568	12927	0.99	2.46	2.96

Notes

1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS_E
Gravity line to SAS_2 in middle of mesa area.

SAS E-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	52.97	1025	0.08	0.26	0.31
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	53	1025	0.08	0.26	0.31

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	2307158	52.97
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			52.97

SAS E-5

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	66.70	1290	0.10	0.31	0.38
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	67	1290	0.10	0.31	0.38

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	2905288	66.70
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			66.70

SAS E-2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	13.06	253	0.02	0.07	0.09
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	13	253	0.02	0.07	0.09

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	568824	13.06
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			13.06

SAS E-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	87.03	1684	0.13	0.40	0.48
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	87	1684	0.13	0.40	0.48

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	3791104	87.03
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			87.03

SAS E-3

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	18.69	362	0.03	0.10	0.12
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	19	362	0.03	0.10	0.12

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	814004	18.69
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			18.69

SAS E-2 (Includes flow from E-1 and E.1 and E.2)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	213.27	4126	0.31	0.88	1.06
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	213	4126	0.31	0.88	1.06

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	2622709	60.21
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			60.21

SAS E-4

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	55.03	1065	0.08	0.27	0.32
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00	0.00	0.00
TOTAL	55	1065	0.08	0.27	0.32

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	2397114	55.03
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			55.03

SAS E-3 (includes flow from E-1, E-2 & E.1, E.2, E.3)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	254.77	4929	0.37	1.03	1.24
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	255	4929	0.37		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	994077	22.82
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			22.82

Drainage Area for SAS F

Main gravity trunk off escarpment in southwest corner of mesa area.

SAS F-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	101.48	1963	0.15	0.46	0.55
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	101	1963	0.15		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	4470393	101.48
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			101.48

SAS E-4 (includes flow from E-1, E-2, E-3 & E.1, E.2, E.3, E.4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	343.12	6638	0.50	1.35	1.62
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	343	6638	0.50		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1451093	33.31
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			33.31

SAS F-2 (includes flow from SAS F-1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	128.54	2487	0.19	0.56	0.68
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	15.75	NA	0.02		
TOTAL	144	2487	0.21		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	605314	13.90
Urban Center	Commercial	0	0.00
Interchange	Commercial	80715	1.85
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1178606	27.06
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			42.81

SAS E-5 (includes flow from E-1, E-2, E-3, E-4 & E.1, E.2, E.3, E.4, E.5)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	441.63	8544	0.64	1.68	2.02
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	0.00	NA	0.00		
TOTAL	442	8544	0.64		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1386050	31.82
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			31.82

Notes

1. See Assumptions sheet for values used in calculations.

Notes

1. See Assumptions sheet for values used in calculations.

Drainage Area for SAS G

Gravity trunk on west side of Mesquite Sol

SAS G-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	36.31	NA	0.04		
TOTAL	36	0	0.04		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	1574684	36.15
Interchange	Commercial	7069	0.16
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			36.31
TOTAL			72.62

Notes

1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS Un
Existing gravity line in University Blvd downstream of SAS 1

SAS Un-1

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.12	0.14
Commercial	71.23	NA	0.09		
TOTAL	71	0	0.09		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	3102734	71.23
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			71.23

Drainage Area for SAS_West Force Main
Force main west to proposed City of Albuquerque pump station.

SAS_West Force Main (includes the flow from SAS_6, SAS_7, SAS_8, & SAS_F, & SAS_G)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	254.07	4015	0.37	1.03	1.24
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.23	0.27
Commercial	141.28	NA	0.17		
TOTAL	395	4015	0.54		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			0.00

SAS Un-2

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.20	0.24
Commercial	122.96	NA	0.15		
TOTAL	123	0	0.15		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	5356146	122.96
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			122.96

Flows for SAS_A and SAS_1 with West Force Main Flows

SAS_A with flow from Force Main

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	329.66	6362	0.46	1.59	1.91
Senior Community	0.00	0	0.00		
Multi-Family	36.16	1634	0.12	0.23	0.27
Commercial	141.28	NA	0.17		
TOTAL	507	8015	0.77		

SAS Un-1 (Includes flow from Un.1 & SAS 1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	1010.96	19550	1.47	4.71	5.66
Senior Community	21.37	171	0.01		
Multi-Family	166.11	7505	0.56	0.32	0.38
Commercial	195.60	NA	0.24		
TOTAL	1394	27234	2.28		

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	243611	5.50
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			5.50

SAS_1_1 (Includes flow from SAS_A and Force Main)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	274.30	5306	0.40	1.10	1.32
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00	0.23	0.27
Commercial	141.28	NA	0.17		
TOTAL	416	5306	0.57		

SAS Un-2 (Includes flow from SAS Un-1 & Un.1 & Un.2 & SAS 1)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	1010.96	19550	1.47	4.71	5.66
Senior Community	21.37	171	0.01		
Multi-Family	166.11	7505	0.56	0.52	0.62
Commercial	318.56	NA	0.39		
TOTAL	1517	27234	2.43		

SAS_1_2 (Includes flow from SAS_1_1 & SAS_A & Force Main)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	762.66	14565	1.09	3.45	4.16
Senior Community	0.00	0	0.00		
Multi-Family	103.74	4687	0.35	0.27	0.32
Commercial	164.25	NA	0.20		
TOTAL	1021	19252	1.65		

Notes
1. See Assumptions sheet for values used in calculations.

NOTE: LINE LABELS SHOWN WITH UNDERSCORE (i.e. SAS_1_) ARE LEVEL A
 LINE LABELS SHOWN USING THE DASH (i.e. SAS 1-) ARE THE MAIN LINES
 LINE LABELS SHOWN USING THE DOT (i.e. SAS 1.) ARE COLLECTOR LINES
 DRAINING INTO THE MAIN LINES

*Minimum Velocity is 2.2 fps
 Level B SAS Flow Rates and Pipe Sizes

Sanitary Sewer Line	Area (acres)	Population	Design Flow Rate (MGD)	Calcd Pipe Size (inches)	Pipe Size (inches)	Minimum Slope (ft/ft)	Velocity at Min Slope in true pipe size (fps)	Required Slope for min vel (ft/ft)
SAS 1-1	20	391	0.13	4.8	8	0.0040	1.85	0.00650
SAS 1-2	26	504	0.16	5.0	8	0.0054	1.85	0.00860
SAS 1-1	259	4585	1.20	14.0	18	0.0012	2.07	0.00141
SAS 1-2	589	12103	2.92	20.2	24	0.0010	2.30	
SAS 1-3	620	13196	3.03	20.5	24	0.0010	2.37	
SAS 1-4	633	13277	3.06	19.7	24	0.00125	2.65	
SAS 1-5	715	14301	3.32	20.3	24	0.00125	2.28	
SAS 1-6	1317	27234	5.89	22.1	24	0.0025	4.01	
SAS Un-1	71	0	0.14	5.0	8	0.0040	1.88	0.00610
SAS Un-2	123	0	0.24	6.1	8	0.0040	2.17	0.00415
SAS Un-1	1394	27234	6.04	22.3	24	0.0025	4.02	
SAS Un-2	1517	27234	6.27	22.7	24	0.0025	3.46	
SAS 2-1	25	56	0.07	3.8	8	0.0164	2.55	
SAS 2-2	45	865	0.29	6.6	8	0.0040	2.18	0.00405
SAS 2-3	41	385	0.11	4.6	8	0.0040	1.78	0.00745
SAS 2-4	546	3798	1.12	11.6	12	0.0028	2.72	
SAS 2-1	116	0	0.23	4.7	8	0.0150	3.49	
SAS 2-2	146	56	0.30	5.2	8	0.0150	3.75	
SAS 2-3	1711	56	3.35	22.2	24	0.0008	2.27	
SAS 2-4	1852	962	3.82	23.9	24	0.0008	2.31	
SAS 2-5	2336	9821	5.83	17.2	24	0.0095	6.67	
SAS 2-6	2990	15604	7.15	30.2	36	0.0007	2.64	
SAS 2-7	3050	16272	7.33	30.5	36	0.0007	2.65	
SAS 2-8	385	7127	1.35	16.1	18	0.0012	2.25	
SAS 3-1	4975	50871	13.67	37.6	42	0.0008	3.13	
SAS 4-1	111	0	0.22	5.9	8	0.0040	2.13	0.00440
SAS 4-2	143	0	0.28	6.5	8	0.0040	2.26	
SAS 4-3-1	206	0	0.40	8.3	10	0.0022	1.97	0.00295
SAS 4-3-2	345	0	0.67	11.2	12	0.0012	1.75	0.00210
SAS 4-3-3	594	0	1.15	13.8	15	0.0012	2.02	0.00147
SAS 4-4	125	0	0.24	6.1	8	0.0040	2.17	0.00415
SAS 4-5	210	0	0.41	8.3	10	0.0022	1.98	0.00290
SAS 4-6	102	0	0.20	5.7	8	0.0040	2.07	0.00470
SAS 4-1	193	0	0.38	7.8	8	0.0028	2.05	0.00320
SAS 4-2	330	0	0.64	8.8	10	0.0040	2.78	
SAS 4-3	675	0	1.31	14.5	15	0.0012	2.07	0.00139
SAS 4-4	1379	0	2.68	18.9	21	0.0012	2.51	
SAS 4-5	1536	0	2.99	19.7	21	0.0012	2.56	
SAS 4-6	1559	0	3.03	19.8	21	0.0012	2.56	
SAS 6-1-1	94	1814	0.51	6.8	8	0.0192	4.73	
SAS 6-1-2	192	3716	0.97	7.7	8	0.0192	5.41	
SAS 6-1-3	294	4915	1.28	8.1	10	0.0242	6.43	
SAS 6-2	172	3331	0.88	8.1	10	0.0115	4.47	
SAS 6-3	82	1191	0.35	7.0	8	0.0040	2.37	
SAS 6-4	36	703	0.22	4.2	8	0.0244	4.1	
SAS 6-5	22	198	0.09	4.2	8	0.0040	1.66	0.00680
SAS 6-1	41	0	0.08	2.6	8	0.0433	3.74	
SAS 6-2	218	2487	0.85	11.8	12	0.0015	2	0.00186
SAS 6-3	280	3121	1.06	12.8	15	0.0015	2.17	0.00155
SAS 6-4	550	8173	2.16	16.8	18	0.0015	2.58	
SAS 6-5	846	12622	3.23	19.5	21	0.0015	2.84	
SAS 6-6	1056	12736	3.65	21.4	24	0.0015	3.05	
SAS 7-1	141	0	0.27	6.4	8	0.0040	2.24	
SAS 8-1	61	0	0.12	4.7	8	0.0040	1.81	0.00690
SAS 8-2	202	114	0.42	9.0	10	0.0102	4.47	
SAS A-3	112	3100	0.82	9.2	10	0.0052	3.22	
SAS A-4	107	2730	0.73	9.9	10	0.0028	2.42	
SAS A-5	105	2722	0.73	9.9	10	0.0028	2.42	
SAS A-3	130	2522	0.68	8.6	10	0.0052	3.1	
SAS A-4	244	4375	1.15	14.9	24	0.0008	1.74	0.00153
SAS A-5	356	7475	1.83	17.7	24	0.0008	1.97	0.00107
SAS A-7	463	10205	2.40	19.6	24	0.0008	2.11	0.00089
SAS A-4	568	12927	2.96	21.2	24	0.0008	2.21	24" due to flow from FM
SAS B-1	150	2901	0.77	10.2	12	0.0028	2.55	24" due to flow from FM
SAS C-1	326	14048	3.14	20.1	24	0.0012	2.58	24" due to flow from FM
SAS F-1	33	253	0.09	3.5	8	0.0111	2.39	
SAS F-2	59	362	0.12	4.7	8	0.0040	1.81	0.00690
SAS E-3	55	1065	0.32	6.0	8	0.0076	2.97	
SAS F-4	67	1290	0.38	7.3	8	0.0040	2.41	
SAS E-1	87	1684	0.48	8.5	10	0.0028	2.26	
SAS E-2	213	4126	1.06	11.9	12	0.0022	2.43	
SAS E-3	255	4929	1.24	14.2	18	0.0012	2.09	0.00139
SAS E-4	343	6633	1.62	10.4	18	0.0107	5	
SAS E-5	442	8544	2.02	17.0	18	0.0012	2.32	MATCH UPSTREAM SIZE
SAS F-1	144	2487	0.55	6.8	8	0.0122	4.05	
SAS F-2	0	0	0.71	9.2	10	0.0040	2.4	
SAS G-1	36	0	0.07	8.1	10	0.0028	2.53	

Overall 7438 90000 21.64

Drainage Area for Gravity line to

SAS

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	672.00	13000	0.98		
Senior Community	0.00	0	0.00	2.44	2.93
Multi-Family	0.00	0	0.00		
Commercial	230.00	NA	0.28	0.37	0.45
TOTAL	902	13000	1.26	2.82	3.38

Area Calc

Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	230.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	672.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			902.00

Drainage Area for SAS_4 Gravity line along northwest quadrant.

PS#1 (now, old alt, only SAS_4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00		
Senior Community	0.00	0	0.00	0.00	0.00
Multi-Family	0.00	0	0.00		
Commercial	111.23	NA	0.14	0.18	0.22
TOTAL	111	0	0.14	0.18	0.22

Area Calc

Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	4545146	111.23
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			111.23

PS#1 (10yrs, old alt, SAS4 & 2 & E)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	381.47	7380	0.55		
Senior Community	0.00	0	0.00	1.48	1.77
Multi-Family	0.00	0	0.00		
Commercial	142.93	NA	0.18	0.23	0.28
TOTAL	524	7380	0.73	1.71	2.05

Area Calc

Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	4545146	111.23
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			111.23

Notes
 1. See Assumptions sheet for values used in calculations.



Drainage Area for SAS_2

Gravity line from University to southwest quadrant of mesa top

SAS_2_1 (includes flow from SAS_4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	0.00	0	0.00	0.00	0.00
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	5.24	NA	0.01	0.01	0.01
TOTAL	5	0	0.01	0.01	0.01

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	228094	5.24
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			5.24

SAS_2_4 (Flows from other sub-basins not included)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	360.41	7127	0.53	1.43	1.72
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	16.96	NA	0.02	0.03	0.03
TOTAL	385	7127	0.56	1.46	1.75

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	738661	16.96
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	1804510	360.41
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			385.37

PS#2 (2yrs, old alt)

SAS_2_2 (includes flow from SAS_2_1 & SAS_E)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	13.06	253	0.02	0.07	0.09
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	9.03	NA	0.01	0.01	0.02
TOTAL	22	253	0.03	0.09	0.11

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	185148	3.79
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			3.79

PS#3 (ultimate build out)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	1805.72	34952	2.62	5.88	7.06
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	46.13	NA	0.06	0.07	0.09
TOTAL	1853	34952	2.68	5.95	7.15

SAS_2_3 (includes flow from SAS_2_1 & SAS_2_2 & SAS_4)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	13.06	253	0.02	0.07	0.09
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	14.74	NA	0.02	0.02	0.03
TOTAL	28	253	0.04	0.10	0.12

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	245024	5.11
Employment Center	Commercial	0	0.00
Village Centers	Commercial	0	0.00
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	0	0.00
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			5.11

Notes

1. See Assumptions sheet for values used in calculations.

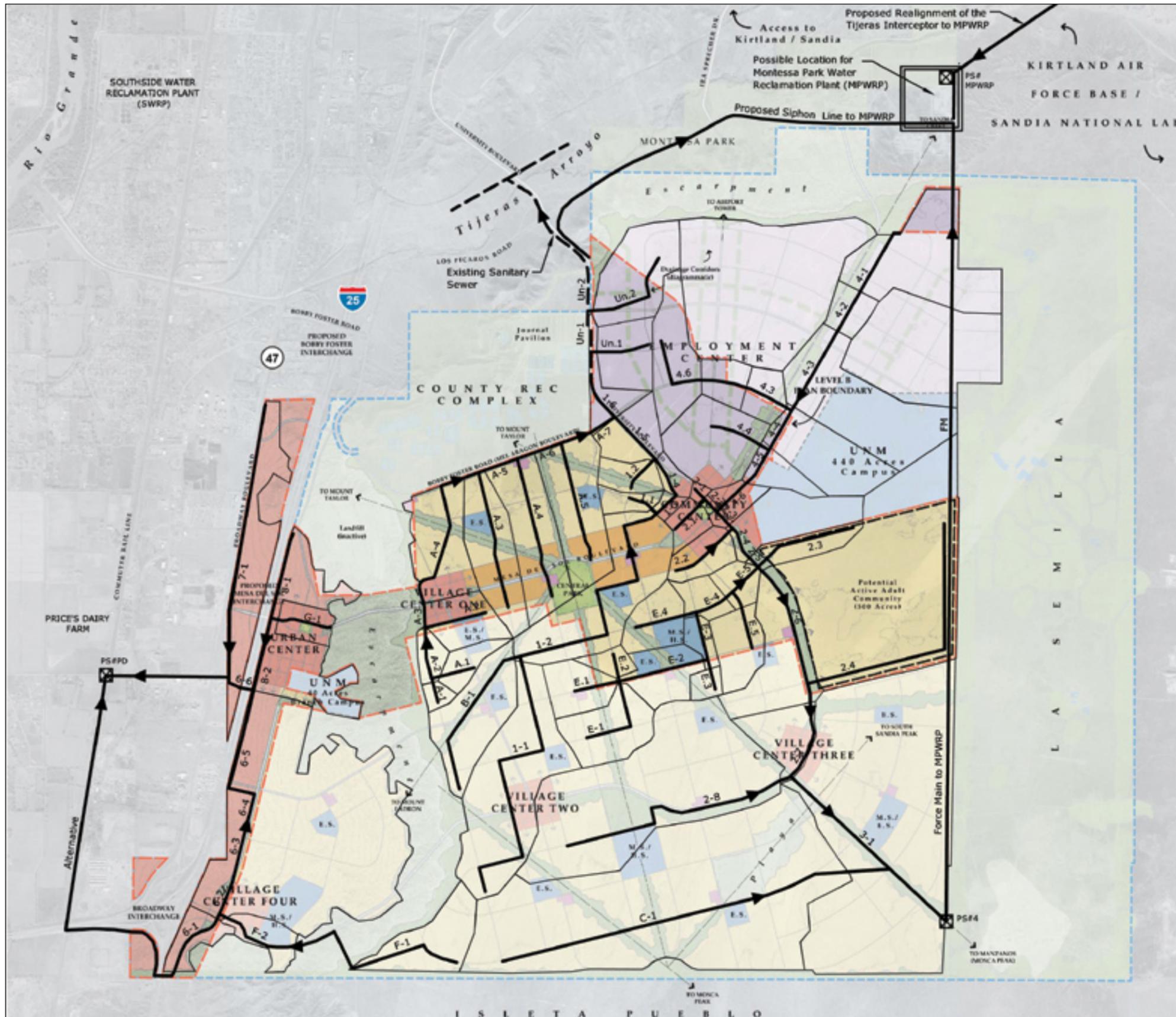
Drainage Area for SAS_3

Gravity line to main pump station in southeast quadrant of mesa area

SAS_3 (includes flows from SAS_2 & SAS_C)

Drainage Area	Area (acres)	Population	Average Flow (MGD) ¹	Peak Flow (MGD) ¹	Design Flow (MGD) ¹
Residential	699.10	13525	1.01	2.53	3.04
Senior Community	0.00	0	0.00		
Multi-Family	0.00	0	0.00		
Commercial	14.43	NA	0.02	0.02	0.03
TOTAL	714	13525	1.03	2.56	3.07

Area Calc			
Name	Type	Area (ft)	Area (ac)
Community Center	Commercial	0	0.00
Employment Center	Commercial	0	0.00
Village Centers	Commercial	628758	14.43
Urban Center	Commercial	0	0.00
Interchange	Commercial	0	0.00
MdS Blvd	Multi-Family	0	0.00
Residential	Single Family	30452766	699.10
Senior Community	Senior Community	0	0.00
UNM 440	UNM	0	0.00
UNM 40	UNM	0	0.00
TOTAL			713.53



**SANITARY SEWER
MASTER PLAN
INCLUDING
LEVEL A AREA**

Figure 5B-5

Legend

-  Sewer Line (Trunk Line) and Identifier
-  Sewer Line (Level B Collector) and Identifier
-  Force Main
-  Pump Station and Identifier
-  Basin Boundaries



5C Dry utilities

5C.1 Major Facilities

Major Electrical Facilities

The transmission system requires the following space (easements):

- For a typical double circuit transmission line a 50' easement is required. This can be split 20' over the public road ROW and 30' on private land behind the public road ROW in an easement. If a transmission line does not parallel a public road ROW then a 50' easement is required.
- For a typical single circuit transmission line (in a vertical configuration) a 40' easement is required. This can be extended over the ROW with 20' easement granted behind the public ROW in a private land easement.
- For an underground installation a 20' private easement center above the duct bank is required. If the easement is not adjacent to public road ROW a 20' temporary construction easement is also required. For paralleling underground circuits, 20' of separation is required.
- A typical unit substation site is sized at 200' x 200'. Locations will be determined based on load. The site needs access (either direct or by and access easement) to a public road ROW. Substations are located on land owned by PNM. This location will be the terminus of a transmission line and therefore will have one incoming and one outgoing transmission line to adjacent substations.
- A 115 kV switching station is typically sized at 500' x 500'. Final size and layout will be determined by terrain and design.
- Exact easement widths, access requirements, and lot sizes will be determined based on final site specific designs.

The main electrical distribution system requires the following space (easements):

- Distribution systems in the employment center will be located in a 10' easement located behind the public road ROW on suitable final grade.
- Distribution systems in the urban and residential centers will be located in private alleys and adjacent to streets.
- Switch Cabinets are approximately 7'x7'x4' and requires approximately a 22'x13' clear working space.
- Distribution pedestals will be placed within PUE's located in alleys and in parking lot easements.
- Transformers will be located within an easement, for access and feed, whose size will be determined by the transformer size to meet the minimum working space and fire safety clearance requirements outlined in the current PNM Electric Service Guide.

Major Gas Facilities

The high-pressure gas system requires the following space (easements):

- 10" very high-pressure gas line requires a 10' easement on private property behind the ROW.
- Typical Gas Regulator Station = 50' x 100'.

The distribution gas system requires the following space (easements):

- Within the employment center, a 10' exclusive PNM gas easement behind road ROW will be granted for routing of utility systems.
- Planning and development of systems within residential and urban centers will locate utilities within private alleys and adjacent to streets to allow building foundations to encroach to a "zero lot line." Gas lines shall be placed adjacent to the street edge of the sidewalk to insure a minimum of 2' separation from any building foundations and in joint trench along with electric and telecommunications.
- PNM policies shall be followed for all meter placements.

3000 Acre – Conceptual Services

Utilizing the absorption planning tables for Mesa del Sol load estimates and a load time-line can be established to determine the best planning for the future electrical needs.

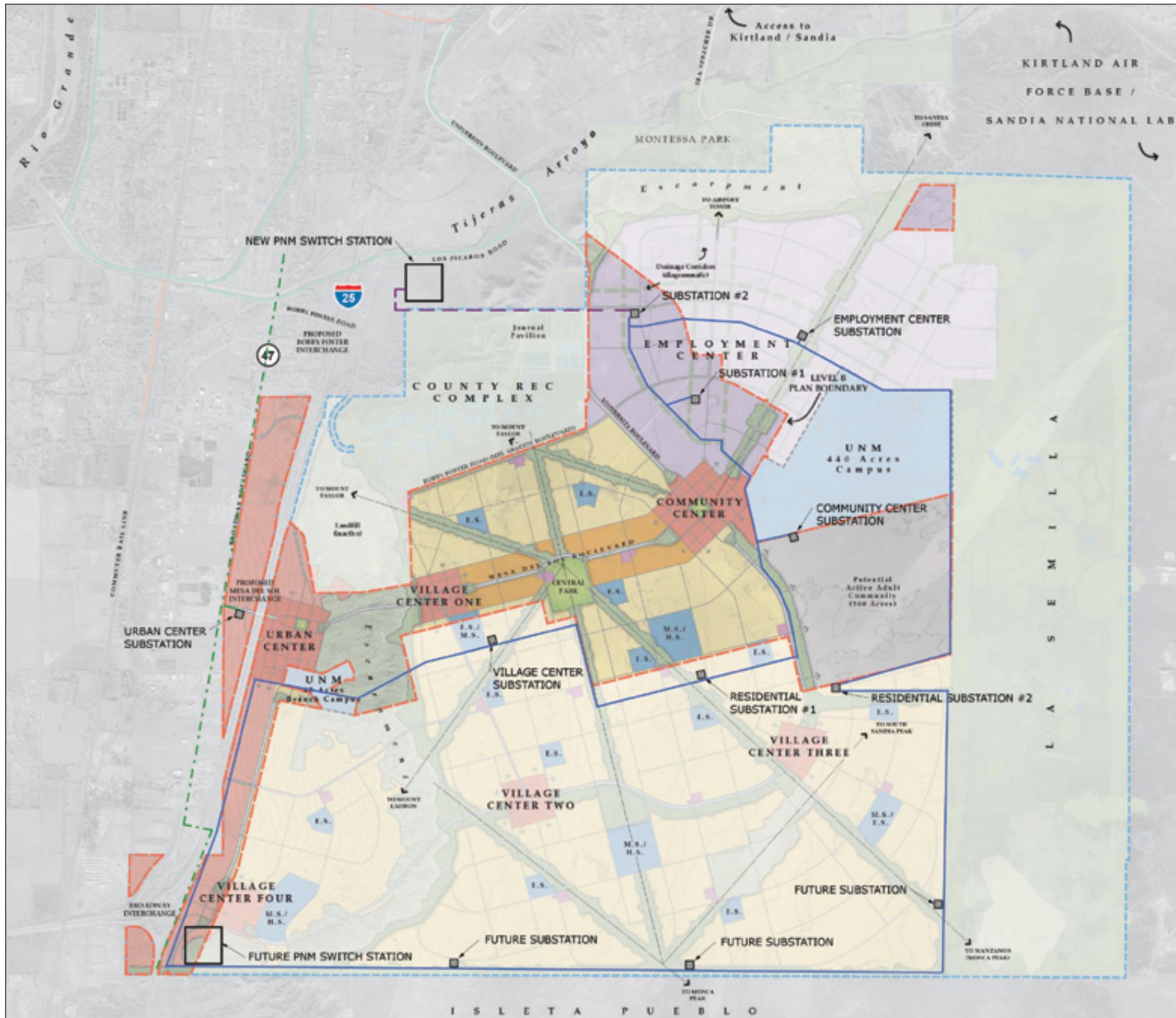
5C.2 Electrical Load Calculations

Estimates of Electrical Usage

The tables attached at the end of Appendix 5C list the factors that were used as the basis for the load calculations. Refer to Appendix 5C.4 for the residential load spreadsheet that outlines NEC section 220, used to determine loads for each residential product type. An application of the residential load spreadsheet for each residential type is seen on Table 5C-2 – Load under the heading NEC Projected Load (Appendix 5C.4). The load per square-foot estimate used for the Non-Residential product can be seen in Table 5C-3 – Load, under the heading NEC Projected Load (Appendix 5C.4). PNM will coordinate with developers to ensure adequate electric system resources.

Maps – Diagrams of Electrical Usage

PNM will determine the location and number of substations and the necessary 115 kV to 12.47 kV transformers for Mesa del Sol based on the electrical load of the area. Figure 5C-1 shows an estimate of 8 substation sites based on area and electrical load (based on electrical usage in Appendix 5C.4) for the possible locations for substations. Each easement site holds two transformers in full build conditions. Careful planning with PNM will establish the best locations that will maximize potential land/load coverage for each transformer, and help minimize the number of required sites.

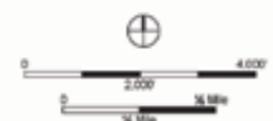


TRANSMISSION LINE ROUTING

Figure 5C-1

Legend

- Mixed Use Centers
- Neighborhood Centers (diagrammatic placement)
- Commercial
- Schools and UNM Land
- Office / R&D
- Corridor Residential
- Residential
- Large Parks
- Trunk Open Space Network
- Steep Slopes and Playas
- Double Circuit Overhead Transmission Line
- Single Circuit Overhead Transmission Line
- Existing 45KV and 115KV Transmission Lines



Development Timeline and Tables

PNM will determine the timing of electric and gas infrastructure installation based on electric demand and gas consumption. The development tables included the following: Table 5C-1, General Assumptions and Factors, Table 5C-2, Development Absorption: Residential, and Table 5C-3, Development Absorption: Non-Residential. These tables establish an absorption timeline for a way to establish a range of possible need dates. The breakdown of the tables can be seen in additional the attached tables: Table 5C-2 – Load, Table 5C-3 – Load. This aggressive timeline establishes an overall electrical demand load that exceeds 2 MVA before the full build out in 2007. With 2 years required to plan, design and install a substation, this first substation is needed soon within the development of Mesa del Sol.

5C.3 Index of Terms:

MDS: Mesa del Sol, Planned Community Development in Southwest Albuquerque

PNM: Gas and Electric Utility in Albuquerque

Transmission Line: High voltage power line (Greater than 40 kV), typically overhead.

Distribution Line: PNM provides electric power at 12.47 kV for three phase power and/or 7.2 kV for single phase power.

Very High-Pressure Gas Line: Very high-pressure gas line (greater than 60lbs of pressure), requiring a gas regulator station for distribution.

Gas Distribution Line: A high-pressure gas line (60 lbs pressure) used to distribute gas to users.

ROW: Public Right of Way

Remote Terminal: “RT”, by Qwest, is a series of cabinets that are used to distribute telecommunications and data services to users. Transmission services are distributed to an RT site by fiber and are distributed to users typically over copper lines. An RT site requires easement and cannot be installed in the public ROW.

Node: Node by Comcast is a series of small above ground enclosures that are used to distribute telecommunications and data services to users. Transmission services are distributed to Node by fiber and are distributed to users over a coax line. A node can be installed in the public ROW.

Journal Pavilion and County Rec Complex: A sports and entertainment complex just west of the northern project boundary. Currently one of the few facilities located on top of the mesa.

Table 5C-1 General Assumptions and Factors

Description	Total Amount	Unit Size	Lot Size	Density Net
				DU/AC
Single Family Detached				
Green Court	843	1200	3,200	13.6
Small Lot	896	1800	4,050	10.8
Medium Lot	1359	2200	4,500	9.7
Large Lot	1023	2500	5,000	8.7
Manor	418	3000	6,000	7.3
Estate	180	3500	8,400	5.2
Town Home				
Small Lot	1113	1200	1,440	30
Large Lot	1113	1500	2,160	30
Condominium	1371	1200	---	30
Apartments				
Standard	0	1000	---	30
Mixed	0	1000	---	30
Employment Center	300			
Highway Commercial	0			
Urban Center	828			
Community Center	819			
Village Center	192			
Active Adult	2000			
Total	12455			
				FAR
Urban Center	1,500,000			0.47
Village Center	200,000			0.19
Community Center	700,000			0.20
Highway Commercial	4,000,000			0.31
Employment Center	1,220,000			0.22
Technology Park	2,580,000			0.22
Office Park	350,000			0.22
Total	10,550,000			

Table 5C-1B Land Absorption Overview

Land Use Type	EPS		Master Plan	
Gross Area				
	3042	100%	3000	100%
-Open Space, Steep Slopes & Buffer	-464	15%	-580	-19%
Developable Area	2578	85%	2420	81%
Developable Area by Land Use				
Residential	992.32	48%	1,260.00	55%
Non-Residential	1,088.16	52%	1,038.00	45%
Total	2,080.47	100%	2,298.00	100%
Remaining Non-Residential Land	497.53		122	
Bulk Sale Price				

FAR = Floor to Area Ratio
DU/AC = Dwelling Units/Acre

Table 5C-2 Development Absorption: Residential

Land Use Type	Lot Size	Start Yr.	Total (Units)	2006 Year 0	2007 Year 1	2008 Year 2	2009 Year 3	2010 Year 4	2011 Year 5	2012 Year 6	2013 Year 7	2014 Year 8	2015 Year 9	2016 Year 10	2017 Year 11	2018 Year 12	2019 Year 13	2020 Year 14	2021 Year 15	2022 Year 16	2023 Year 17	2024 Year 18	2025 Year 19	2026 Year 20
Single Family Detached																								
Green Court	3200	2007	843	-	-	49	51	25	38	20	17	21	15	33	44	91	94	5	52	92	71	94	31	
Small Lot	4050	2007	896	-	-	49	52	25	38	20	26	21	15	33	44	91	94	5	74	106	71	99	33	
Medium Lot	4500	2007	1,359	-	-	86	85	40	58	31	32	39	28	56	88	139	151	8	112	105	103	134	66	
Large Lot	5000	2007	1,023	-	-	65	67	32	47	22	25	28	19	41	61	111	117	7	52	90	82	112	45	
Manor	6000	2009	418	-	-	12	13	6	7	4	5	7	4	7	12	24	22	2	37	80	63	82	31	
Estate	8400	2011	180	-	-	5	6	4	3	3	3	2	2	4	5	9	8	1	12	32	31	33	17	
Town Home																								
Small Lot	1440	2009	1,113	-	-	-	-	31	31	62	62	62	62	62	62	77	77	77	77	93	93	93	92	
Large Lot	2160	2009	1,113	-	-	-	-	31	31	62	62	62	62	62	62	77	77	77	77	93	93	93	92	
Condominium																								
		2010	1,371	-	-	-	-	38	38	76	76	76	76	76	76	96	96	96	96	114	114	114	113	
Apartments																								
Standard		2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mixed		2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		8,316																						
Employment Center		2016	300	-	-	-	-	-	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-	
Highway Commercial			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Urban Center		2015	828	-	-	-	-	-	-	-	-	-	240	-	240	-	-	240	-	-	108	-	-	
Community Center		2010	819	-	-	-	-	100	-	-	-	-	120	-	-	-	-	240	-	-	-	-	359	
Village Center		2021	192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	192	-	-	-	-	
Active Adult		2010	2,000	-	-	-	-	285	343	352	362	370	288	-	-	-	-	-	-	-	-	-	-	
Net-New Total			12,455	-	-	266	274	617	634	652	670	688	929	674	694	715	736	758	781	805	829	854	879	
Cumulative Total			- - -			266	540	1,157	1,791	2,443	3,113	3,801	4,730	5,404	6,098	6,813	7,549	8,307	9,088	9,893	10,722	11,576	12,455	



Table 5C-2 Load Development Absorption: Residential

Land Use Type	Unit Size	Start Yr.	Total (Units)	NEC Projected Load (KW Cont.)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
					NEC MVA Load Year 0	NEC MVA Load Year 1	NEC MVA Load Year 2	NEC MVA Load Year 3	NEC MVA Load Year 4	NEC MVA Load Year 5	NEC MVA Load Year 6	NEC MVA Load Year 7	NEC MVA Load Year 8	NEC MVA Load Year 9	NEC MVA Load Year 10	NEC MVA Load Year 11	NEC MVA Load Year 12	NEC MVA Load Year 13	NEC MVA Load Year 14	NEC MVA Load Year 15	NEC MVA Load Year 16	NEC MVA Load Year 17	NEC MVA Load Year 18	NEC MVA Load Year 19	NEC MVA Load Year 20
Single Family Detached																									
Green Court	1200	2007	843	21.3	-	-	1.04	1.09	0.53	0.81	0.43	0.36	0.45	0.32	0.70	0.94	1.94	2.00	0.11	1.11	1.96	1.51	2.00	0.66	-
Small Lot	1800	2007	896	22.1	-	-	1.08	1.15	0.55	0.84	0.44	0.57	0.46	0.33	0.73	0.97	2.01	2.07	0.11	1.63	2.34	1.57	2.18	0.73	-
Medium Lot	2200	2007	1,359	22.5	-	-	1.94	1.91	0.90	1.31	0.70	0.72	0.88	0.59	1.26	1.98	3.13	3.40	0.18	2.52	2.36	2.32	3.02	1.49	-
Large Lot	2500	2007	1,023	24.6	-	-	1.60	1.65	0.79	1.15	0.54	0.61	0.69	0.47	1.01	1.50	2.73	2.87	0.17	1.28	2.21	2.01	2.75	1.11	-
Manor	3000	2009	418	25.2	-	-	0.30	0.33	0.15	0.18	0.10	0.13	0.18	0.10	0.18	0.30	0.60	0.55	0.05	0.93	2.01	1.59	2.06	0.78	-
Estate	3500	2011	180	25.8	-	-	0.13	0.15	0.10	0.08	0.08	0.08	0.05	0.05	0.10	0.13	0.23	0.21	0.03	0.31	0.82	0.80	0.85	0.44	-
Town Home																									
Small Lot	1200	2009	1,113	21.3	-	-	-	-	0.66	0.66	1.32	1.32	1.32	1.32	1.32	1.32	1.64	1.64	1.64	1.64	1.98	1.98	1.98	1.96	-
Large Lot	1500	2009	1,113	21.7	-	-	-	-	0.67	0.67	1.34	1.34	1.34	1.34	1.34	1.34	1.67	1.67	1.67	1.67	2.02	2.02	2.02	2.00	-
Condominium																									
	1200	2010	1,371	21.3	-	-	-	-	0.81	0.81	1.62	1.62	1.62	1.62	1.62	1.62	2.04	2.04	2.04	2.04	2.43	2.43	2.43	2.41	-
Apartments																									
Standard	1000	2012	-	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mixed	1000	2012	-	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Employment Center																									
			300	21.3	-	-	-	-	-	-	-	-	-	-	6.39	-	-	-	-	-	-	-	-	-	-
Highway Commercial																									
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Urban Center																									
			828	21.3	-	-	-	-	-	-	-	-	-	5.11	-	5.11	-	-	5.11	-	-	2.30	-	-	-
Community Center																									
			819	21.3	-	-	-	-	2.13	-	-	-	-	2.56	-	-	-	-	5.11	-	-	-	-	7.65	-
Village Center																									
			192	21.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.09	-	-	-	-	-
Active Adult																									
			2,000	21.3	-	-	-	-	6.07	7.31	7.50	7.71	7.88	6.13	-	-	-	-	-	-	-	-	-	-	-
Total Load																									
			12,455		-	-	6.09	6.27	5.17	6.50	6.57	6.76	6.99	6.14	8.26	10.10	15.99	16.46	6.00	13.13	18.14	16.22	19.29	11.56	-
Cumulative Load (MVA)																									
					-	-	6.09	12.36	17.53	24.03	30.60	37.35	44.34	50.48	58.74	68.84	84.83	101.30	107.29	120.43	138.56	154.78	174.08	185.64	185.64
Cumulative Demand Load (MVA)																									
				33%	-	-	2.01	4.08	5.78	7.93	10.10	12.33	14.63	16.66	19.38	22.72	27.99	33.43	35.41	39.74	45.73	51.08	57.45	61.26	61.26

Table 5C-3 Development Absorption: Retail

Land Use Type	FAR	Start Yr.	Total (Sq-Ft)	2006 Year 0	2007 Year 1	2008 Year 2	2009 Year 3	2010 Year 4	2011 Year 5	2012 Year 6	2013 Year 7	2014 Year 8	2015 Year 9	2016 Year 10	2017 Year 11	2018 Year 12	2019 Year 13	2020 Year 14	2021 Year 15	2022 Year 16	2023 Year 17	2024 Year 18	2025 Year 19	2026 Year 20
Urban Center	0.47	2011	1,500,000	-	-	-	-	-	175,000	225,000	300,000	300,000	200,000	-	-	300,000	-	-	-	-	-	-	-	-
Village Center	0.19	2021	200,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40,000	40,000	40,000	40,000	40,000	-
Community Center	0.20	2006	700,000	50,000	58,000	60,000	56,000	56,000	25,000	20,000	20,000	20,000	20,000	50,000	58,000	60,000	56,000	55,000	7,000	7,000	7,000	7,000	7,000	-
Highway Commercial	0.31	2011	4,000,000	-	-	-	-	-	224,000	224,000	224,000	224,000	224,000	176,000	176,000	176,000	176,000	176,000	400,000	400,000	400,000	400,000	400,000	-
Employment Center	0.22	2006	1,220,000	-	110,000	110,000	110,000	110,000	24,000	24,000	24,000	24,000	24,000	60,000	60,000	60,000	60,000	60,000	70,000	70,000	70,000	80,000	70,000	-
Technology Park	0.22	2006	2,580,000	100,000	200,000	200,000	200,000	200,000	50,000	50,000	50,000	50,000	50,000	130,000	130,000	130,000	130,000	130,000	150,000	150,000	150,000	150,000	150,000	-
Office Park	0.22	2008	350,000	-	-	250,000	65,000	35,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net-New Total (Sq-Ft)			10,550,000	150,000	368,000	620,000	431,000	401,000	498,000	543,000	618,000	618,000	518,000	416,000	424,000	726,000	422,000	422,000	667,000	667,000	697,000	677,000	667,000	-
Cumulative Total (Sq-Ft)			---	150,000	518,000	1,138,000	1,569,000	1,970,000	2,468,000	3,011,000	3,629,000	4,247,000	4,765,000	5,181,000	5,605,000	6,331,000	6,753,000	7,175,000	7,842,000	8,509,000	9,206,000	9,883,000	10,550,000	10,550,000

Table 5C-3 Load Development Absorption: Retail

Land Use Type	FAR	Start Yr.	Total (Units)	NEC Projected Load (kW/SqFT)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
					NEC MVA Load																				
Urban Center	0.47	2013	1,500,000	0.020	-	-	-	-	-	3.50	4.50	6.00	6.00	4.00	-	-	6.00	-	-	-	-	-	-	-	-
Village Center	0.19	2021	200,000	0.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.68	0.68	0.68	0.68	0.68	-
Community Center	0.20	2012	700,000	0.015	0.75	0.87	0.90	0.84	0.84	0.38	0.30	0.30	0.30	0.30	0.75	0.87	0.90	0.84	0.84	0.11	0.11	0.11	0.11	0.11	-
Highway Commercial	0.31	2012	4,000,000	0.012	-	-	-	-	-	2.69	2.69	2.69	2.69	2.69	2.11	2.11	2.11	2.11	2.11	4.80	4.80	4.80	4.80	4.80	-
Employment Center	0.22	2007	1,220,000	0.020	-	2.20	2.20	2.20	2.20	0.48	0.48	0.48	0.48	0.48	1.20	1.20	1.20	1.20	1.20	1.40	1.40	1.40	1.60	1.40	-
Technology Park	0.22	2017	2,580,000	0.025	2.50	5.00	5.00	5.00	5.00	1.25	1.25	1.25	1.25	1.25	3.25	3.25	3.25	3.25	3.25	3.75	3.75	4.50	3.75	3.75	-
Office Park	0.22	2008	350,000	0.025	-	-	6.25	1.63	0.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Load					3.25	8.07	14.35	9.67	8.92	8.29	9.22	10.72	10.72	8.72	7.31	7.43	13.46	7.40	7.40	10.74	10.74	11.49	10.94	10.74	-
Cumulative Load (MVA)					3.25	11.32	25.67	35.34	44.25	52.54	61.76	72.48	83.20	91.92	99.23	106.66	120.12	127.52	134.93	145.66	156.40	167.88	178.82	189.55	189.55
Cumulative Demand Load (MVA)				40%	1.30	4.53	10.27	14.13	17.70	21.02	24.70	28.99	33.28	36.77	39.69	42.66	48.05	51.01	53.97	58.26	62.56	67.15	71.53	75.82	75.82



Table 5C-4 High Development Absorption: Load Demand

Land Use Type	Demand Factor (kW/SqFT)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
		NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load	NEC MVA Load
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Residential																							
Total Load		0.00	0.00	6.09	6.27	5.17	6.50	6.57	6.76	6.99	6.14	8.26	10.10	15.99	16.46	6.00	13.13	18.14	16.22	19.29	11.56	0.00	
Cumulative Load (MVA)		0.00	0.00	6.09	12.36	17.53	24.03	30.60	37.35	44.34	50.48	58.74	68.84	84.83	101.30	107.29	120.43	138.56	154.78	174.08	185.64	185.64	
Cumulative Demand Load (MVA)	33%	0.00	0.00	2.01	4.08	5.78	7.93	10.10	12.33	14.63	16.66	19.38	22.72	27.99	33.43	35.41	39.74	45.73	51.08	57.45	61.26	61.26	
Non-Residential																							
Total Load		3.25	8.07	14.35	9.67	8.92	8.29	9.22	10.72	10.72	8.72	7.31	7.43	13.46	7.40	7.40	10.74	10.74	11.49	10.94	10.74	0.00	
Cumulative Load (MVA)		3.25	11.32	25.67	35.34	44.25	52.54	61.76	72.48	83.20	91.92	99.23	106.66	120.12	127.52	134.93	145.66	156.40	167.88	178.82	189.55	189.55	
Cumulative Demand Load (MVA)	40%	1.30	4.53	10.27	14.13	17.70	21.02	24.70	28.99	33.28	36.77	39.69	42.66	48.05	51.01	53.97	58.26	62.56	67.15	71.53	75.82	75.82	
Total Build-Out		3.25	8.07	20.44	15.94	14.08	14.80	15.79	17.47	17.71	14.86	15.57	17.53	29.45	23.86	13.40	23.87	28.87	27.71	30.23	22.29	0.00	
Total Cumulative Load		3.25	11.32	31.76	47.70	61.78	76.57	92.36	109.83	127.54	142.39	157.97	175.50	204.95	228.82	242.22	266.09	294.96	322.66	352.89	375.19	375.19	
Total Cumulative Demand		1.30	4.53	12.28	18.21	23.48	28.95	34.80	41.32	47.91	53.42	59.08	65.38	76.04	84.44	89.38	98.01	108.28	118.23	128.97	137.08	137.08	
		1st Substation			2nd Substation			3rd Substation			4th Substation			5th Substation		6th Substation		7th Substation		8th Substation			

Table 5D Allowable Fixtures & Maximum Allowable Light Levels

Lighting Zone L1	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	25' allowed	5.0 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Outdoor Sales and Displays	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	25' allowed	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Architectural Entry Lighting	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Architectural Landscape/Art Lighting	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Outdoor Recreational Facilities	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed



Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L1A	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	25' allowed	5.0 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Outdoor Sales and Displays	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	25' allowed	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	3,500 lumens
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	Not Allowed
Architectural Accent Lighting	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Architectural Entry Lighting	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Architectural Landscape/Art Lighting		1700 lumens per fixture	Not Allowed			
Outdoor Recreational Facilities	Not Allowed	Not Allowed	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	

Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L2	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	30' allowed, 25' recommended	5.0 fc, 8 fc for drive aisles	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	15' above the highest grade under canopy	20 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Outdoor Sales and Displays	25' recommended for customer parking, repair & storage	10 fc for sales stock, 15 fc for sales display, 6.0 fc for customer parking, repair and sales	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	25' allowed	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	15' on open top deck	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	Not Allowed	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting		150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	Only one (1) identifying symbol on a cultural, religious or civic structure
Architectural Entry Lighting	Width of entry plus 3' each side	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	Not Allowed
Architectural Landscape/Art Lighting		1700 lumens per fixture	1700 lumens per fixture	1700 lumens per fixture	1700 lumens per fixture	
Outdoor Recreational Facilities	30' for tennis courts, 100' for driving ranges, 100' for sports lighting fixtures	Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Not Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33



Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L2A	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	30' allowed, 25' recommended	5.0 fc, 8 fc for drive aisles	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	15' above the highest grade under canopy	20 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Outdoor Sales and Displays	30' allowed, 25' recommended for customer parking, repair & storage	10 fc for sales stock, 20 fc for sales display, 6.0 fc for customer parking, repair and sales	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	25' allowed	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	15' on open top deck	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	Not Allowed	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting		150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	150 lumens per linear foot, No single fixture may exceed 3500 lumens	Only one (1) identifying symbol on a cultural, religious or civic structure
Architectural Entry Lighting	Width of entry plus 3' each side	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	500 lumens per linear foot, No single fixture may exceed 3500 lumens	Not Allowed
Architectural Landscape/Art Lighting		1700 lumens per fixture	1700 lumens per fixture	1700 lumens per fixture	1700 lumens per fixture	
Outdoor Recreational Facilities	30' for tennis courts, 100' for driving ranges, 100' for sports lighting fixtures	Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Not Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33

Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L3	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	30' allowed, 25' recommended	5.0 fc, 12 fc for drive aisles adjacent to all stores in a center containing a store over 50,000 sq. ft.	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	15' above the highest grade under canopy	20 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Outdoor Sales and Displays	30' allowed, 25' recommended for customer parking, repair & storage	10 fc for sales stock, 20 fc for sales display, 6.0 fc for customer parking, repair and sales	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	25' allowed	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	Not Allowed	2.0 fc, Allowed	Not Allowed	2.0 fc, 20 fc at entrance area	Not Allowed	Not Allowed
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting		200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	Only one (1) identifying symbol on a cultural, religious or civic structure
Architectural Entry Lighting	Width of entry plus 3' each side	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	Not Allowed
Architectural Landscape/Art Lighting		2400 lumens per fixture				
Outdoor Recreational Facilities	30' for tennis courts, 100' for driving ranges, 100' for sports lighting fixtures	Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Not Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33



Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L3A	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	30' allowed, 25' recommended	5.0 fc, 12 fc for drive aisles adjacent to all stores in a center containing a store over 50,000 sq. ft.	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	15' above the highest grade under canopy	20 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Outdoor Sales and Displays	30' allowed, 25' recommended for customer parking, repair & storage	10 fc for sales stock, 20 fc for sales display, 6.0 fc for customer parking, repair and sales	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	30' allowed	8 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	15' on open top deck	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	Not Allowed	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting		200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	200 lumens per linear foot, No single fixture may exceed 3500 lumens	Only one (1) identifying symbol on a cultural, religious or civic structure
Architectural Entry Lighting	Width of entry plus 3' each side	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	500 lumens per linear foot, No single fixture may exceed 3500 lumens, 1000 lumens per linear foot of entry for retail over 50,000 sq. ft. & outdoor eating uses	Not Allowed
Architectural Landscape/Art Lighting		2400 lumens per fixture				
Outdoor Recreational Facilities	30' for tennis courts, 100' for driving ranges, 100' for sports lighting fixtures	Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Not Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33

Table 5D Allowable Fixtures & Maximum Allowable Light Levels (continued)

Lighting Zone L4	Maximum Mounting Height	Full-cutoff	Cutoff	Semi-cutoff	Indirect	Non-cutoff
Surface Parking Lots	30' allowed, 25' recommended	5.0 fc, 12 fc for drive aisles adjacent to all stores in a center containing a store over 50,000 sq. ft.	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Private Roads Private Alleys. Public Streets	25' Recommended for residential	5 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Point of Service Canopies & Awnings	15' above the highest grade under canopy	20 fc	Not Allowed	Not Allowed	May be used if source of light is shielded and does not increase light levels above those stated for full-cutoff fixtures	Not Allowed
Outdoor Sales and Displays	30' allowed, 25' recommended for customer parking, repair & storage	10 fc for sales stock, 25 fc for sales display, 8.0 fc for customer parking, repair and sales	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Security Storage and loading	30' allowed	8 fc	Not Allowed	Not Allowed	Not Allowed	Not Allowed
Parking Structures with Open sides	15' on open top deck	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	1 fc within 10' of street facing edge of covered decks, no limit with structure providing light trespass limits can be met	Not Allowed	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view	Indirect lights or non-cutoff fixtures can be used along deck edge to enhance 1.0 fc light levels providing the light is shielded from street view
Pedestrian Circulation	15' height	6,000 lumens	6,000 lumens	4,000 lumens	4,000 lumens concealed lamp within fixture required	3,500 lumens
Architectural Accent Lighting	Note: Area calc = width of building face x building height	20 lumens per sq. ft foot, No single fixture may exceed 3500 lumens	20 lumens per sq. ft foot, No single fixture may exceed 3500 lumens	20 lumens per sq. ft foot, No single fixture may exceed 3500 lumens	20 lumens per sq. ft foot, No single fixture may exceed 3500 lumens	Up lighting allowed only if aimed and shielded to illuminate specific architectural elements
Architectural Entry Lighting	Width of entry plus 3' each side	1000 lumens per linear foot, No single fixture may exceed 3500 lumens	1000 lumens per linear foot, No single fixture may exceed 3500 lumens	1000 lumens per linear foot, No single fixture may exceed 3500 lumens	1000 lumens per linear foot, No single fixture may exceed 3500 lumens	Not Allowed
Architectural Landscape/Art Lighting		2400 lumens per fixture	2400 lumens per fixture	2400 lumens per fixture	2400 lumens per fixture	
Outdoor Recreational Facilities	30' for tennis courts, 100' for driving ranges, 100' for sports lighting fixtures	Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33	Not Allowed	Lights shall not be aimed above 62 degrees from vertical and must use internal shields as defined in IESNA Recommended Practice 33



