

Revision and Update History

- *October 2011:* Original Report
- *March 2012:* This report was updated to reflect the high end densities of the proposed land uses within the Community Development Plan
- *August 2014:* This report was updated to remove Offsite Area #5 from the sewer system, as this area is now being served by the Ray Road sewer line.

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I.0 Introduction

The Pacific Proving Grounds North (PPGN) is generally located east of Ellsworth Road, north of the future State Route 24 (previously referred to as SR 802), south of the Ray Road alignment, and west of Signal Butte Road (See Exhibit I: Vicinity Map). An updated ALTA Survey was prepared by Rosendahl Millet & Associates dated January 17, 2011 (Exhibit 2). The ALTA survey shows two separate parcels described as Area 1 with an area of 456.6 acres and Area 2 with an area of 105.7 acres. The scope of this report will deal with the development of a portion of Area 1 only and will be called the PPGN site throughout the balance of this report. The entitlements for Area 2 will be accomplished under a separate submittal in the future.

The PPGN site is located in portions of Sections 26, 27, 34 and 35 in the Township 1 South, Range 7 East of the Gila & Salt River Base and Meridian in Maricopa County, Arizona.

The PPGN site is within the southern portion of the original General Motors Proving Grounds. The northern portion of the GM Proving Grounds is owned by DMB Associates, Inc. who refers to their project as Mesa Proving Grounds (now referred to as “Eastmark”). See Exhibit 3 for the latest DMB Mesa Proving Grounds Master Sewer Exhibit at Full Build Out. The Phoenix Mesa Gateway Airport is located on the west side of Ellsworth Road and this regional area of Mesa is known as the Mesa Gateway Area. A Strategic Development Plan for Mesa Gateway has been prepared by the City of Mesa and was adopted by Resolution No. 9425 on December 8, 2008.

Revised Report Summary

This report has been revised (August 2014) to reflect the modifications made to the Eastmark Master Sewer Report (Prepared by Wood Patel & Assoc, Inc., dated 1/15/2014). Offsite 5, known as SBI05 and as shown in Exhibit 10, is now accommodated through the sewer main installed as part of the Eastmark DU 8&9 construction. As a result, Offsite 5 was removed from the sewer demand (Exhibit 8) and pipe capacity (Exhibit 9) calculations of this report. The following portions of this report have been updated:

- Section 5 Sewer System Design Criteria – the sentence discussing Offsite 5
- Exhibit 3 – Master Sewer Exhibit, Full Build Out Conditions of Mesa Proving Grounds (Revised 1/15/2014)
- Exhibit 8 – Sewer Demands – Average Day
- Exhibit 9 – Peak Daily Sewer Flows (Wet Weather) and Pipe Capacity Using Manning’s Equation
- Exhibit 10 – Master Sewer Exhibit

2.0 Master Sewer Report Scope

The PPGN will be a Community Development Plan (CDP) and will consist of individual Development Units (DU). This Master Sewer Report will consider the design for the build out of the CDP. This Master Sewer Report is an overall view of both the PPGN and upstream properties, and is intended to size sewer lines accordingly. Each DU will be required to prepare its own Master Sewer Plan to address final densities and layouts specific to that particular Development Unit Plan (DUP).

This report does not address how the site will be phased as there are many factors that will shape the phasing and development of this area. In some cases, a phase of development may require extension of facilities outside or beyond that phase of construction. Phasing of sewer improvements will be addressed with each DUP and/or Preliminary Plat.

3.0 City of Mesa Sewer Master Plan

The PPGN falls within the Gateway Area Sewer Improvements Master Plan (GASIMP). The GASIMP dated January 2009 covers several sewer basins, including the Elliot Road, Warner Road, Ray Road, Williams Field Road, and Pecos Road Sewer Basins. The PPGN falls into the Williams Field Road Sewer Basin.

3.1 Current Williams Field Road Sewer Basin Plan

The current plan for the Williams Field Road Sewer Basin as described in the GASIMP is to extend a 21" sewer trunk line from the intersection of Ray Road and Ellsworth Road south to Williams Field Road where it would turn to the east and reduce to an 18" trunk line. Ultimately it would downsize to a 12" line and pick up outfall from properties as far east as Meridian Road. Flow collected in the Williams Field Road Sewer Basin would merge with the Ray Road Basin (at the intersection of Ray Road and Ellsworth Road) and be conveyed west along Ray Road to the East Mesa Interceptor that eventually discharges into the Greenfield Water Reclamation Plant. The Ray Road sewer line, and other downstream lines, have been sized considering the development of the Williams Field Road Sewer Basin.

Refer to Exhibit 5, City of Mesa Gateway Master Sewer Improvements for existing and proposed sewer lines regarding the following sewer line discussions in this report. All of the public sewer lines will be owned and maintained by the City after completion of construction.

The City has recently indicated that the Williams Field Road sewer cannot be routed as shown on the GASIMP. An Arizona Department of Transportation (ADOT) box culvert is being constructed at Ellsworth Road and Ray Road. Due to

the culvert's depth, the 21" Ellsworth line cannot be built to the South. The GASIMP will have to be revised to account for this feature.

3.2 Proposed Williams Field Road Sewer Basin Plan

It is proposed that the Williams Field Road Sewer Basin be modified to exclude all areas south or west of the proposed SR 24 Freeway. Therefore, it is proposed that the trunk line to service this modified basin be routed through the roadways proposed within PPGN. The proposed trunk line would then be routed in Williams Field Road east of Crismon Road. Final alignments for sewer lines will ultimately depend on both the final land plan, as well as the phasing of construction. The DUP for each unit will address any changes as proposed in this report.

The Current Williams Field Sewer basin was defined in the DMB Mesa Proving Grounds Master Sewer Report as shown in Exhibit 3. This basin has been highlighted and overlaid onto the GASIMP in Exhibit 6. This basin's area was slated to serve 1,935± acres. The 189± acres occupied by the proposed SR 24 right-of-way, the proposed internal parks, and the proposed internal street rights-of-way for the PPGN, was removed from the service acreage. Due to the realignment of the trunk line discussed above, and the alignment of SR 24 bisecting the original basin, the basin is redefined to serve an area of 1,330± acres as shown in Exhibit 7. The City of Mesa should evaluate the 416± acres that lie south or west of the proposed SR 24 Freeway to determine whether it can be added back into the Williams Field basin with sewer stubs beneath the SR 24 alignment or be reassigned to the Pecos Road Basin.

4.0 Existing Conditions

Sewer service for the PPGN property will be provided by the recently constructed Ray Road sewer (west of Ellsworth Road) per the GASIMP. Note that the GASIMP shows the Ray Road sewer as 'future', but it was constructed after the date of the report and exhibit.

The City of Mesa has a design project that is in the beginning stages of construction at the time of this report that will extend sewer south from the intersection of Ellsworth Road and Ray Road. This proposed sewer will run south in Ellsworth Road along the entire frontage of the project. The proposed line is a 21" with 21" stubs at the northern most and southern most ends of the PPGN frontage along Ellsworth Road. There is also a proposed manhole that is located approximately five feet north of the centerline of the main entry into PPGN.

Between Ellsworth Road and Signal Butte Road the Ray Road alignment has an existing 21" PVC sewer line that transitions to an 18" sewer line. This line connects into the now existing Ray Road sewer line. There is also several thousand feet of 12" sewer line extending north from Ray Road along Signal Butte Road.

Williams Field Road has no existing sewer.

Mountain Road has an existing 12" PVC sewer line located 19' east of the centerline. This sewer line could serve as a likely sewer outfall for the eastern portions of the Williams Field Road Basin if phasing requires. Further investigation and study is needed to confirm that adequate depth is available.

5.0 Sewer System Design Criteria

The calculations of sewer flows and pipe sizing in this report are based on system design criteria in the City of Mesa Engineering Design Standards dated 2009, as well as Title 18, Chapter 9 of the Arizona Administrative Code, and regionally accepted design standards.

Average daily sewer use was estimated as outlined in Section 411 of the City of Mesa Engineering Design Standards. Land uses were modeled based on the proposed PPGN land uses and the City of Mesa General Plan for areas outside of the PPGN project area.

Sewer design criteria for Modeled Land Use can be found in Exhibit 8. The total of calculated average day sewer flow is 1.07 million gallons per day (MGD).

A peaking factor was applied to the average daily sewer flows as outlined in Section 411 of the City of Mesa Engineering Design Standards. A peaking factor of 3.0 was applied to all flows less than 1.0 MGD and a peaking factor of 2.5 was applied to flows between 1.0 and 10.0 MGD. It is our understanding that this peaking factor accounts for peak usage and wet weather flows. The total calculated peak sewer flow at the point of discharge into the existing City of Mesa sewer facilities is 2.7 MGD.

6.0 Proposed Sewer System

The proposed sewer system has been preliminarily designed based on the most current master plan and the peak demands as described above. The PPGN build-out peak flows and pipe sizing calculations are found in Exhibit 9. The proposed sewer system has been designed to connect into a proposed manhole is being constructed with a current City of Mesa utility extension project.

The preliminary design shows that the main sewer trunk lines are 21", 18", 15", 12" and 10". Pipe size was determined by two thirds flow depth in the proposed pipes. The

alignment of these sewer trunk lines are shown on the Master Sewer Exhibit located in Exhibit 10. Minimum slopes of these trunk lines are as follows:

Proposed Minimum Sewer Slopes	
21" Trunk Lines	0.0012 ft/ft
18" Trunk Lines	0.0016 ft/ft
15" Trunk Lines	0.0028 ft/ft
12" Trunk Lines	0.0028 ft/ft
10" Trunk Lines	0.0042 ft/ft

These slopes are greater than the minimum required by ADEQ. The slope of the sewer lines is enhanced because of the natural ground slope. At the sewer connection at the intersection of Ray Road and Ellsworth Road, there is approximately 18' of cover over the existing stub. The trunk line terminates at the southwest corner of the area labeled "Offsite 8" with approximately 16' of cover. The natural ground in this area slopes to the southwest at approximately 0.60%. Considering these two factors, this preliminary design provides adequate sewer depth for the most upstream users in the Williams Field Road Sewer Basin.

Any phasing of development will require the construction of final pipe sizing as calculated in this report and each DU will conduct a Master Sewer Report for its internal flows and pipe sizing. The Williams Field Road sewer line will be sized for all upstream properties, burdening downstream properties with over-sized sewer lines until full build out. However, downstream properties may be eligible for pay backs as upstream users connect to this line.

7.0 Conclusion

This Master Sewer Report has analyzed the design for the build out of the CDP. Conceptual peak usage demands have been estimated and the sewer trunk lines have been sized based on these estimates. This report represents a change to the current City of Mesa Sewer Master Plan to account for the future SR 24 Freeway and the proposed PPGN site.

This report has addressed PPGN as a whole; however, each DU will be required to prepare its own Master Sewer Plan to address final densities and layouts specific to that particular Development Unit Plan (DUP).

This report does not address how the site will be phased as there are many factors that will shape the phasing and development of this area. In some cases, a phase of development may require extension of facilities outside or beyond that phase of construction. Phasing of sewer improvements will be addressed with each DUP.



Harvard Investments
Pacific Proving Grounds North Site

Master Sewer Report
for
Harvard Investments

City of Mesa, Arizona

Reviewed ENSR
11/17/14
Steph Garston



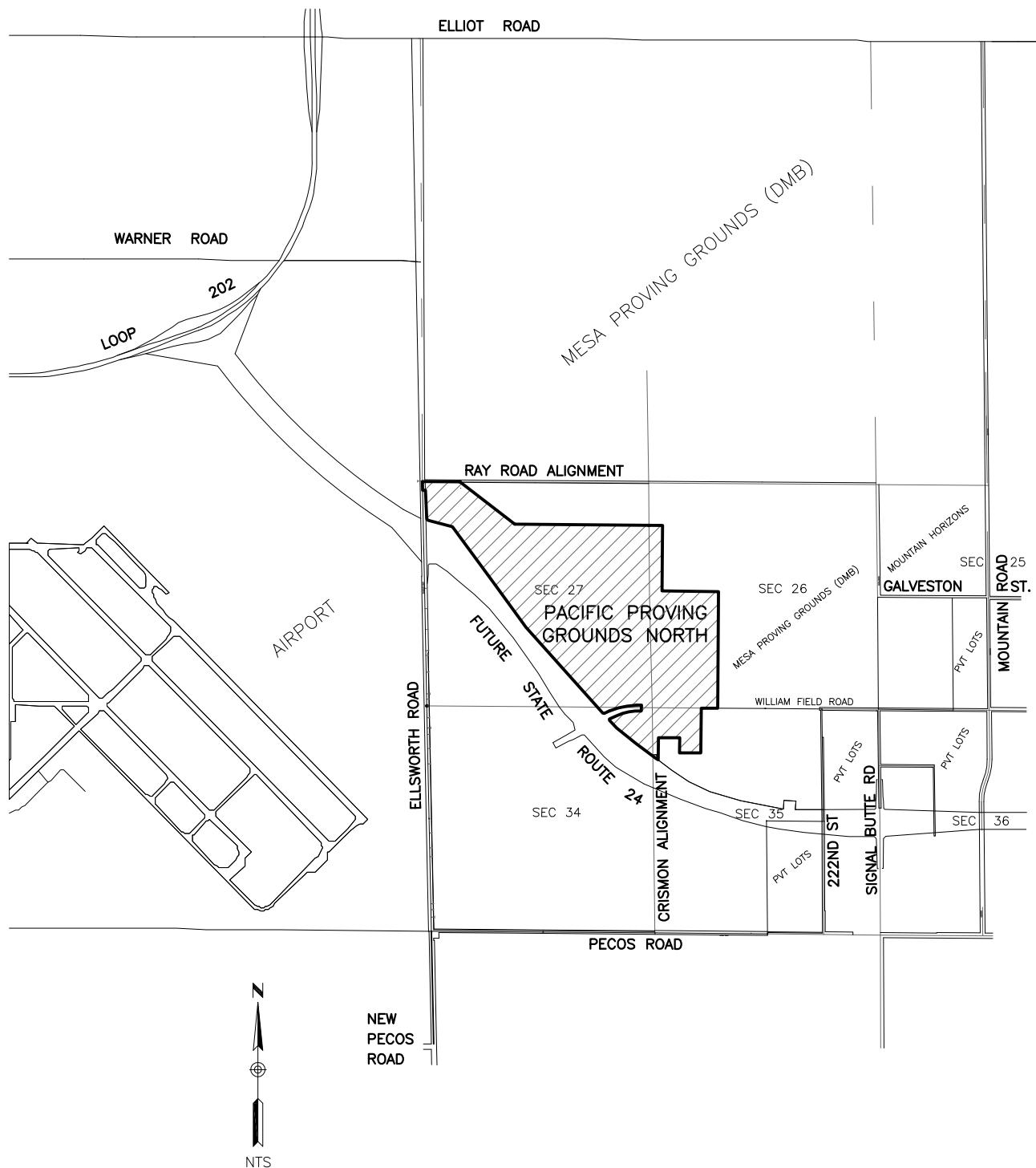
Project No. 11-007

Date: October, 2011
Revised: March, 2012
Revised: August 2014

2045 S. Vineyard Avenue, Suite 101
Mesa, AZ 85210
o: 480.503.2250
f: 480.503.2258

EXHIBIT I

VICINITY MAP



EXHBT

Project: **PACIFIC PROVING GROUNDS NORTH OWNERSHIP MAP**
Mesa, Arizona

VICINITY MAP

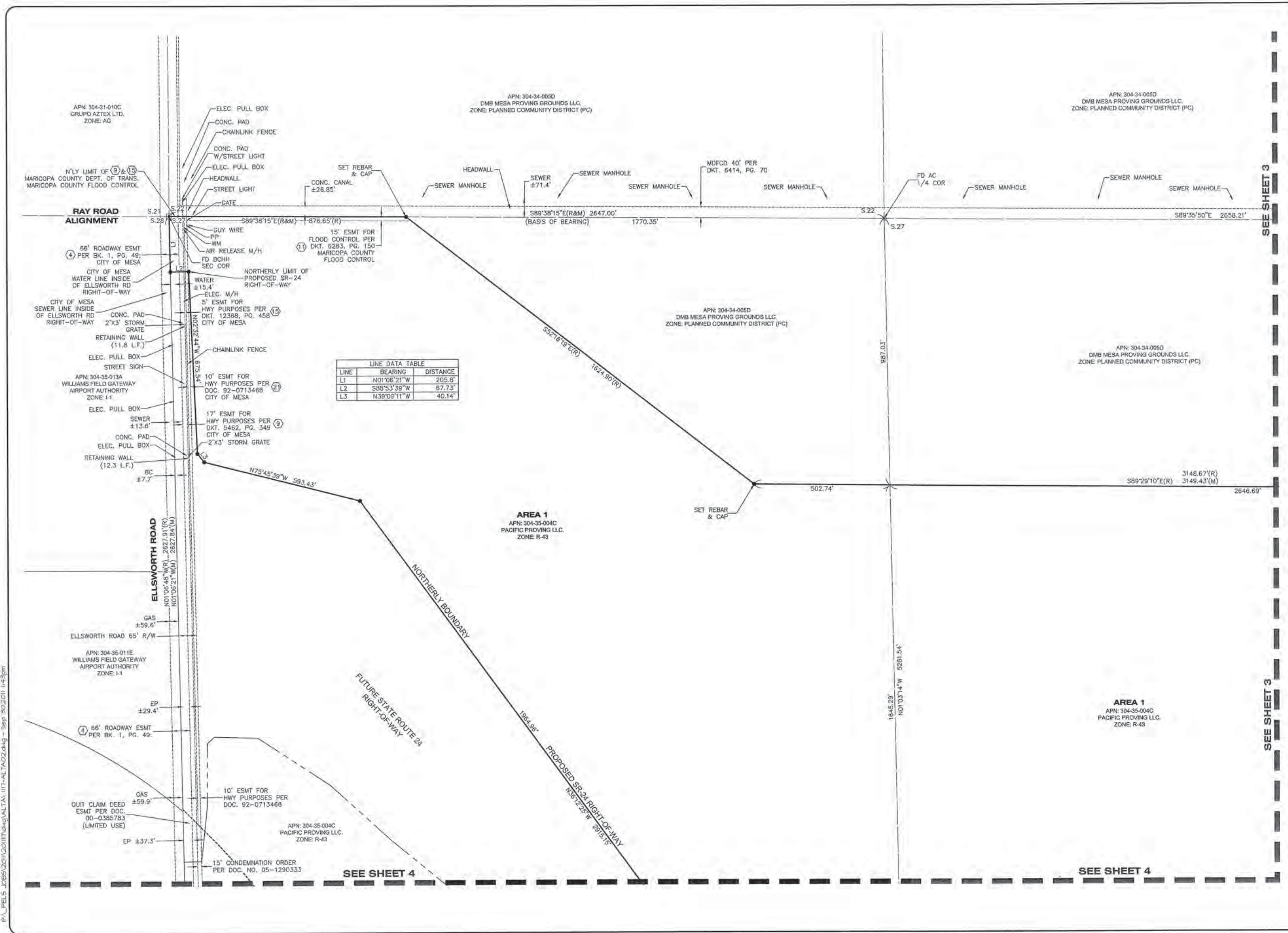


eps group, Inc.
Engineers, Planners & Surveyors

2045 S. Vineyard, Ste. 101, Mesa, Arizona 85210
Phone (480) 503-2250 Fax (480) 503-2258

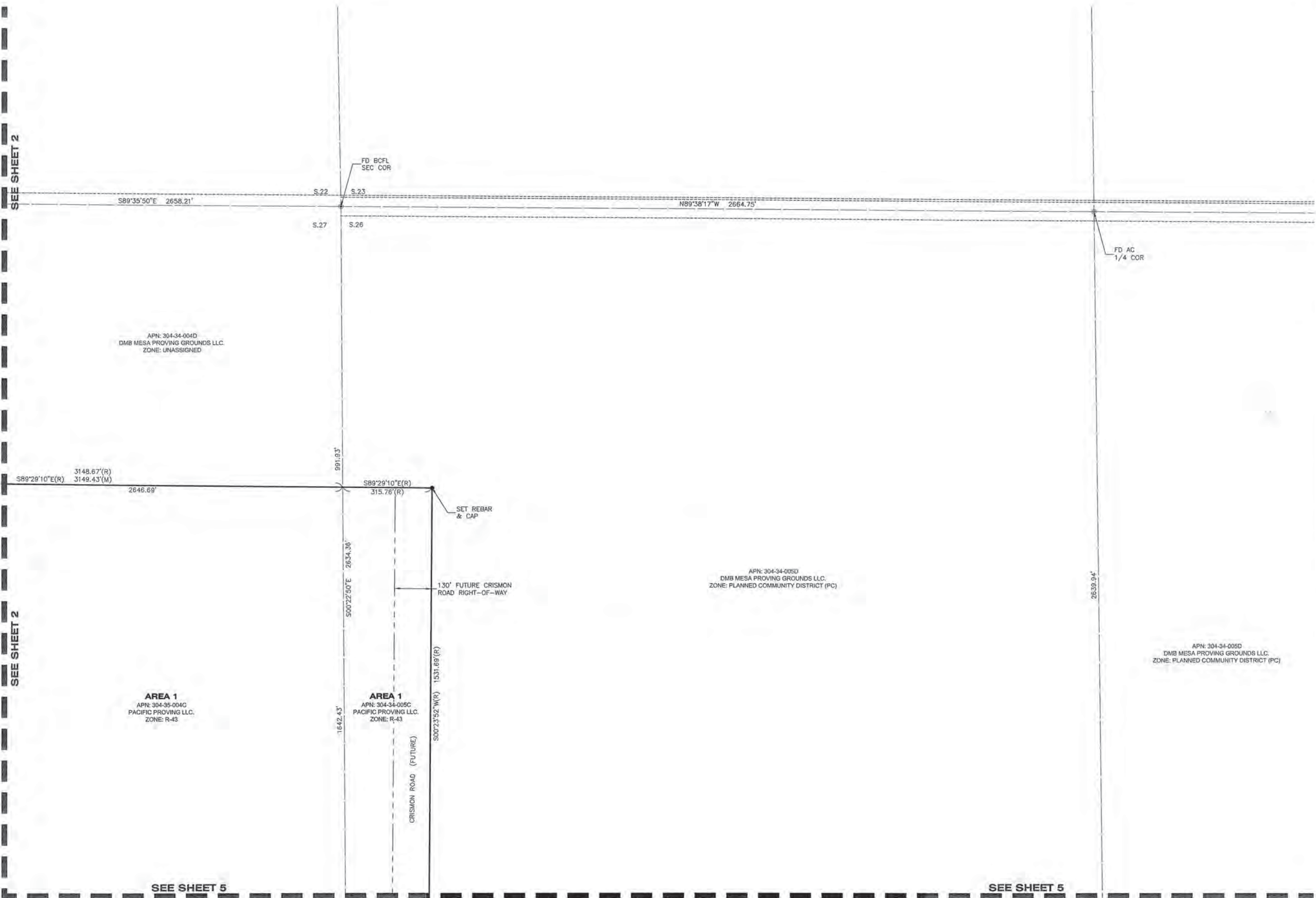
EXHIBIT 2

ALTA SURVEY



LINE	BEARING	DISTANCE
L1	N01°06'21"W	205.8'
L2	S88°53'39"W	67.73'
L3	N39°09'11"W	40.14'

SEE SHEET 2



CLIENT HARVARD INVESTMENTS 17700 N. PACSETT WAY SCOTTSDALE, ARIZONA 85255 TEL 480-348-1118 FAX 480-348-8976	ALTA / ACSM LAND TITLE SURVEY A PORTION OF THE OLD GM PROVING GROUND MESA, ARIZONA MARICOPA COUNTY	POWER ENGINEERING & LAND SURVEYING, LLC P.E.L.S. • ENGINEERING • LAND SURVEYING • URBAN DESIGN • CONSTRUCTION SURVEYING 252 NORTH STAPLEY DRIVE MESA, ARIZONA 85203 (480) 487-2666 TEL (480) 969-8652 FAX	REV. NO. DESCRIPTION
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www.stake.com

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DRAWN: NRS

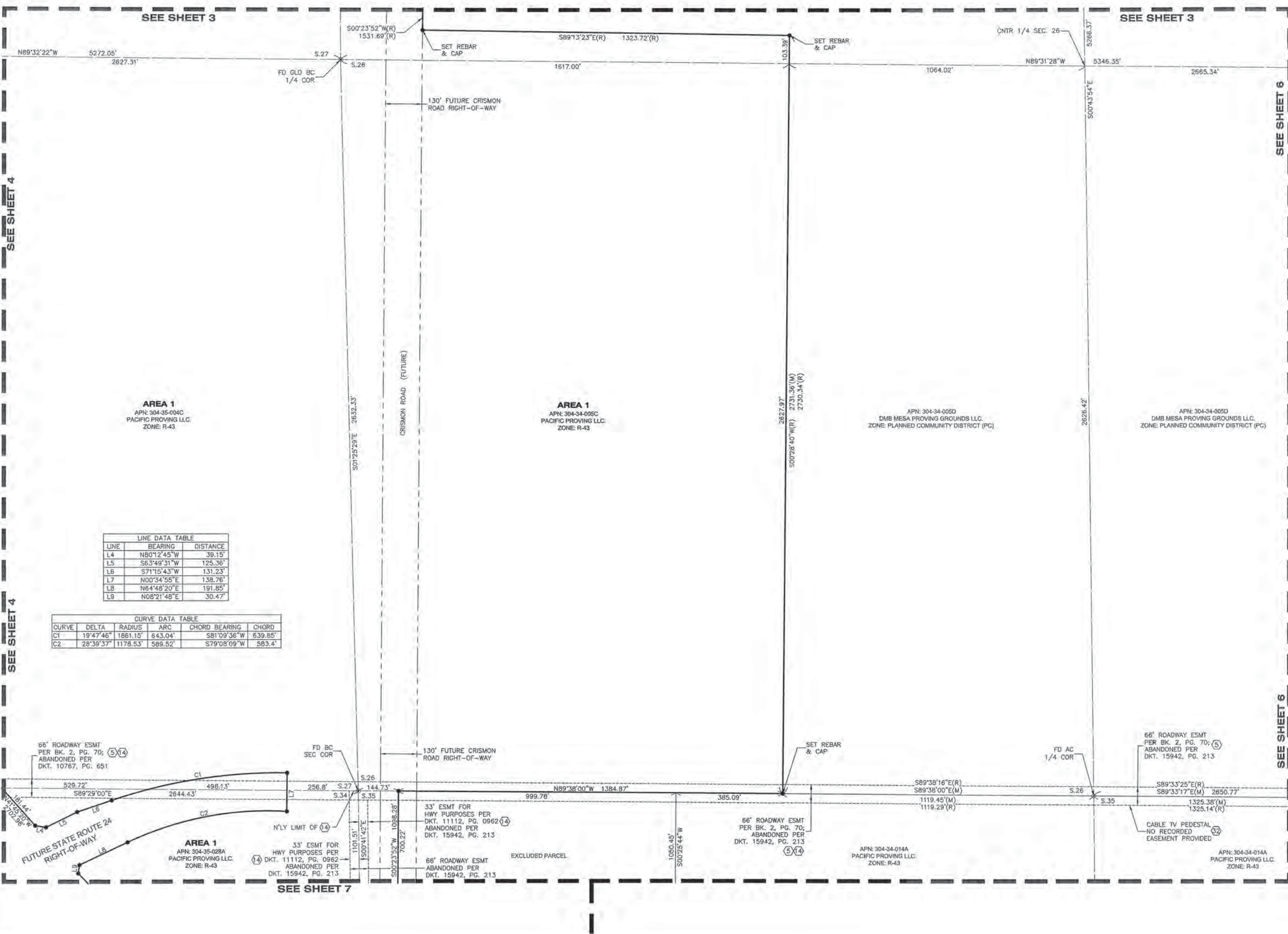
MADE IN THE U.S.A.
CERTIFICATE NO.
24532
PHILLIP W.
ROSENDAHL
9-30-11
ALABAMA, U.S.A.

EXP: 3/31/2012

PROJECT NO.
201117

DATE: 09-30-11

SHEET
5
5 OF 7



P:\P.E.L.S. JOBS\2011\0117\ALTA.dwg - Sep 30, 2011 11:44pm

SEE SHEET 5

SEE SHEET 5

66' ROADWAY ESMT
PER BK. 2, PG. 70;
ABANDONED PER
DKT. 15942, PG. 213

5' POWER ESMT PER
DKT. 10858, PG. 142
SALT RIVER PROJECT
EASEMENT

APN: 304-34-005D
DMB MESA PROVING GROUNDS LLC.
ZONE: PLANNED COMMUNITY DISTRICT (PC)

APN: 304-34-005D
DMB MESA PROVING GROUNDS LLC.
ZONE: PLANNED COMMUNITY DISTRICT (PC)

APN: 304-34-017U
NANCY A. GROH
ZONE: R-43

66' ROADWAY ESMT
PER BK. 2, PG. 70;
PER DOC. NO. 04-0641345

APN: 304-34-025
NANCY A. GROH
ZONE: R-43

E'LY LIMIT OF 14
FOUND GLO BC
SEC COR
(P.O.B. AREA 2)

WILLIAMS FIELD ROAD

APN: 304-34-021W
DEMURE PROPERTIES
ZONE: AG

AREA 2
APN: 304-34-003S
PACIFIC PROVING LLC.
ZONE: R-43

APN: 304-34-212
PULTE HOME CORPORATION
ZONE: R-9

66' ROADWAY ESMT
PER BK. 2, PG. 70;
PER DOC. NO. 04-0641345

65' WILLIAMS FIELD
ROAD R/W

APN: 304-34-021Z
DEMURE PROPERTIES
ZONE: AG

APN: 304-34-038
MARILYN A. LANDE
ZONE: R-43

APN: 304-34-060
MARILYN A. LANDE
ZONE: R-43

APN: 304-34-058F
ROBERT R. ARAVE
ZONE: R-43

APN: 304-34-058K
JOSE A. GONZALEZ
ZONE: R-43

APN: 304-34-033A
MICHAEL LOWDERMILK
ZONE: R-43

APN: 304-34-040K
DARRIN J. JOHNSON
ZONE: R-43

APN: 304-34-040B
WESLEY G. KING
ZONE: R-43

APN: 304-34-040C
MICHAEL HESS
ZONE: R-43

APN: 304-34-040D
HUNTER G. SMITH
ZONE: R-43

APN: 304-34-047
JAMES C.
HERSHEY JR.
ZONE: R-43

REV. NO.

POWER ENGINEERING
& LAND SURVEYING, LLC
P.E.L.S.
ENGINEERING
LAND SURVEYING
CONSTRUCTION SURVEYING
URBAN DESIGN
14801 422-2466 TEL
14801 959-9582 FAX
352 NORTH STAPLEY DRIVE
MESA, ARIZONA 85203

ALTA / ACSM LAND TITLE SURVEY

A PORTION OF THE OLD GM PROVING GROUND
MESA, ARIZONA
MARICOPA COUNTY

CLIENT
HARVARD INVESTMENTS
17700 N. PACESETTER WAY
SCOTTSDALE, ARIZONA 85255
TEL 480-348-1118
FAX 480-348-8976

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www.stake-it.com

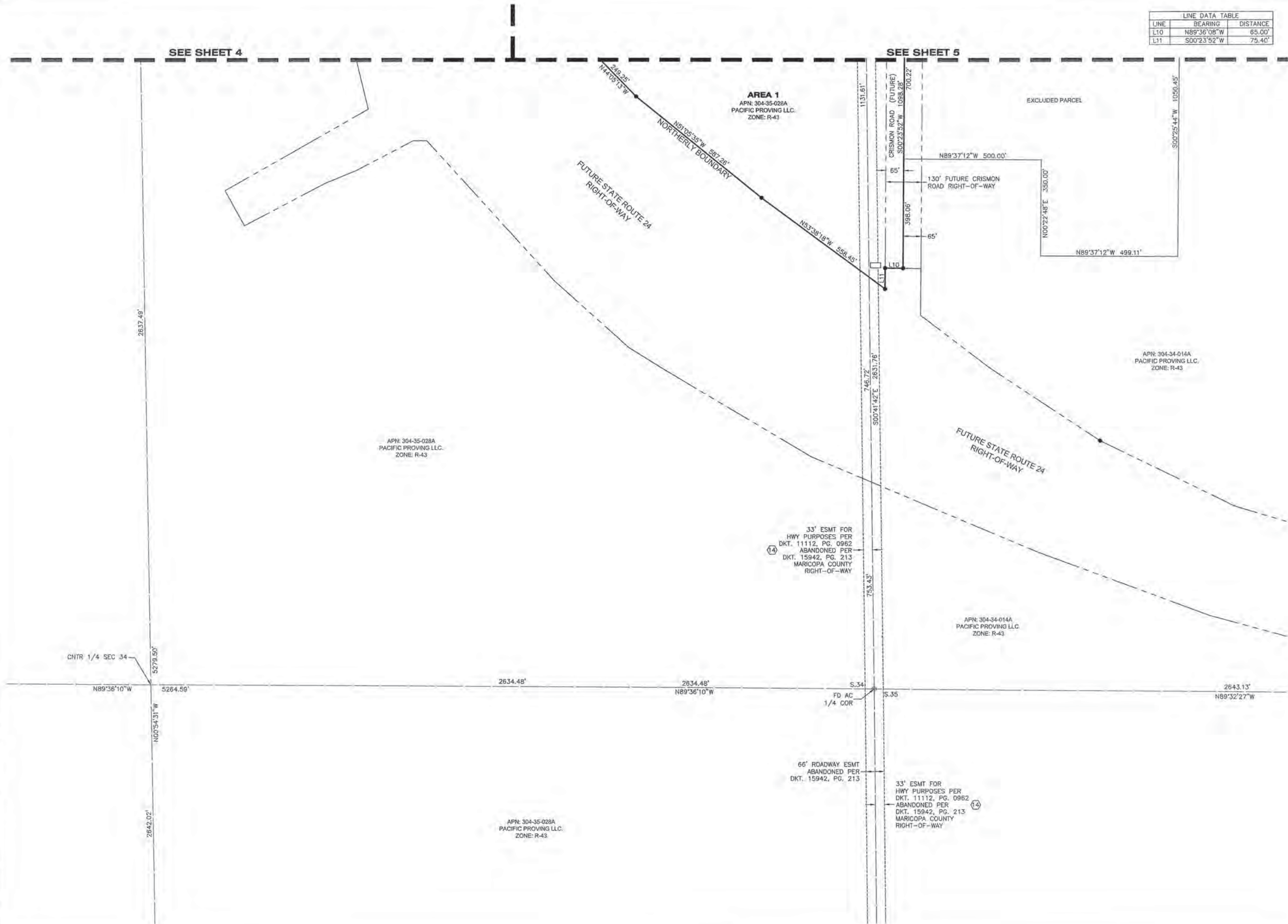
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DRAWN: NRS



PROJECT NO.
201117
DATE: 09-30-11

SHEET
6
OF 7

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LINE DATA TABLE		
LINE	BEARING	DISTANCE
L10	N89°36'08"W	65.00'
L11	S00°23'52"W	75.40'

POWER ENGINEERING
& LAND SURVEYING, LLC
P.E.L.S.
• ENGINEERING
• LAND SURVEYING
• URBAN DESIGN
• CONSTRUCTION SURVEYING
329 NORTH STABLEY DRIVE
MESA, ARIZONA 85205
(480) 427-2468 TEL
(480) 969-3862 FAX

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MARICOPA COUNTY

CLIENT
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17700 N. PUEBLO AVE
SCOTTSDALE, ARIZONA 85255
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FAX 480-348-8976

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www.stake-it.com

DESIGN: N/A
DRAWN: NRS



PROJECT NO.
201117
DATE: 09-30-11

SHEET
7
7 OF 7

EXHIBIT 3

DMB MESA PROVING GROUNDS MASTER SEWER EXHIBIT

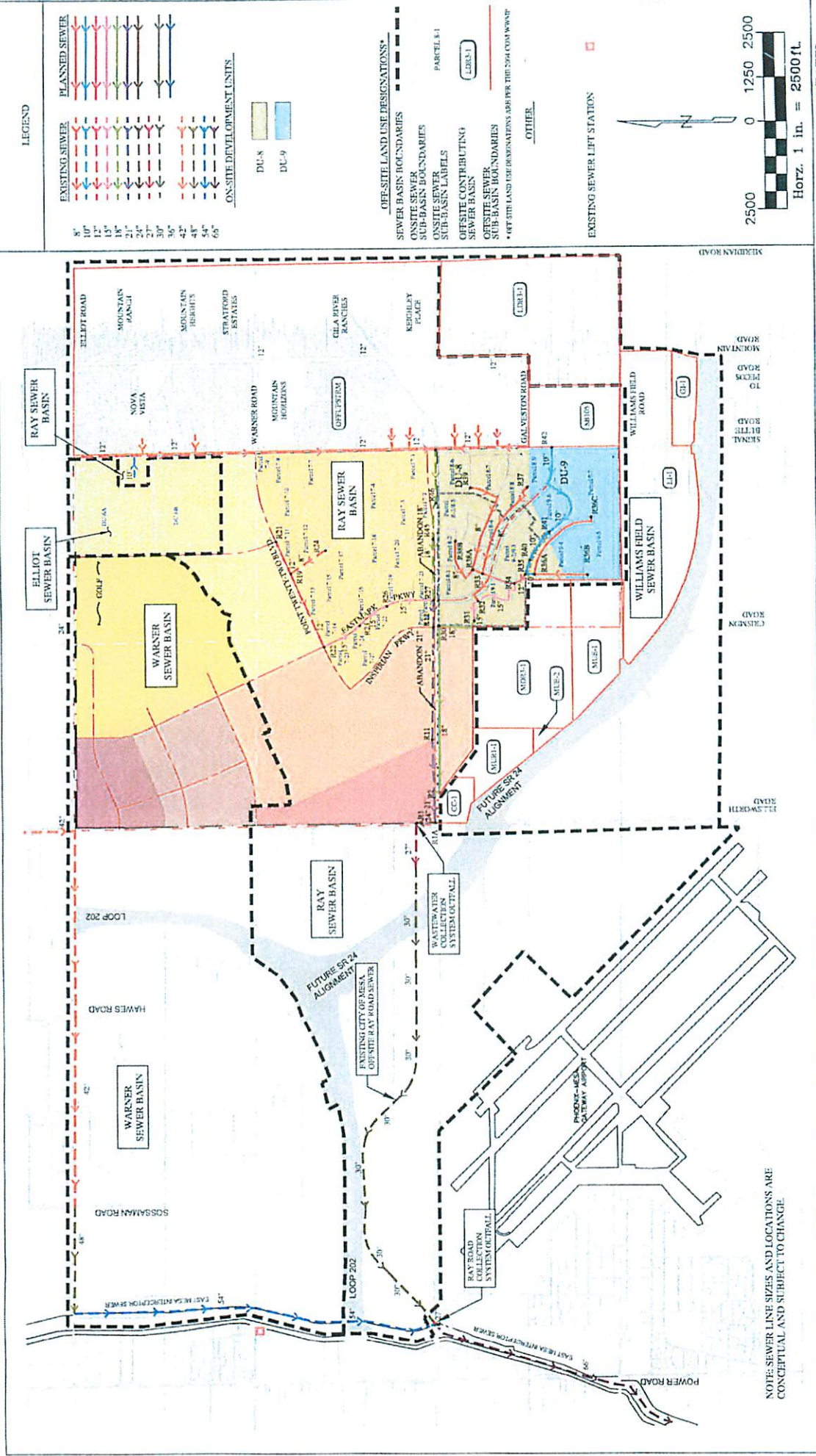


PLATE 2 - MASTER SEWER EXHIBIT, FULL BUILD OUT CONDITION

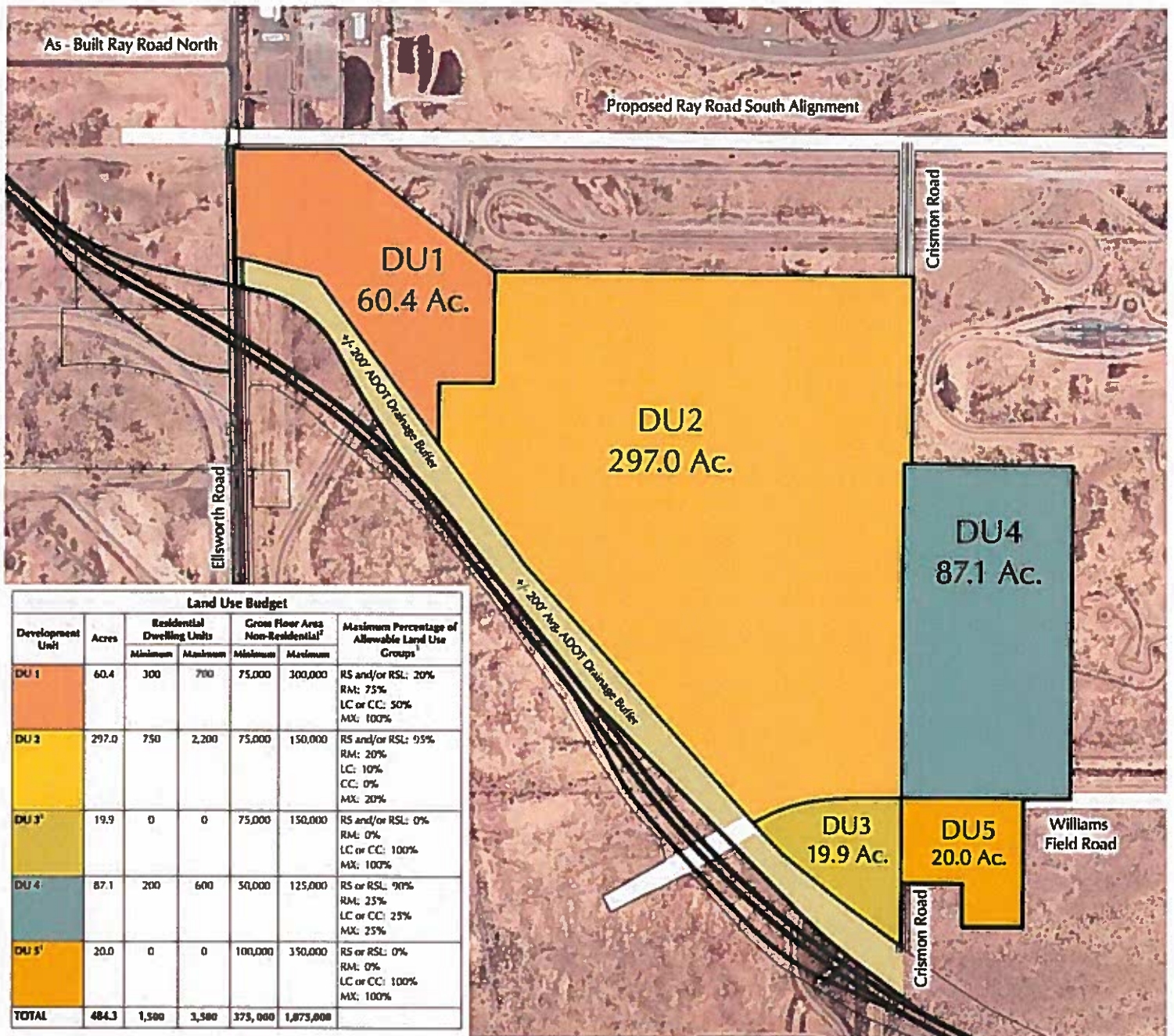
EASTMARK
MESA, ARIZONA

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WOODPATTEL
PLANNING & ENGINEERING
2220 South Country Club Drive
Mesa, AZ 85210
(480) 844-3000
www.woodpatte.com

EXHIBIT 4

PACIFIC PROVING GROUNDS CONCEPTUAL FRAMEWORK PLAN

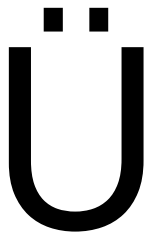
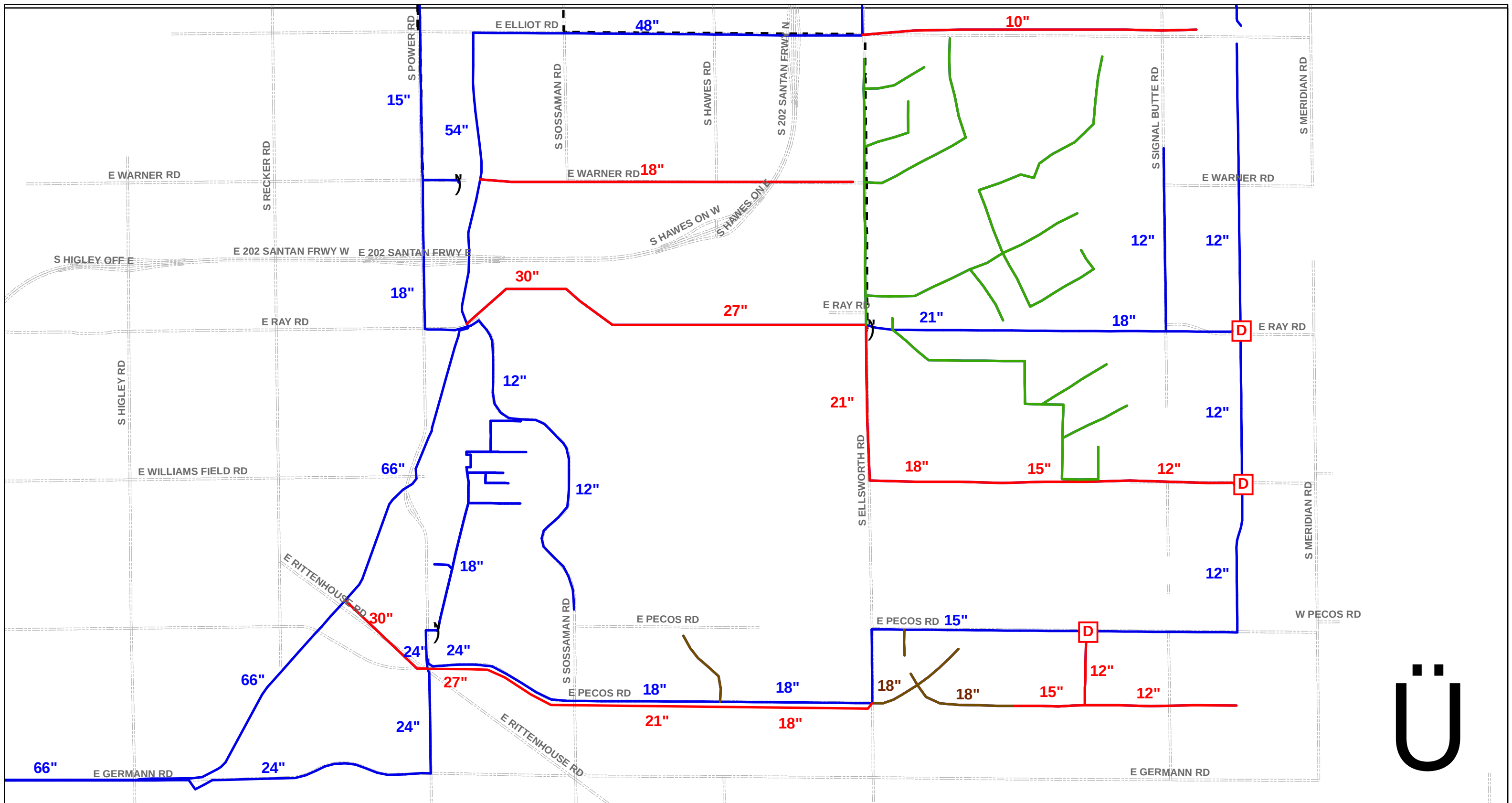


Development Unit Plan

M E S A , A R I Z O N A
PACIFIC PROVING GROUNDS NORTH

EXHIBIT 5

CITY OF MESA GATEWAY AREA SEWER IMPROVEMENTS MASTER PLAN



- | | |
|--------------------------------|---------------------------------|
| — Existing Gravity Sewer | — Proposed DMB Improvements |
| - - - Existing Force Main | — Proposed Paragon Improvements |
| J Existing Lift Station | — Future Improvements |
| D Proposed Diversion Structure | |

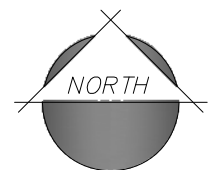
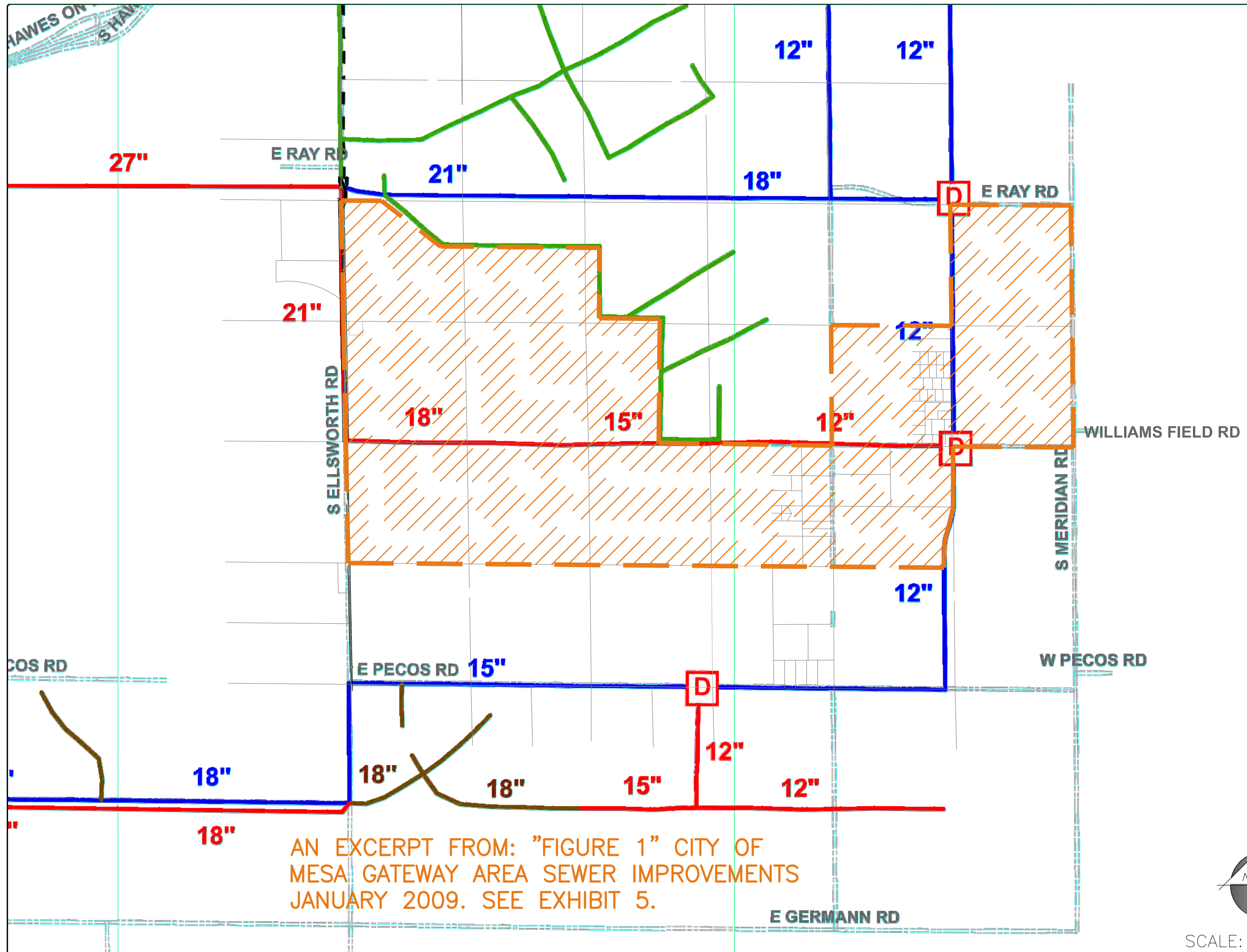
FIGURE 1
 City of Mesa
 Gateway Area Sewer Improvements

January 2009

EXHIBIT 6

EXISTING WILLIAMS FIELD SEWER BASIN

11-007



SCALE: 1"=2000'

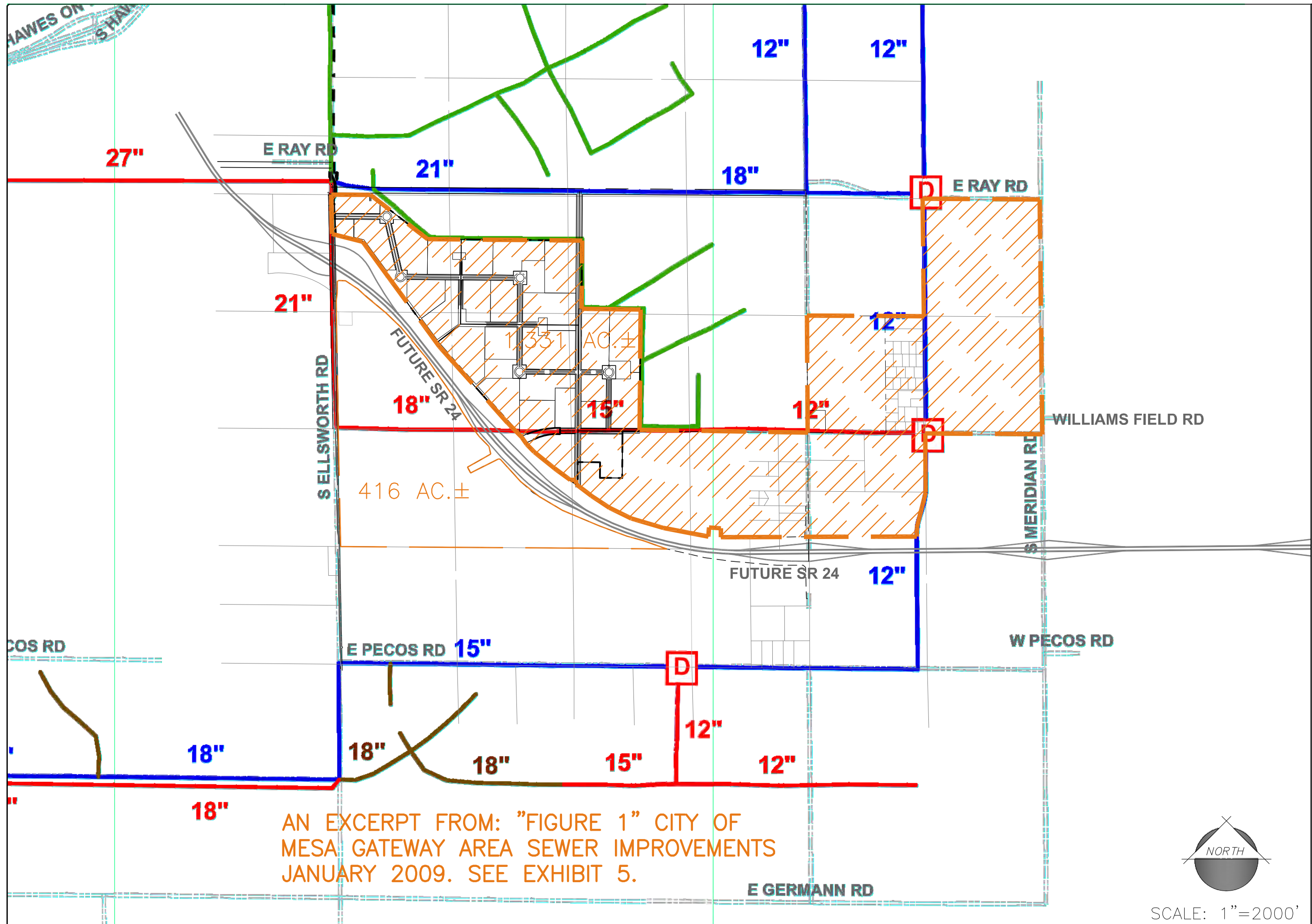
EXHIBIT 7

ADJUSTED WILLIAMS FIELD SEWER BASIN

and

ALTERNATE WILLIAMS FIELD ROAD SEWER ALIGNMENT

11-007



Sheet No. 1 of 1	Job No. 11-007	Project: PACIFIC PROVING GROUNDS NORTH	Design: BAN Drawn by: BAN	eps group, Inc. Engineers, Planners & Surveyors 2045 S. Vineyard, Ste. 101, Mesa, Arizona 85210 Phone (480) 963-2258 Fax (480) 963-2258

EXHIBIT 8

UNIT SEWER DEMANDS – AVERAGE DAY
SEWER DEMANDS – AVERAGE DAY

Unit Sewer Demands - Average Day

Project:	Pacific Proving Grounds North - Master Sewer Study	
Prepared by:	John McGhee, PE	Date: 7/30/2014

*Summary of City of Mesa Design Criteria

C.O.M. Land Use Classification	Population Density	Units	Unit Demand (GPD / AC)	C.O.M. Defined D.U. / Ac	Assumed D.U. / Ac	Description
BP	8	emp/ac	54	N/A	N/A	Business Park
Com	14	emp/ac	54	N/A	N/A	Commercial
EDU	15	emp/ac	54	N/A	N/A	Educational
ER	3	per d.u.	80	1-2	1.5	Low Density Residential
GI	15	emp/ac	54	N/A	N/A	General Industrial
HDR	1.7	per d.u.	80	15+	20	High Density Residential
LDR	3	per d.u.	80	2-4	3	Medium Density Residential
LI	7	emp/ac	54	N/A	N/A	Light Industrial
LMDR	3.2	per d.u.	80	4-6	5	Medium Density Residential
MDR	2.7	per d.u.	80	6-10	8	Medium Density Residential
MHDR	2	per d.u.	80	10-15	12.5	High Density Residential
MUR	1.7	per d.u.	80	N/A	12.5	Mixed Use Residential

Sewer Demands - Average Day

Project: Pacific Proving Grounds North - Master Sewer Study

Prepared by: John McGhee, PE

Date: 8/18/2014

Parcel ID	PPGN Residential Parcels			Other PPGN Parcels and Offsite Areas						Average Day Demands	
	Assumed D.U.	Population Density	Unit Demand (GPD/DU)	C.O.M. Land Use Class	Area ⁽¹⁾ (acre)	Population Density	Units	Unit Demand (GPD)	Assumed D.U. / Ac	Average Day Flow (GPD)	Average Day Flow (MGD)
DU1-A				Com	10.8	14.0	emp/ac	54	N/A	8,165	0.008
DU1-B				Com	4.3	14.0	emp/ac	54	N/A	3,251	0.003
DU1-C				Com	15.3	14.0	emp/ac	54	N/A	11,567	0.012
DU1-D	458	1.7	80							62,288	0.062
DU2-A	129	2.7	80							27,821	0.028
DU2-B	130	2.7	80							28,166	0.028
DU2-C	136	2.7	80							29,376	0.029
DU2-D	122	2.7	80							26,438	0.026
DU2-E	163	2.7	80							35,251	0.035
DU2-F	190	2.7	80							40,954	0.041
DU2-G	200	2.7	80							43,200	0.043
DU2-H	124	2.7	80							26,784	0.027
DU2-I	130	2.7	80							28,166	0.028
DU2-J	193	2.7	80							41,645	0.042
DU2-K	146	2.7	80							31,622	0.032
DU2-L				EDU	12.1	15.0	emp/ac	54	N/A	9,801	0.010
DU2-M	238	2.7	80							51,322	0.051
DU2-N	136	2.7	80							29,376	0.029
DU2-O	126	2.7	80							27,302	0.027
DU2-P				Com	9.4	14.0	emp/ac	54	N/A	7,106	0.007
DU3-A				Com	16.1	14.0	emp/ac	54	N/A	12,172	0.012
DU4-A				Com	7.7	14.0	emp/ac	54	N/A	5,821	0.006
DU4-B	74	2.7	80							16,070	0.016
DU4-C	187	2.7	80							40,435	0.040
DU4-D	193	2.7	80							41,645	0.042
DU4-E	166	2.7	80							35,942	0.036
DU5-A				COM	16.2	14.0	emp/ac	54	N/A	12,247	0.012
Offsite 1				LI	89.9	7.0	emp/ac	54	N/A	33,982	0.034
Offsite 2				LI	68.8	7.0	emp/ac	54	N/A	26,006	0.026
Offsite 3				LI	110.7	7.0	emp/ac	54	N/A	41,845	0.042
Offsite 4				GI	100.2	15.0	emp/ac	54	N/A	81,162	0.081
Offsite 5 ⁽²⁾				LDR	105.9	3.0	per d.u.	80	3.0	0	0.000
Offsite 6				LDR	53.0	3.0	per d.u.	80	3.0	38,160	0.038
Offsite 7				ER	158.7	3.0	per d.u.	80	1.5	57,132	0.057
Offsite 8				ER	158.9	3.0	per d.u.	80	1.5	57,204	0.057
Total										1,069,426	1.07

⁽¹⁾ Areas have been reduced from those in the the Land Use Budget to account for right of way and open space areas

⁽²⁾ Offsite 5, which includes SBI05, has been removed from this study. The Eastmark Master Sewer report (Prepared by Wood Patel & Assoc., Inc., dated 1/15/2014) was revised to capture Offsite 5, which is now sewered to the Ray Road sewerline.

EXHIBIT 9

PEAK DAILY SEWER FLOWS AND PIPE CAPACITY

Peak Daily Sewer Flows (Wet Weather) and Pipe Capacity Using Manning's Equation

Project: Pacific Proving Grounds North - Master Sewer Study

Prepared by: John McGhee, PE

Date: 8/18/2014

Sewer Pipe Information										Flow Information		Peak Demand Information					Full Flow Check		Non-Pressurized Flow Calculations						
up- stream Node	Down- stream Node	Length (ft)	Pipe Diameter (in)	Upstream Invert	Downstream Invert	Slope (ft/ft)	Manning's Roughness	Upstream Manhole Rim Elevation	Cover at Upstream Manhole	Additional Contributing Parcels	Additional Estimated Daily Flow (GPD)	Cumulative Daily Flow (GPD)	Peaking Factor	Peak Demand (GPD)	Peak Demand (MGD)	Peak Demand (cfs)	Full Flow Capacity (cfs)	Pressurized Flow?	Theta of flow (rad)	Depth of Flow (ft)	Percent Full (d/D)	Area of Flow (ft²)	Wetted Perimeter of flow (ft)	Velocity of Flow (fps)	
21	20	2657	10	1429.38	1418.22	0.0042	0.013	1448.62	20.1	Offsite 7, 8	114,336	114,336	3.0	343,008	0.343	0.531	1.42	NO	2.83	0.35	42%	0.2193	1.180	2.42	
20	19	874	10	1418.12	1414.45	0.0042	0.013	1446.55	29.3	Offsite 6	38,160	152,496	3.0	457,488	0.457	0.708	1.42	NO	3.13	0.42	50%	0.2715	1.306	2.61	
19	18	1756	15	1414.03	1409.11	0.0028	0.013	1441.91	29.1	Offsite 4 **	81,162	233,658	3.0	700,974	0.701	1.085	3.43	NO	2.68	0.48	39%	0.4378	1.677	2.48	
18	17	1341	15	1409.01	1405.26	0.0028	0.013	1431.83	24.1	Offsite 3	41,845	275,503	3.0	826,508	0.827	1.279	3.43	NO	2.83	0.53	42%	0.4939	1.770	2.59	
17	16	1233	15	1405.16	1401.71	0.0028	0.013	1426.44	22.5	Offsite 2	26,006	301,509	3.0	904,527	0.905	1.400	3.43	NO	2.92	0.56	44%	0.5278	1.826	2.65	
16	15	987	15	1401.61	1398.84	0.0028	0.013	1421.99	21.6	---	---	301,509	3.0	904,527	0.905	1.400	3.43	NO	2.92	0.56	44%	0.5278	1.826	2.65	
15	14	910	15	1398.74	1396.19	0.0028	0.013	1417.41	19.9	Offsite 1	33,982	335,491	3.0	1,006,474	1.006	1.557	3.43	NO	3.03	0.59	47%	0.5713	1.896	2.73	
14	13	697	15	1396.09	1394.14	0.0028	0.013	1413.24	18.4	DU5-A	12,247	347,738	3.0	1,043,215	1.043	1.614	3.43	NO	3.07	0.60	48%	0.5867	1.920	2.75	
13	12	1320	15	1394.04	1391.93	0.0016	0.013	1404	11.2	DU2-P, DU3-A, DU4-A, DU4-B, DU4-E	77,112	424,850	3.0	1,274,551	1.275	1.972	2.59	NO	3.76	0.82	65%	0.8487	2.352	2.32	
12	11	1320	18	1391.68	1389.57	0.0016	0.013	1411.82	21.6	DU2-K, DU2-N, DU2-O, DU4-C, DU4-D	170,381	595,231	3.0	1,785,694	1.786	2.763	4.21	NO	3.51	0.89	59%	1.0864	2.630	2.54	
11	10	1068	18	1389.47	1387.76	0.0016	0.013	1406.37	18.4	DU2-J, DU2-L, DU2-M	102,767	697,999	3.0	2,093,996	2.094	3.240	4.21	NO	3.78	0.99	66%	1.2322	2.837	2.63	
10	9	1037	18	1387.66	1385.86	0.0017	0.013	1408.55	22.4	DU2-F, DU2-G	84,154	782,152	3.0	2,346,457	2.346	3.631	4.39	NO	3.94	1.04	67%	1.3082	2.953	2.78	
9	8	638	21	1385.61	1383.98	0.0026	0.013	1411.75	27.9	DU2-E, DU2-H	62,035	844,187	3.0	2,532,562	2.533	3.918	8.03	NO	3.11	0.86	49%	1.1808	2.724	3.32	
8	7	678	21	1383.98	1382.45	0.0023	0.013	1410.69	28.5	DU2-D, DU2-I	54,605	898,792	3.0	2,696,377	2.696	4.172	7.55	NO	3.27	0.93	53%	1.2972	2.857	3.22	
7	6	690	21	1382.45	1380.91	0.0022	0.013	1408.05	27.3	DU2-A, DU2-C	57,197	955,989	3.0	2,867,967	2.868	4.437	7.51	NO	3.35	0.97	55%	1.3651	2.935	3.25	
6	5	677	21	1380.91	1380.02	0.0013	0.013	1403.67	24.5	DU2-B	28,166	984,155	3.0	2,952,466	2.952	4.568	5.76	NO	3.85	1.18	67%	1.7198	3.365	2.66	
5	4	817	21	1380.02	1378.96	0.0013	0.013	1400.54	22.3	DU1-D	62,288	1,046,443	2.5	2,616,109	2.616	4.048	5.72	NO	3.63	1.09	62%	1.5689	3.176	2.58	
4	3	567	21	1378.96	1377.67	0.0023	0.013	1399.99	22.8	---	---	1,046,443	2.5	2,616,109	2.616	4.048	7.58	NO	3.22	0.91	52%	1.2640	2.819	3.20	
3	2	615	21	1377.67	1376.79	0.0014	0.013	1398.37	22.4	DU1-C	11,567	1,058,010	2.5	2,645,026	2.645	4.092	6.01	NO	3.57	1.06	61%	1.5228	3.120	2.69	
2	1	564	21	1376.79	1375.67	0.0020	0.013	1392.75	17.7	DU1-A, DU1-B	11,416	1,069,426	2.5	2,673,565	2.674	4.137	7.08	NO	3.34	0.96	55%	1.3530	2.921	3.06	

Notes:

** Offsite 5, which includes SB105, has been removed from this study. The Eastmark Master Sewer report (Prepared by Wood Patel & Assoc., Inc., dated 1/15/2014) was revised to capture Offsite 5, which is now sewered to the Ray Road sewerline.

(1) Highlighted Cell - The removal of Offsite 5 (SB105) reduces the size of the 'Node 9 - Node 10' length from 21 inches to 18 inches.

(2) Slopes and lengths updated to match DU2 Phase 1 Layout / Pre-Plat (Notes 1 to 10)

EXHIBIT 10

MASTER SEWER EXHIBIT

11-007 - PACIFIC PROVING GROUNDS NORTH

