SANDIS

September 30, 2022
Project No. 621021

Tyler Wood, Vice President, Development
Quarterra
492 9th Street, Suite 300
Oakland, CA 94607
Mobile: 510.484.1529
Email: tyler.wood@quarterra.com

RE: LMC MANTECA
DETENTION BASIN CAPACITY REVIEW

Dear Tyler,

The purpose of this letter is to document the review of the existing detention basin located south of E Atherton Drive and to determine if it has sufficient capacity to accommodate the proposed Emblem development.

Study Area

The study area covers approximately 97 acres located in the southern portion of Manteca along Highway 120. Within this area approximately 61 acres will be developed as the LMC Manteca project including single family and multifamily housing. The remaining study area includes existing roadways, existing detention basin, and existing parcels not part of the development but tributary to the existing detention basin.

Detention Basin Size Review

The study area is planned to ultimately drain to the existing detention basin built to the south of E. Atherton Drive. This was determined in 2011 at the time the extension of E. Atherton Drive was designed and the associated city storm drainage infrastructure (see attached Exhibit A). Based on the calculations prepared in 2011 the basin was sized per the following criteria:

- Detain the full volume of the 10-year, 24-hr design storm
- Discharge the volume over a 96-hr period

These criteria are consistent with the 2006 "SSJID City of Manteca Storm Drainage Agreement" and further defined in the "City of Manteca Storm Drain Master Plan", dated 2013. Specifically

See Exhibit B for a copy of the original calculations prepared by MCR Engineering which note a total storage volume of 20.81 ac-ft as required based on a mixture of Commercial and Medium Density Residential land uses.

The proposed development includes less intensive land uses, such as low density residential, and results in a slightly lower total volume of 17.60 ac-ft requirement. This includes the assumption that any remaining undeveloped land within the watershed could be commercial, resulting in the highest amount of run off. See Exhibit C for a summary of the proposed land uses and Exhibit D for the required volume calculations.

Per the Atherton Gap Record documents dated May 29, 2014 the detention basin was constructed with a total storage volume of approximately 20.16 ac-ft, which is larger than the 17.60 ac-ft required. This is based on a high-water level of 33.34 ft, a toe of bank elevation of 24.2 ft, 3:1 side slopes, and a base area of roughly 80,478 sqft. See Exhibit E for an excerpt of the record documents and Exhibit F for a calculation of the volume.

To confirm that the volume is available a topographic survey of the basin was prepared. The results of this survey show that the toe of slope varies from 24.3 to 24.9 feet however the overall basin dimensions and top of bank are essentially the same as the record documents. Some parts of the basin perimeter do not reach the design elevation of 34.34 with the lowest point being 34.05. Assuming the 1-foot freeboard must be maintained the high-water elevation becomes 33.34 and coupled with the higher toe of slope elevation this results in a smaller storage volume, 18.06 ac-ft vs 20.16 ac-ft, however it is still greater than the required volume of 17.60 ac-ft. The topographic survey is attached as Exhibit G and the associated volume calculations as Exhibit H.

Conclusion

The proposed LMC Manteca development is consistent with the design assumptions used to develop the detention basin. Per the calculations and topographic survey the existing detention basin has sufficient capacity to accommodate the proposed LMC Manteca development.

Please feel free to contact us with any questions.

Regards,

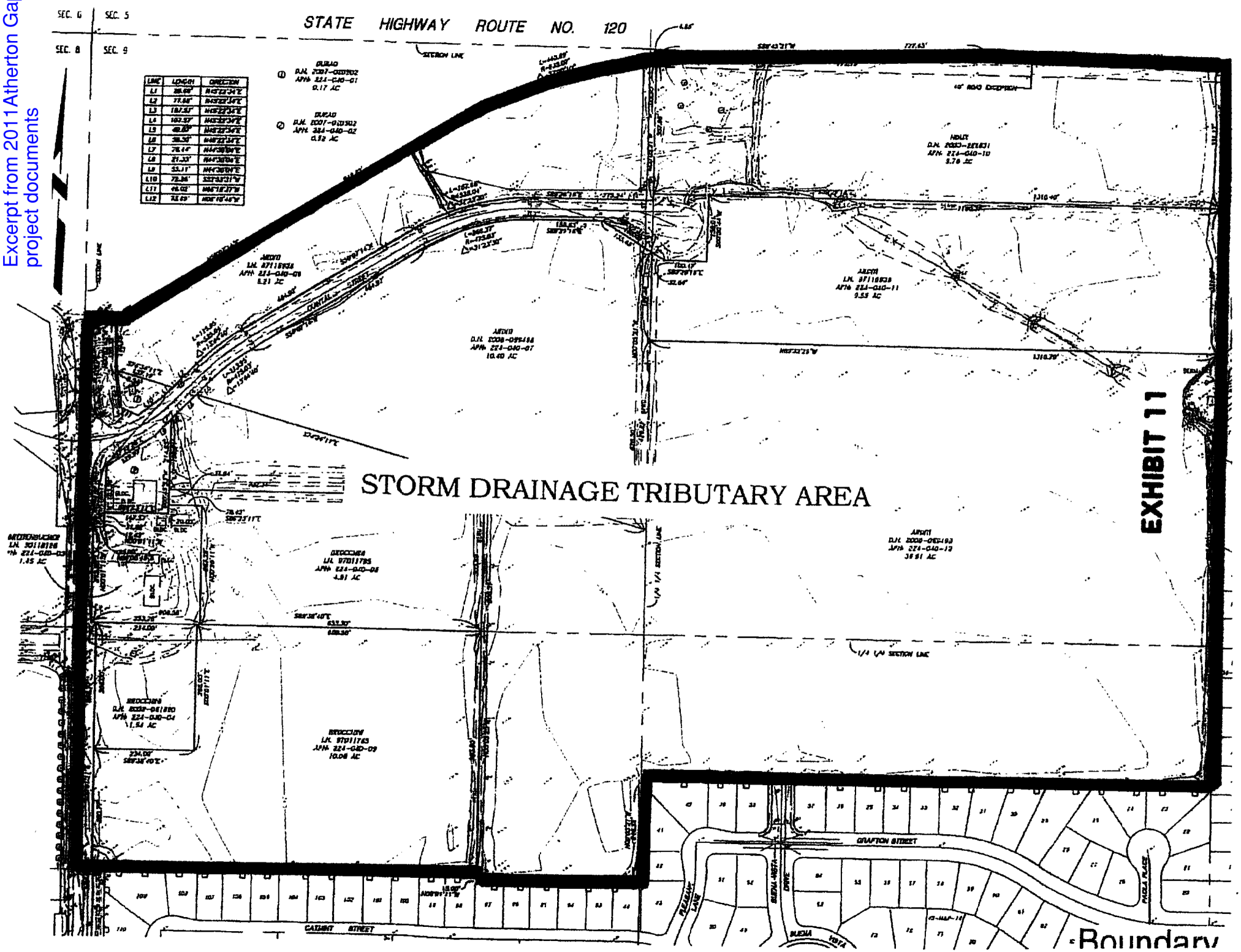
SANDIS

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. KUYKENDALL
No. 70870
Exp. 6/30/23
CIVIL
STATE OF CALIFORNIA

Michael Kuykendall, PE
Director of Engineering

CC: Brian Cancimilla, PE, Sandis Project Manager

EXHIBIT A
Excerpt from 2011Atherton Gap project documents



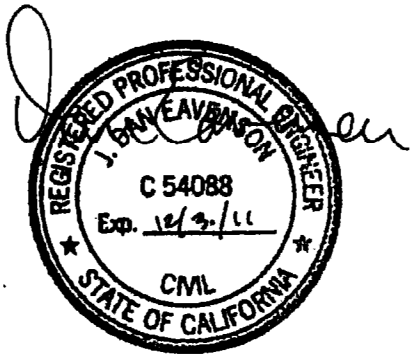
STORM DRAIN CALCULATIONS

ATHERTON DRIVE EXTENSION:

ATHERTON DRIVE AT S. MAIN STREET:
In the City of Manteca, California

Prepared By:

MCR Engineering, Inc.
1242 Dupont Court
Manteca, CA 95336
(209) 239-6229



March 2011

MCR ENGINEERING
1242 Dupont Court
Manteca, CA 95336
(209) 239-6229
FAX (209) 239-8839

JOB	09-021 Atherton Drive		
SHEET	1	OF	1
BY	SLS	DATE	3/10/2011

BASIN - Design Calculations

Per City of Manteca Design Standards

Volume Requirements:

Design Frequency = 10 Year

Runoff, R = 3.56 inches 0.30 ft

	C	I (ft)	A (ac)	V (ac-ft)
Commercial	0.75	0.30	82.23	18.30
Medium Density Res	0.45	0.30	12.26	1.66
Basin	1.00	0.30	2.86	0.86
	Total		97.35	20.81

Required Volume of Storage (100%) = 20.81 ac-ft 906,452 cf

Volume Calculations:

Lowest grate = 33.84 Side Slopes = 3:1

Ground Water Elev = 22.00 Side Slopes = 3:1

Max. W.S.L. = 33.34 Water Surface Area = 115,324 sf

Avg Basin Bottom Elev. = 24.00 Bottom Surface Area = 79,843 sf

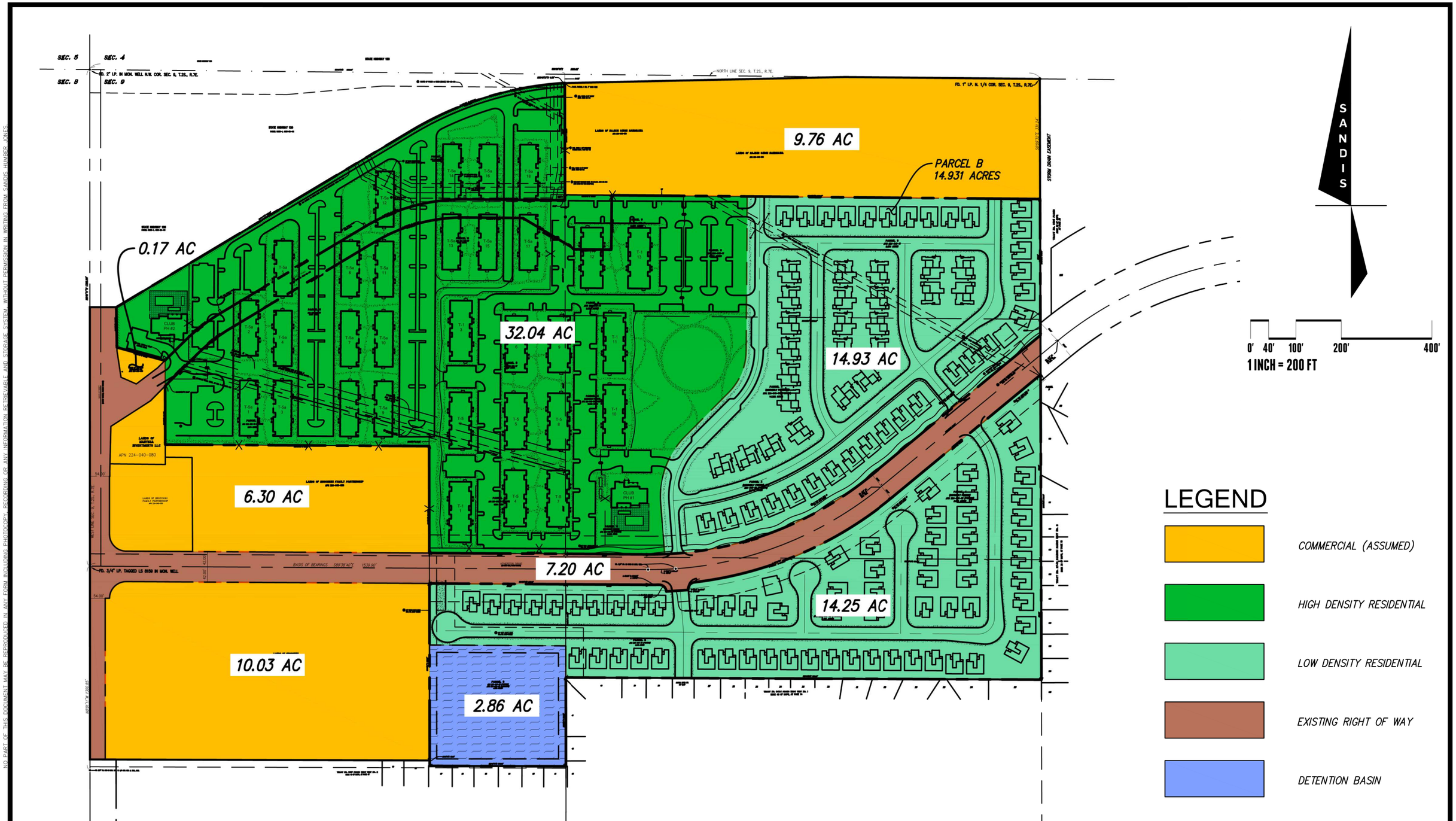
Water Depth = 9.34 ft Average Area = 97,584 sf

Basin Volume = 20.92 ac-ft 911,430 cf

Pump Station Requirements:

Empty Basin in 96 hrs Qreq 2.62 cfs

1,177 gpm



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SANDIS

BUILD ON.
SANDIS.NET

DATE: 09-30-2022
SCALE: 1"=200'
BY: GL
PROJECT No.: 621021

MANTECA

LMC MANTECA
RESIDENTIAL DEVELOPMENT

CALIFORNIA

EXHIBIT C
PROPOSED LAND USE

SHEET

File: X:\P\621021\4_ENGINEERING\5_MODELS + ANALYSIS\STORMWATER\Hydrology Report\Exhibits\Exhibit C - Landuse Areas.dwg Date: Sep 30, 2022 - 3:07 PM

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LMC Manteca
Detention Basin Sizing
9/29/2022

EXHIBIT D

Volume Requirements, per section 3.7.3 of 2013 SDMP:

Design Frequency =	10	year	
Rainfall Depth, R =	3.56	inches	0.30 ft

2011 Calculations

From Atherton Gap Closure project

	C	I (ft)	A (ac)	V (ac-ft)
Commercial	0.75	0.30	82.23	18.30
Medium Density Res	0.45	0.30	12.26	1.64
Basin	1.00	0.30	2.86	0.85
	Total		97.35	20.78

Required Volume of Storage (100%)= 20.78 ac-ft 905,236 cf

Note: The 2011 calculations appear to have a rounding error and state the required volume as 20.81 ac-ft. This difference is nominal and not considered significant

2022 Calculations

	C	I (ft)	A (ac)	V (ac-ft)
Commercial	0.75	0.30	26.26	5.84
High Density Res	0.65	0.30	32.04	6.18
Medium Density Res	0.50	0.30	0	0.00
Low Density Res	0.30	0.30	29.18	2.60
Right of Way	1.00	0.30	7.2	2.14
Basin	1.00	0.30	2.86	0.85
	Total		97.54	17.60

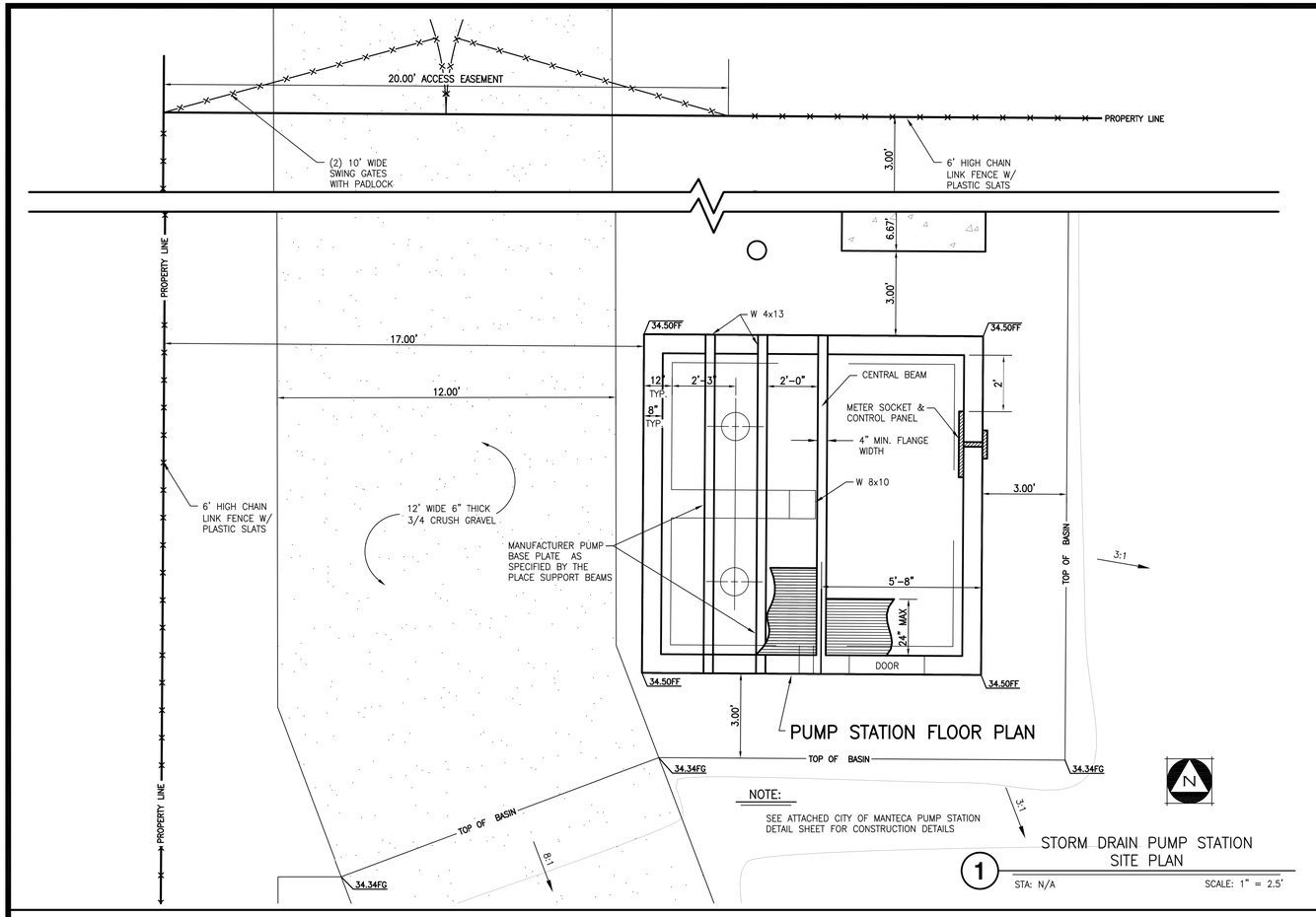
Required Volume of Storage (100%)= 17.60 ac-ft 766,774 cf

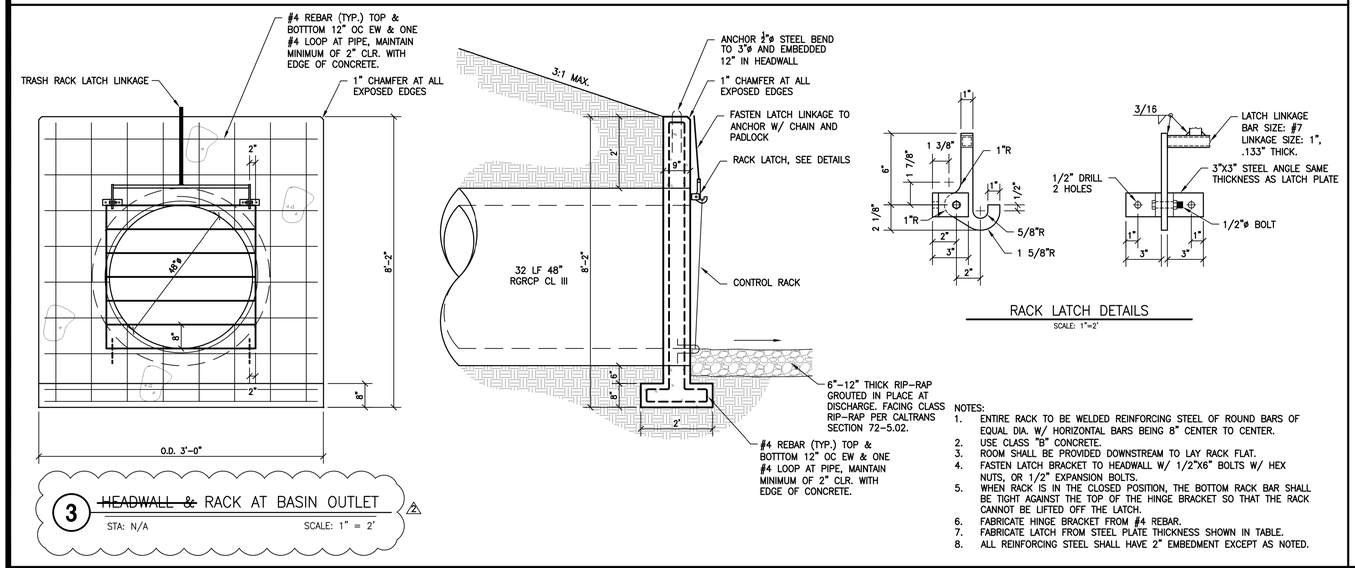
Notes: The runoff coeficients for the 2022 calculations are based on the Storm Drain Master Plan and zoning regulations (see correlation table below).

Correlation of Runoff Coeficients

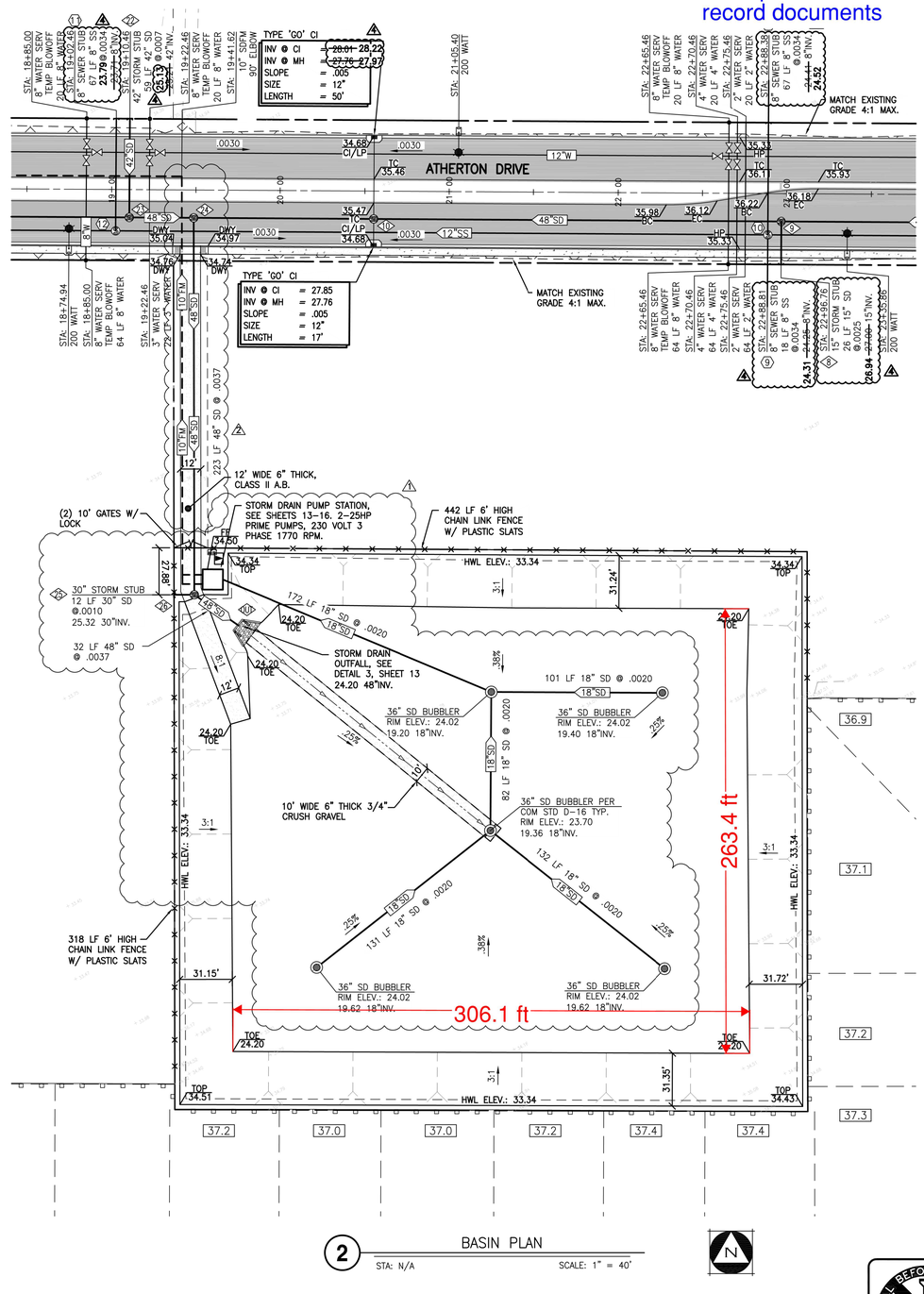
Per Table 3-3 of SDMP		Per Tables 17.20.020-1 and 17.26.020-1		
Land Use	Runoff Coeficient (C)	Equivalent Zoning	Min Density (du/ac)	Max Density (du/ac)
Very Low Density Residential (VLDR)	0.30	R-E	0.5	2
Low Density Residential (LDR)	0.30	R-1	2.1	8
Medium Density Residential (MDR)	0.50	R-2	8.1	15
High Density Residential	0.65	R-3	15.1	25

EXHIBIT E
Excerpt from 2011Atherton Gap record documents





NOTES:
1. ENTIRE RACK TO BE WELDED REINFORCING STEEL OF ROUND BARS OF EQUAL DIA. W/ HORIZONTAL BARS BEING 8" CENTER TO CENTER.
2. USE CLASS "B" CONCRETE.
3. ROOM SHALL BE PROVIDED DOWNSTREAM TO LAY RACK FLAT.
4. FASTEN LATCH BRACKET TO HEADWALL W/ 1/2"X6" BOLTS W/ HEX NUTS, OR 1/2" EXPANSION BOLTS.
5. WHEN RACK IS IN THE CLOSED POSITION, THE BOTTOM RACK BAR SHALL BE TIGHT AGAINST THE TOP OF THE HINGE BRACKET SO THAT THE RACK CANNOT BE LIFTED OFF THE LATCH.
6. FABRICATE HINGE BRACKET FROM #4 REBAR.
7. FABRICATE LATCH FROM STEEL PLATE THICKNESS SHOWN IN TABLE.
8. ALL REINFORCING STEEL SHALL HAVE 2" EMBEDMENT EXCEPT AS NOTED.



BASIN PLAN
STA: N/A
SCALE: 1" = 40'

RECORD DRAWING
BY: Dan Eavenson DATE: 5/29/14

CALL BEFORE YOU DIG USA 800.227.2600

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STORM DRAIN PUMP STATION & CDS DETAILS

CITY OF MANTECA
ATHERTON DRIVE EXTENSION
MANTECA, CALIFORNIA

REVISIONS			
NO.	DESCRIPTIONS	DATE	APPROVED
1	ADDENDUM 1 & 2	3-10-11	
2	PUMP STATION REVISIONS	6-29-12	
3	AMENDED SET OF PLANS	8-6-12	
4	RECORD DRAWINGS	5-29-14	

MCR ENGINEERING
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MCR ENGINEERING, INC.
1242 DUPONT COURT
MANTECA, CA 95336
TEL : (209) 239 - 6229
FAX : (209) 239 - 8839

JOB NO. 09-021
DATE 08/06/2012 15:54
SCALE AS SHOWN
DR. BY SLS
CK. BY JDE
FILE: J:\2009\09-021\dwg\mp phase 1\13_SDPUMP.dwg

REGISTERED PROFESSIONAL ENGINEER J. DAN EAVENSON No. C54088 EXP. 12-31-13 CIVIL STATE OF CALIFORNIA

SHEET NUMBER 13 OF 17

LMC Manteca
Existing Detention Basin Capacity Check (Records)
9/29/2022

EXHIBIT F

Required Volume of Storage (100%)=	17.60	ac-ft	766,774	cf

Volume per record documents

Volume over Base (center) of basin		
High Water Level	33.34	ft
Toe of Slope	24.2	ft
Storage depth	9.14	ft
Width at base	306	ft
Length at base	263	ft
Area at base	80478	sqft

Depth * Base = 735,569 cf

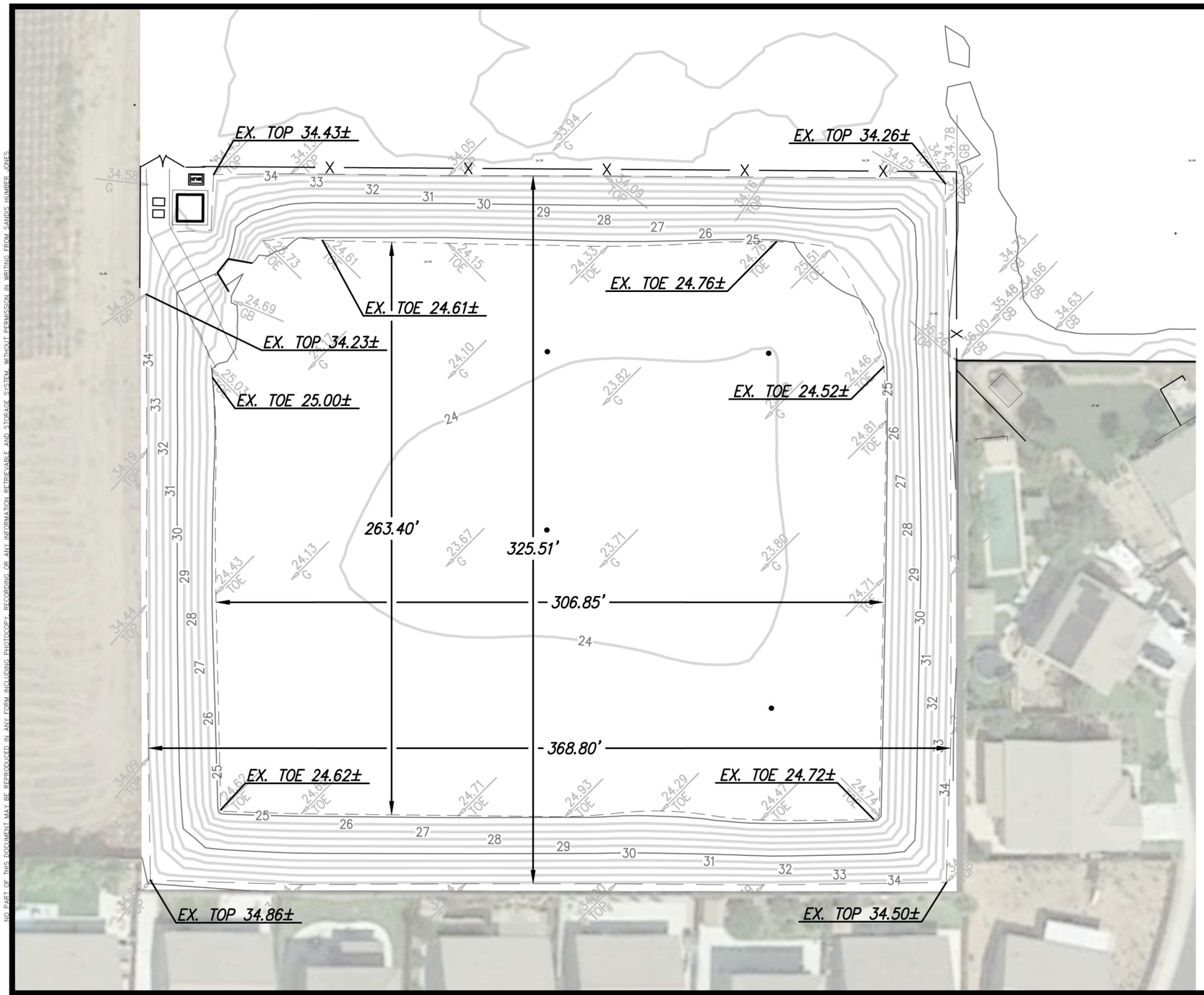
Volume along edges of basin			
Perimeter at base	1138	ft	=2*width + 2* lenght
Length of side slope	27.42	ft	=depth*3
Height of triangle	9.14	ft	=depth

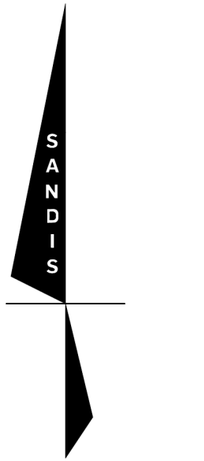
1/2 * length * height * perimeter= 142,602 cf

Total Volume	878,171	cf	20.16	ac-ft

Note:

This calculation neglects the storage gained in the corners of the basin or due to the depression of the basin center and is therfore conservative.





0' 10' 25' 50' 100'

1 INCH = 50 FT

LOWEST TOP ELEVATION	= 34.05'
REQUIRED FREEBOARD	= 1.00'
HIGH WATER LEVEL	= 33.05'
AVERAGE TOE ELEVATION	= 24.74'
WATER DEPTH AT HIGH WATER	= 8.31'
AVERAGE WIDTH (BOTTOM)	= 306.85'
AVERAGE LENGTH (BOTTOM)	= 263.40'

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SCALE:	1"=50'
BY:	SEC
PROJECT No.:	621021

MANTECA

LMC MANTECA RESIDENTIAL DEVELOPMENT

CALIFORNIA

EXHIBIT G EXISTING DETENTION BASIN

EXHIBIT

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LMC Manteca
Existing Detention Basin Capacity Check (Survey)
9/29/2022

EXHIBIT H

Required Volume of Storage (100%)=	17.60	ac-ft	766,774	cf

Volume per survey

Volume over Base (center) of basin			
High Water Level	33.05	ft	1 ft below lowest top of bank elev.
Toe of Slope	24.74	ft	approximate average
Storage depth	8.31	ft	
Width at base	306	ft	average dimension
Length at base	263	ft	average dimension
Area at base	80478	sqft	

Depth * Base = 668,772 cf

Volume along edges of basin			
Perimeter at base	1138	ft	=2*width + 2* lenght
Length of side slope	24.93	ft	=depth*3
Height of triangle	8.31	ft	=depth

1/2 * length * height * perimeter= 117,879 cf

Total Volume	786,651	cf	18.06	ac-ft

Note:

This calculation neglects the storage gained in the corners of the basin or due to the depression of the basin center and is therfore conservative.