

AP - 111

**FACILITY WIDE
BERM &
STORMWATER
REPAIR**

2019

Corner of property:
then berm eroded - need
could back up.

Diversion pond - build
up berms

Berms cut - Repair or ??

Outfall #2 - Erosion, Clean o
basin, sediment, weeds, trash

Additive track
2nd day Contour

East of T716.1 - Near
shed - severe erosion

S bank of T575 berm
erosion.

Concrete Barrier at
Seep area needs to be
cleaned out.

choice
to add
manoff

Culverts at path - clean
out sediment

Near Internal West
Gate - berm eroded -
need to build back up -
unearth valves at base
of bermed area
+ or replace valves

Outfall 1 - Repair
berm on the
west end
Build up and repair
berms going south of
outfall 1 near the
monitoring wells

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1326 ft

1997

35° 29' 25.01" N 108° 25' 51.47" W elev 6914 ft



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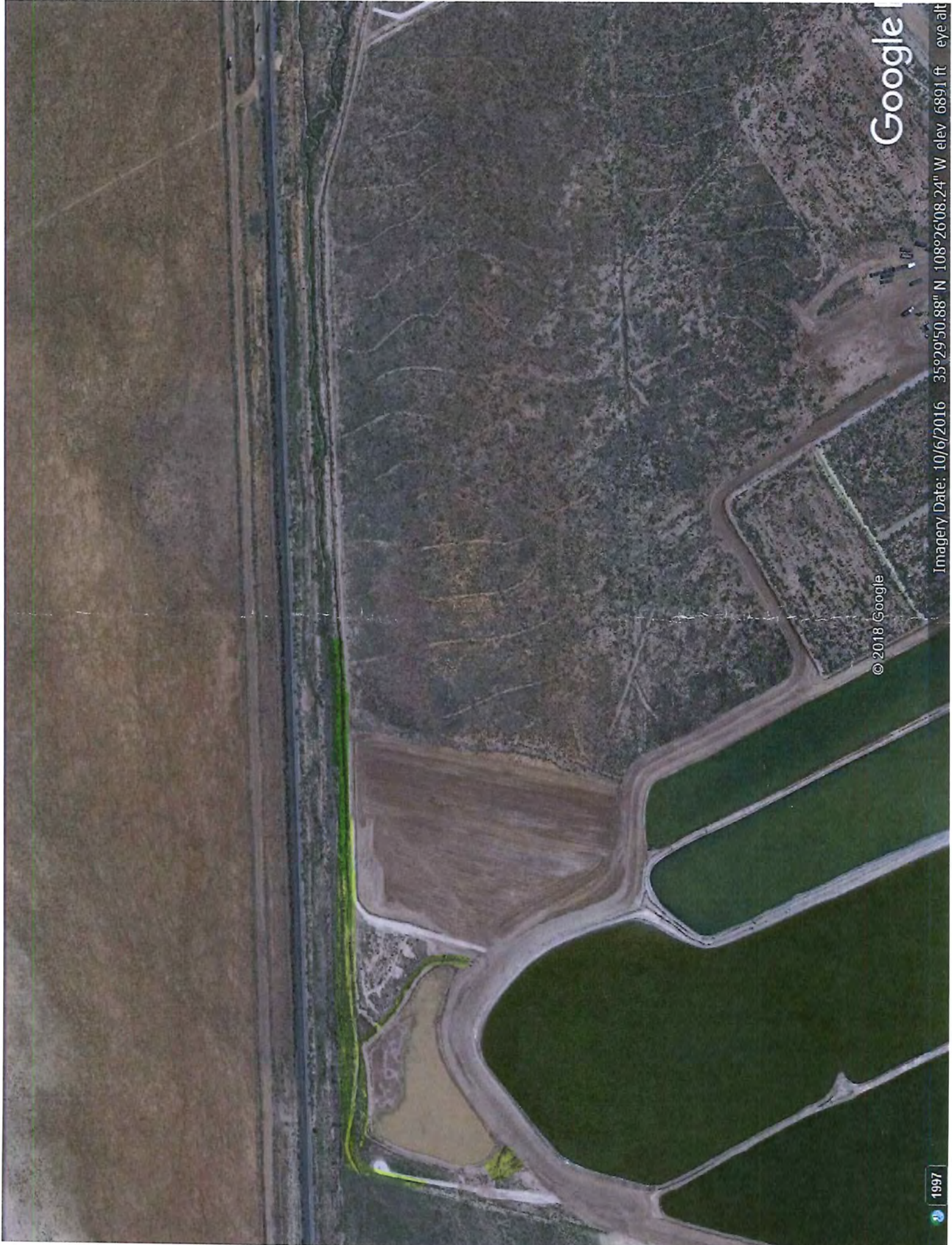


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1997

Imagery Date: 3/18/2016 35°29'08.67" N 108°26'00.91" W elev 6893 ft eye alt



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Imagery Date: 10/6/2016 35°29'50.88" N 108°26'08.24" W elev 6891 ft eye alt

1997



memorandum

To: Mr. John Moore, P.E.
From: Trihydro Corporation
Date: March 21, 2019
Re: Tank Berm Storage Containment Evaluation – Gallup Refinery

BACKGROUND

Trihydro was contacted by Marathon Petroleum (Marathon) in November 2018 to evaluate tank-berm containment compliance at the main tank farm and stormwater holding-tank areas within the Gallup Refinery (Refinery) located near Gallup, New Mexico. The objective of this memorandum is to demonstrate compliance with the United States Environmental Protection Agency (USEPA) Guidance for Spill Prevention, Control, and Countermeasures (SPCC) (40 CFR Part 112). This regulation requires that a berm must contain the full volume of the largest tank plus precipitation. Trihydro evaluated the containment capacity of each tank berm area using survey data, tank dimension and volume information, and precipitation data. This memorandum describes the evaluation process and presents the results of the evaluation and modification recommendations to help achieve compliance.

Trihydro completed an aerial topographic survey of the main tank farm and stormwater holding-tank areas on December 18, 2018. The elevations were collected using an Online Positioning User Service (OPUS) corrected control point located by the stormwater containment area for project control. Known coordinates for this control point are N:1634077.330, E:2545083.332, Elevation: 6909.743 feet in the North American Datum (NAD) 83 and North American Vertical Datum (NAVD) 88, New Mexico West State Plane coordinate system.

EVALUATION

Elevation data created from the aerial imagery was used to create triangulated surfaces to simulate each specific tank berm area (Cell). An analysis using AutoCAD Civil 3D software was performed to identify the overtopping elevation of each containment area. Once the overtopping elevation was identified, a specific containment volume for each Cell was calculated. If the Cell contained more than one tank, the footprint of the smaller tanks was removed from the calculation.

Precipitation estimates were completed using the National Oceanic and Atmospheric Administration (NOAA) Point Precipitation Frequency Estimator. A 25-year, 24-hour storm event was used for the containment calculations. This frequency and duration produce approximately 2.3 inches of rainfall (NOAA).



Mr. John Moore, P.E.
March 21, 2019
Page 2

Table 1 presents the results of each Cell's containment volume evaluation. The table shows each cell, the largest tank volume, surveyed capacity, and precipitation volumes. In some cases, the overtopping point discharges into an additional or "supplemental" containment. This supplemental containment volume is also included in the calculation, and the total excess or deficient volume is identified.

For additional clarification, Figures 1-8 present the containment area for each Cell, the overtopping elevation, and the location of each overtopping point. If additional containment is needed, recommendations for raising the tank berms and the specific elevation to increase the berm height(s) for the containment are provided. Supplementary information regarding the increase in berms with insufficient volume is provided in Figures 9-16.

CONCLUSION

According to the evaluation and calculations performed, the current berm containment capacity achieving SPCC compliance is demonstrated at Cells 1, 2, 4, 6, 9, 16, 17, 18/19, 20/21/22, 23, 29, and the stormwater containment area. Cells not in compliance include 3, 5, 7/8, 10/11, 12/13, 14, 15, 24, 25, 26, 27, 28, and 30. Table 1 summarizes this evaluation and recommendations for increasing containment volume of these Cells are provided in the attached figures.

Trihydro staff is available to discuss this evaluation and associated calculations at your convenience. If you have any questions, please feel free to contact us at (307) 745-7474.

697-054-001

TABLE

TABLE 1. CONTAINMENT CALCULATIONS

Containment Cell	STORAGE TANK SPECIFICATIONS				PRIMARY & SUPPLEMENTAL CAPACITY				PRECIPITATION			ANALYSIS	
	Tanks in Containment Area	Largest Tank in Containment Area	Storage Capacity (Shell Capacity) of Largest Tank (bbls) ¹	Removal of Tank(s) Footprint (bbls)	Cell Capacity (ft ³) ²	Cell Capacity (bbls)	Supplemental Containment Capacity (bbls)	Total Secondary Containment Capacity (bbls)	Surface Area for Rain (ft ²)	25-yr/24-hr Precipitation Event (ft)	Precipitation (bbls) ³	Cell Capacity - Largest Tank - Other Tank(s) Footprint (bbls) - Precipitation (bbls)	Is Secondary Containment Adequate (Y/N)
Cell 1	337-344-345	337	20,000	3,624	171,326	30,515	-	30,515	50,834	0.2	1,735	5,155	Y
Cell 2	583	583	55,000	0	322,694	57,475	-	57,475	44,425	0.2	1,517	959	Y
Cell 3	339	339	25,000	0	112,632	20,061	-	20,061	33,765	0.2	1,153	(6,092)	N
Cell 4	225	225	25,000	0	95,523	17,014	5	19,545	33,827	0.2	1,155	10,404	Y
Cell 5	226	226	25,000	0	109,736	19,545	-	19,545	34,981	0.2	1,194	(6,649)	N
Cell 6	579	579	20,000	0	56,481	10,060	7/8	41,365	32,022	0.2	1,093	30,332	Y
Cell 7/8	574-576	574	40,000	2,879	232,243	41,365	-	41,365	74,124	0.2	2,530	(4,045)	N
Cell 9	575-577	577	10,000	341	66,603	11,863	6	10,060	34,734	0.2	1,186	10,396	Y
Cell 10/11	581-582	582	25,000	132	135,516	24,137	-	24,137	71,845	0.2	2,453	(3,448)	N
Cell 12/13	101-102	101	80,000	6,936	497,177	88,552	-	88,552	101,429	0.2	3,463	(1,847)	N
Cell 14	338	338	25000	0	113,049	20,135	-	20,135	30,044	0.2	1,026	(5,890)	N
Cell 15	567	567	20,000	0	105,320	18,759	-	18,759	29,760	0.2	1,016	(2,257)	N
Cell 16	115-116	115	5,000	439	35,659	6,351	-	6,351	14,830	0.2	506	406	Y
Cell 17	111-112	112	5,000	0	32,599	5,806	16	6,351	14,270	0.2	487	6,670	Y
Cell 18/19	106-231-232-235	106	5,000	1,240	69,706	12,415	-	12,415	29,832	0.2	1,018	5,157	Y
Cell 20/21/22	107-108-227-228-342-343	343	5,000	4,367	80,761	14,384	-	14,384	43,019	0.2	1,469	3,549	Y
Cell 23	451-452-453	453	5,000	208	25,384	4,521	20/21/22	18,906	14,253	0.2	487	13,211	Y
Cell 24	571	571	25,000	0	138,324	24,637	-	24,637	34,564	0.2	1,180	(1,543)	N
Cell 25	569	569	25,000	0	119,433	21,272	-	21,272	33,236	0.2	1,135	(4,862)	N
Cell 26	568-761	568	2,000	0	11,397	2,030	-	2,030	11,406	0.2	389	(360)	N
Cell 27	572	572	25,000	0	55,292	9,848	-	9,848	34,375	0.2	1,173	(16,325)	N
Cell 28	570	570	25,000	0	87,129	15,518	-	15,518	35,775	0.2	1,221	(10,703)	N
Cell 29	562-563	562	20,000	0	282,825	50,374	-	50,374	119,625	0.2	4,084	26,290	Y
Cell 30	701-702-702.1-703-704-705-706-707-708-709-714	702.1	54,000	9,017	306,882	54,659	-	54,659	76,310	0.2	2,718	(11,077)	N
Storm Water Area	27-28-35	35	27,234	1,365	235,206	41,893	-	41,893	61,637	0.2	2,104	11,189	Y

ft² square feet
ft³ cubic feet
bbls barrels

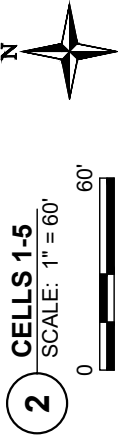
Notes:

- 1. Storage capacity provided by Marathon Petroleum; taken from Storage Tank Inspection Chart provided February 14, 2019.
- 2. Value from December 18, 2018 Trihydro Corporation Survey.
- 3. Values calculated using a 25-year, 24-hour storm (2.3 inches).

FIGURES



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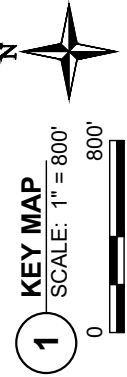


EXPLANATION

- 6948.15 EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION (NO IMPROVEMENTS NECESSARY)
- 6948.15 INSUFFICIENT CONTAINMENT - EXISTING CONTAINMENT OVERTOPPING ELEVATION
- 6951.40 PROPOSED CONTAINMENT - FINAL CONTAINMENT OVERTOPPING ELEVATION TO ACHIEVE COMPLIANCE
- 6935 EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK



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FIGURE 1

CELLS 1-5 CONTAINMENT AREAS

MARATHON PETROLEUM CORP.
GALLUP REFINERY
GALLUP, NEW MEXICO



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2 CELLS 6-11
SCALE: 1" = 60'

6948.15

EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION (NO IMPROVEMENTS NECESSARY)

6948.15

INSUFFICIENT CONTAINMENT - EXISTING CONTAINMENT OVERTOPPING ELEVATION

6951.40

PROPOSED CONTAINMENT - FINAL CONTAINMENT OVERTOPPING ELEVATION TO ACHIEVE COMPLIANCE

6935

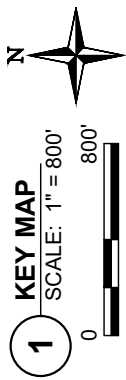
EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')

CONTAINMENT OVERFLOW LOCATION

TANK

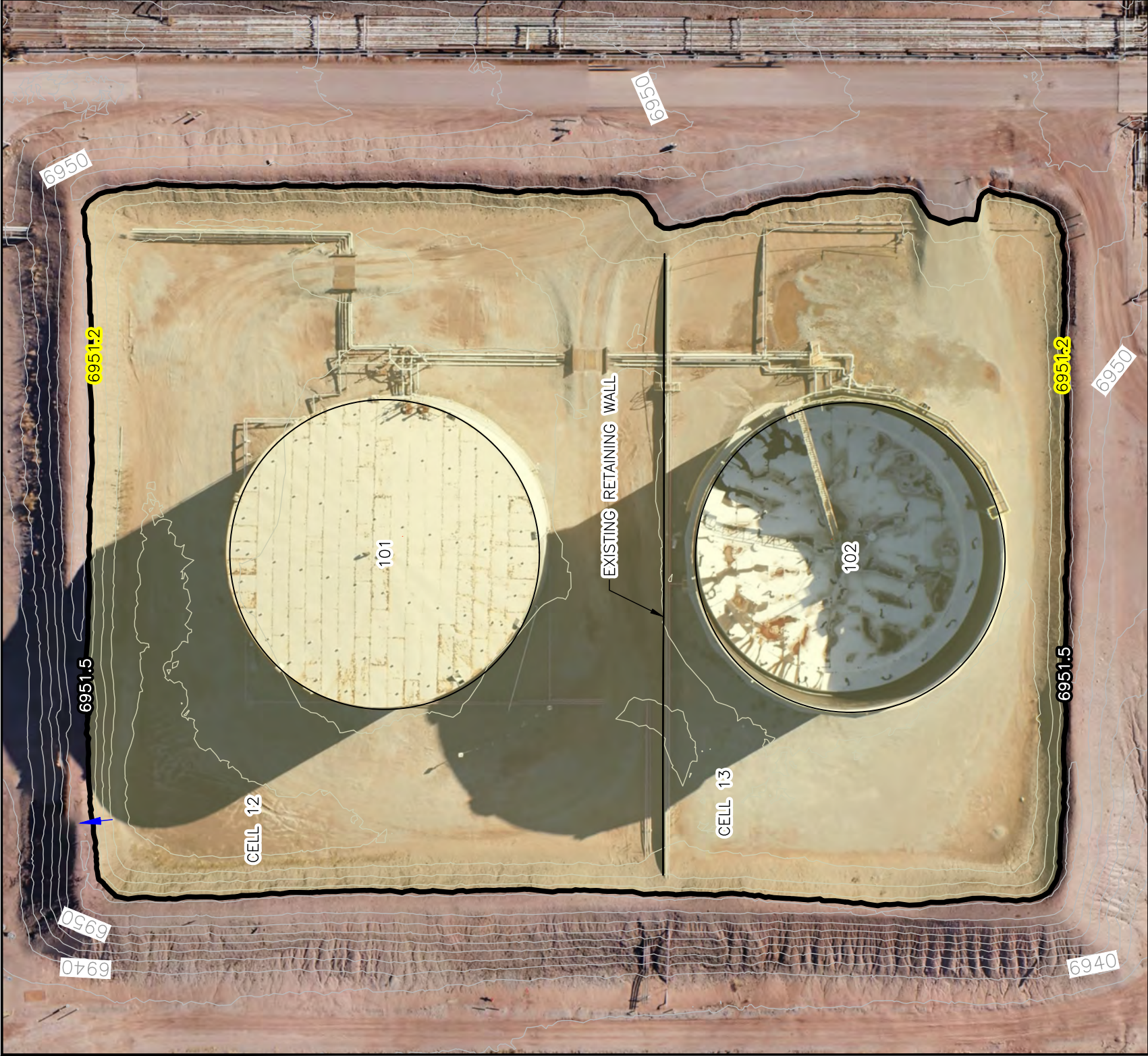


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1 KEY MAP
SCALE: 1" = 800'

 1252 Commerce Drive Laramie, Wyoming 82070 www.trihydro.com (P) 307745.7474 (F) 307745.7729	FIGURE 2	
	CELLS 6-11 CONTAINMENT AREAS	
	MARATHON PETROLEUM CORP. GALLUP REFINERY GALLUP, NEW MEXICO	
Drawn By: FZ	Checked By: MS	Scale: AS SHOWN Date: 2/22/19 File: GALLUP_SPCC-2_201901



2 CELLS 12 & 13
SCALE: 1" = 60'
0 60'

EXPLANATION

- 6948.15 INSUFFICIENT CONTAINMENT - EXISTING CONTAINMENT OVERTOPPING ELEVATION
- 6951.40 PROPOSED CONTAINMENT - FINAL CONTAINMENT OVERTOPPING ELEVATION TO ACHIEVE COMPLIANCE
- 6935. EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK



1 KEY MAP
SCALE: 1" = 800'
0 800'

Trihydro CORPORATION 1252 Commerce Drive Laramie, Wyoming 82070 www.trihydro.com (P) 307745.7474 (F) 307745.7729		FIGURE 3	
		CELLS 12 & 13 CONTAINMENT AREAS	
		MARATHON PETROLEUM CORP. GALLUP REFINERY GALLUP, NEW MEXICO	
Drawn By: REP	Checked By: TM	Scale: AS SHOWN	Date: 3/7/19
		File: GALLUP_SPCC-3_201901	



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2 CELLS 24-28
SCALE: 1" = 60'
0 60'



EXPLANATION

- 6948.15** INSUFFICIENT CONTAINMENT - EXISTING CONTAINMENT OVERTOPPING ELEVATION
- 6951.40** PROPOSED CONTAINMENT - FINAL CONTAINMENT OVERTOPPING ELEVATION TO ACHIEVE COMPLIANCE
- 6935** EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- Blue Arrow** CONTAINMENT OVERFLOW LOCATION
- Circle** TANK



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1 KEY MAP
SCALE: 1" = 800'
0 800'





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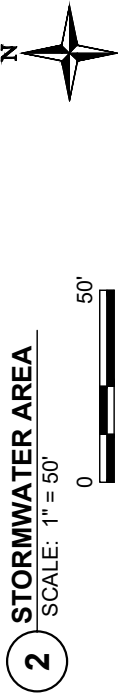
FIGURE 5

**CELLS 24-28
CONTAINMENT AREAS**

**MARATHON PETROLEUM CORP.
GALLUP REFINERY
GALLUP, NEW MEXICO**



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EXPLANATION

- 6948.15
EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION (NO IMPROVEMENTS NECESSARY)
- 6935
EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK

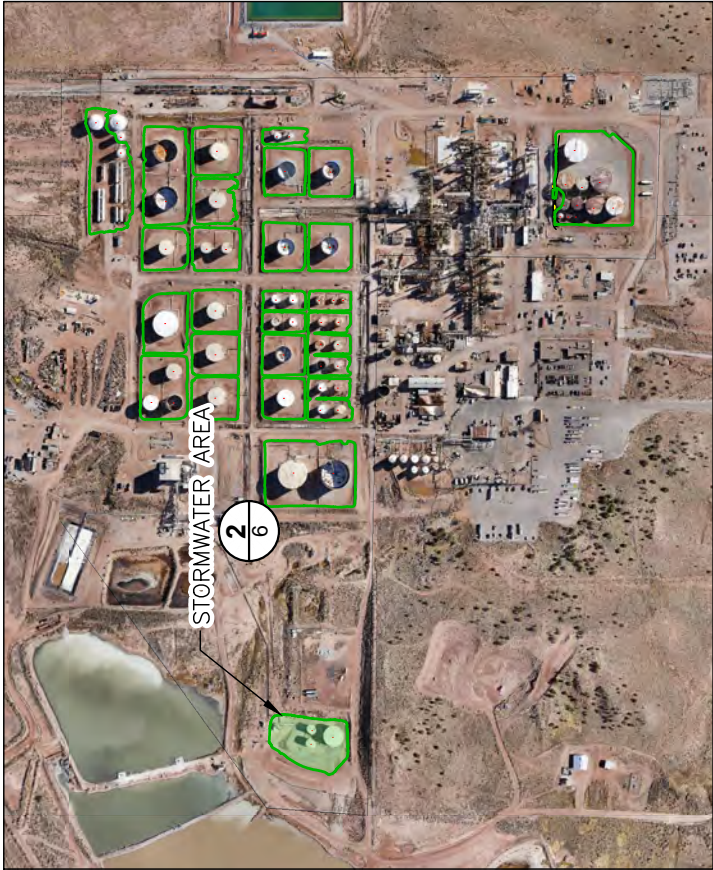
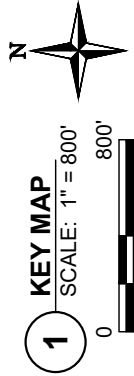


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2 STORMWATER AREA

FIGURE 6

STORMWATER AREA
CONTAINMENT AREA

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2 **STORMWATER AREA**
SCALE: 1" = 100'
0 100'



EXPLANATION

- 6948.15
EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION (NO IMPROVEMENTS NECESSARY)
- 6935
EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK

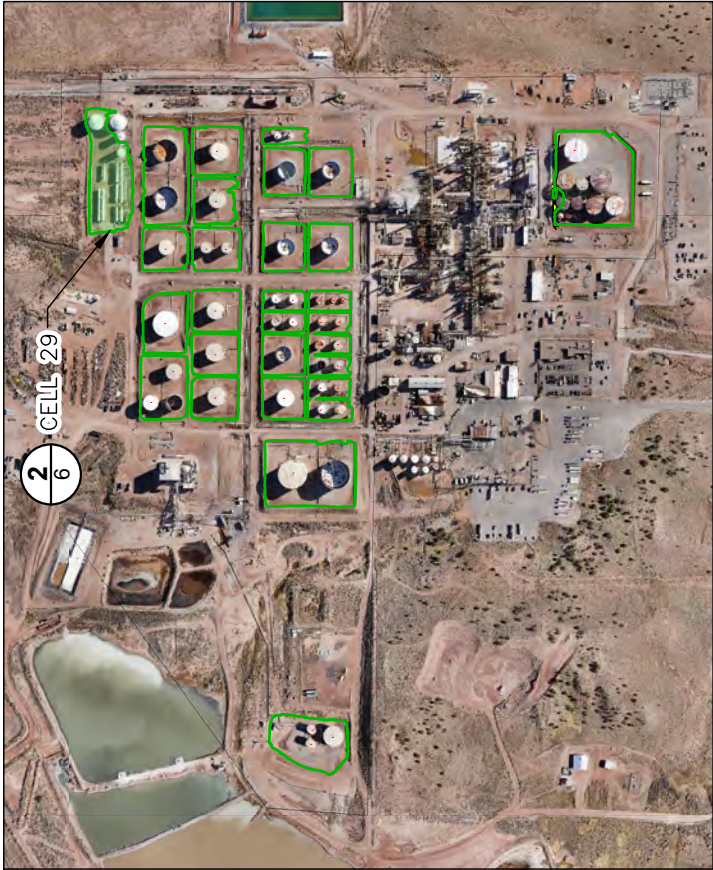


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1 **KEY MAP**
SCALE: 1" = 800'
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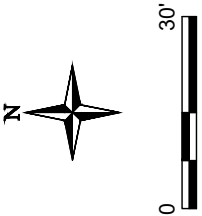
 1252 Commerce Drive Laramie, Wyoming 82070 www.trihydro.com (P) 307745.7474 (F) 307745.7729	FIGURE 7 CELL 29 CONTAINMENT AREA			
MARATHON PETROLEUM CORP. GALLUP REFINERY GALLUP, NEW MEXICO				
Drawn By: FZ	Checked By: MS	Scale: 1" = 100'	Date: 3/7/19	File: GALLUP_SPCC-7_201903



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EXPLANATION

- EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION: 6950.8
- EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1'): 6950
- CONTAINMENT OVERFLOW LOCATION: 6951.60
- TANK: (Symbol: Circle)



AREA WITH INSUFFICIENT CONTAINMENT VOLUME, RECOMMENDATIONS PROVIDED
BUILD-UP AREA TO ACHIEVE ADEQUATE CONTAINMENT
EXISTING GROUND SPOT ELEVATION

FIGURE 10

CELLS 7 AND 8 AREAS OF DETAIL

MARATHON PETROLEUM CORP.
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GALLUP, NEW MEXICO



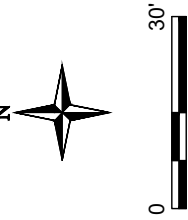
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EXPLANATION

- EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION
- EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK



AREA WITH INSUFFICIENT CONTAINMENT VOLUME, RECOMMENDATIONS PROVIDED

BUILD-UP AREA TO ACHIEVE ADEQUATE CONTAINMENT

EXISTING GROUND SPOT ELEVATION

CELL 5

X 6951.60



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FIGURE 11

CELLS 10 AND 11 AREAS OF DETAIL

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GALLUP, NEW MEXICO**

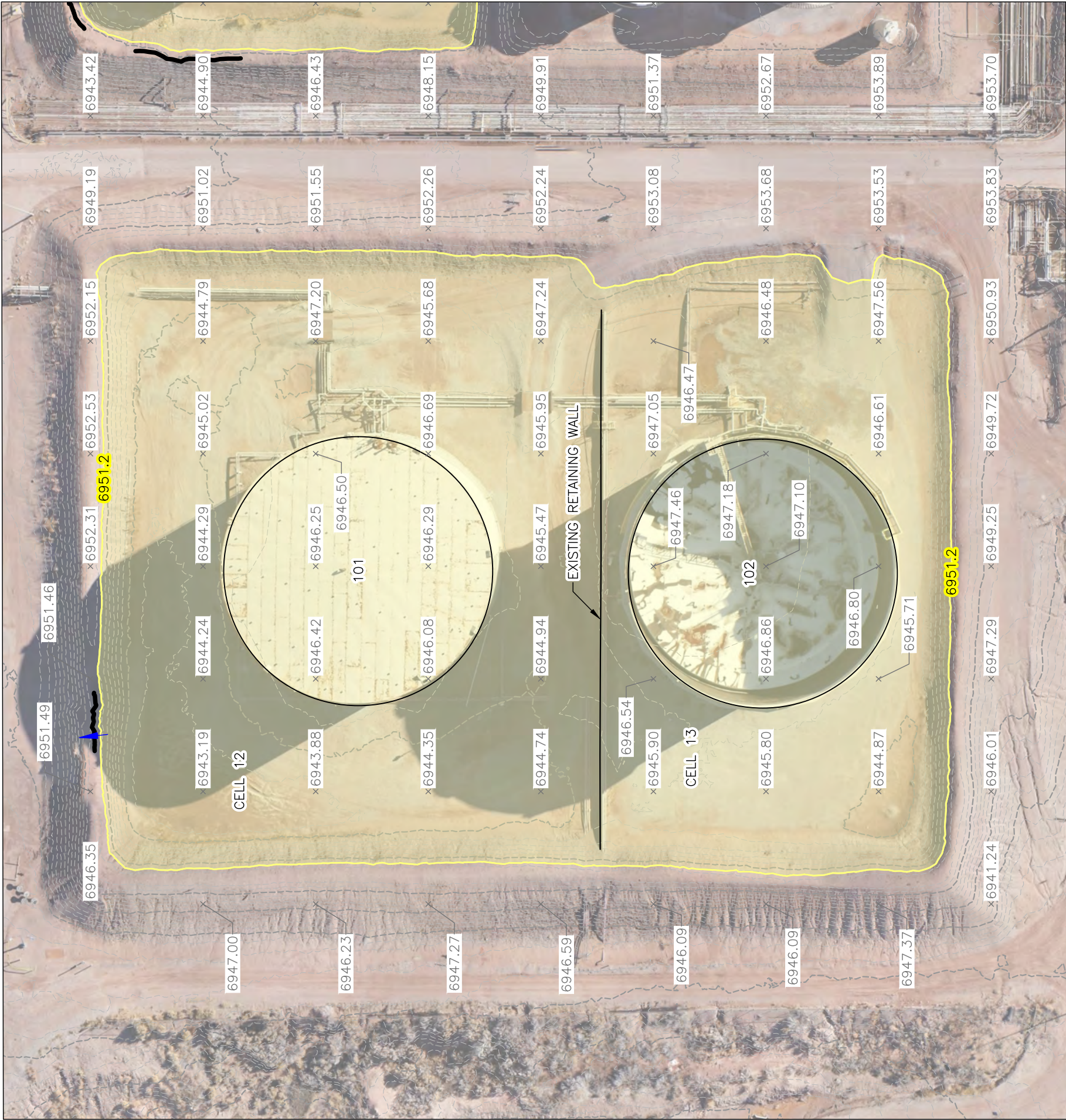
Drawn By: FZ

Checked By: MS

Date: 3/20/19

Scale: 1" = 30'

File: GALLUP_SPCC-9-16_201903



EXPLANATION

- CELL 5
- AREA WITH INSUFFICIENT CONTAINMENT VOLUME, RECOMMENDATIONS PROVIDED
- BUILD-UP AREA TO ACHIEVE ADEQUATE CONTAINMENT
- EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION
- EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK
- EXISTING GROUND SPOT ELEVATION

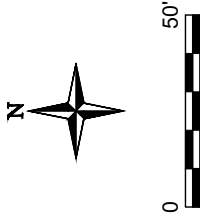


FIGURE 12

CELLS 12 AND 13 AREAS OF DETAIL

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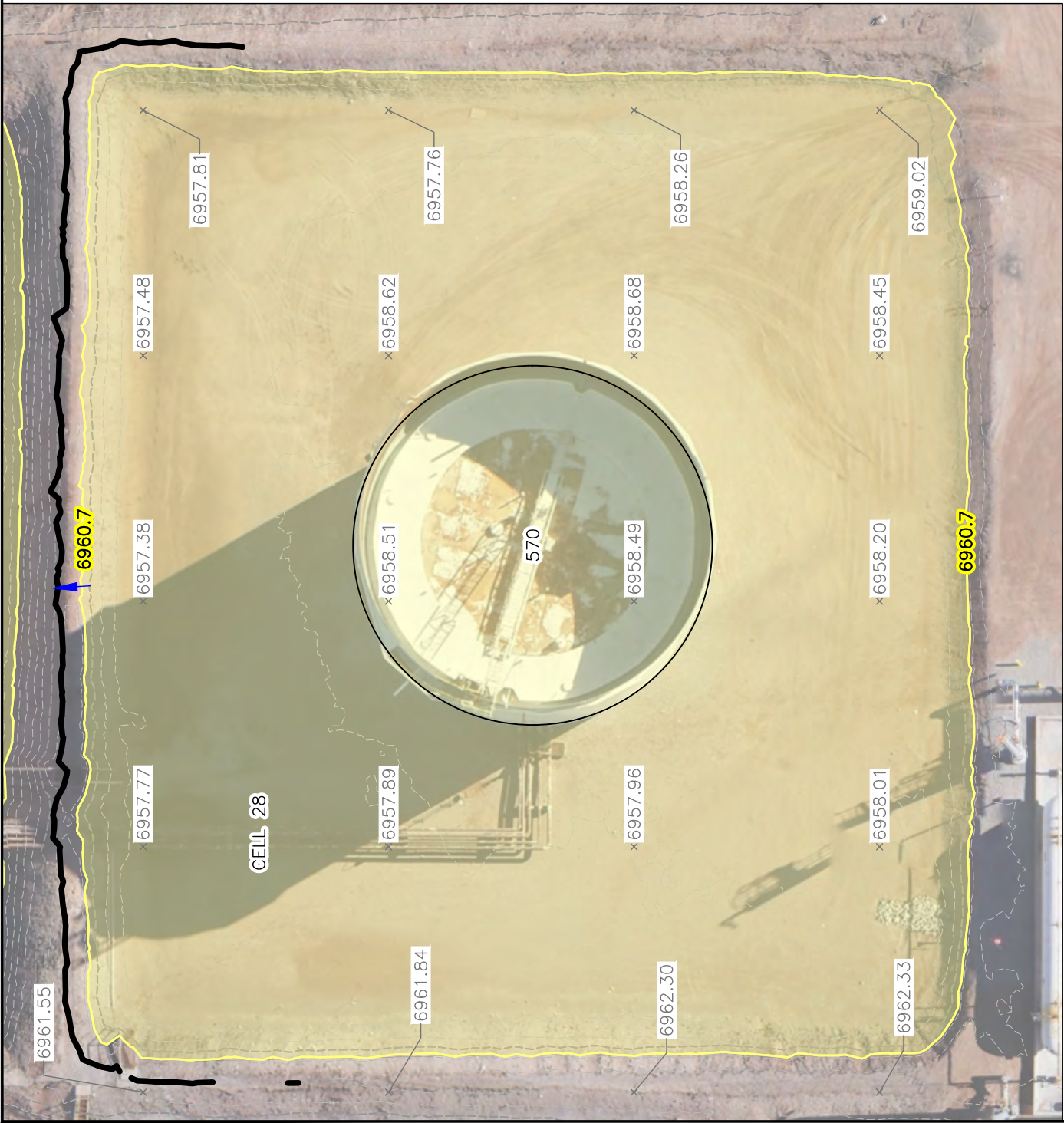


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1 CELL 28 DETAIL
SCALE: 1" = 30'

EXPLANATION

- 6950.8** EXISTING CONTAINMENT BOUNDARY AND OVERTOPPING ELEVATION
- 6950** EXISTING CONTAINMENT ELEVATION CONTOURS (INTERVAL = 1')
- CONTAINMENT OVERFLOW LOCATION
- TANK
- CELL 5
- X 6951.60

AREA WITH INSUFFICIENT CONTAINMENT VOLUME, RECOMMENDATIONS PROVIDED

BUILD-UP AREA TO ACHIEVE ADEQUATE CONTAINMENT

EXISTING GROUND SPOT ELEVATION

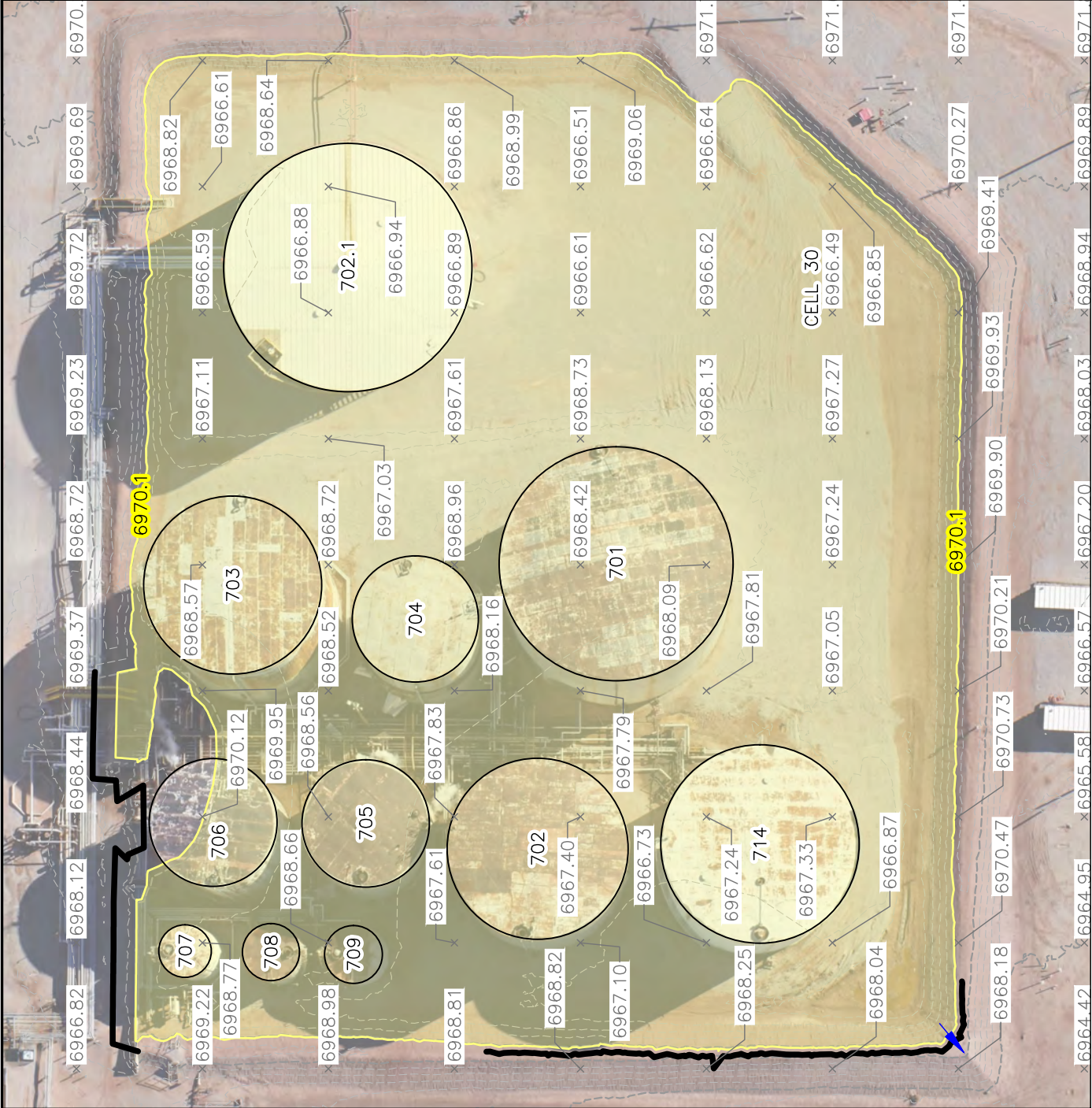
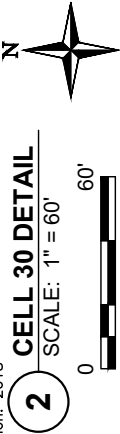


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2 CELL 30 DETAIL
SCALE: 1" = 60'

FIGURE 16

CELLS 28 AND 30 AREAS OF DETAIL

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