DRAINAGE STUDY FOR
TRI-CITY MEDICAL CENTER PSYCHIATRIC HEALTH FACILITY
PROJECT NO. D21-00004
DRAWING NO. PDS2021-LDGRMJ-30378

OCEANSIDE, CALIFORNIA

January 2022

Prepared for:
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I. Project Description

The proposed development is located in the City of Oceanside, north of California State Route 78 and east of Waring Road, immediately west of the existing Tri-City Medical Center accessed from Vista Way. The development is part of the existing medical center at 4002 Vista Way, Oceanside, CA 92056. See Figure 1 for the Site Vicinity Map.

The proposed development is part of a larger development over multiple parcels to include the entire campus. This project considers the addition of one building and the modification of an existing parking lot.

The project involves the partial demolition of the existing surface parking lot, utilities and other features within the proposed parking structure footprint, and the rough grading of the site in preparation for construction of the proposed health facility and reconfigured surface parking lot and sidewalks.

Figure 1: Site Vicinity Map

II. Existing Site Conditions

The existing site consists of seven drainage areas: DMA-1.1 through 1.7. The site generally flows from north to south with a change in elevation of 29 feet. Surfaces discharge the site through existing swales and previously developed drainage basins. DMA's discharge as indicated below:

-Waring Road via surface flow and concrete swale: DMA 1.1
-Adjacent property to southwest via surface flow: DMA 1.4
-Concrete Swale at southwest corner of site: DMA 1.5
-Concrete Swale at southeast corner of site: DMA 1.2, 1.3 and 1.7
-Parking lot east of project via surface flow: DMA 1.6

DMA's 1.2, 1.3 and 1.6 all pass through off-site biofiltration basins but are within the hospital property. After passing through the biofiltration basins, the runoff enters the on-site storm drain system and exits the site in the south

The hydrology results for existing conditions are summarized in Table 1. In addition, refer to Appendix A for the existing condition drainage area map.

III. Proposed Site Conditions

The proposed site will have nine drainage areas: DMA-2.1 through DMA-2.9.

-Construction will not change DMA 2.5, 2.7 and 2.8.
-Construction expands DMA 1.3 (see west boundary of 2.3) and increase the percentage imperviousness, directing more area to the existing detention basin 1.
-Construction reduces DMA 1.2 and splits flow into DMA 2.1 and 2.4. (overall flow to the existing detention basin will decrease). Imperviousness decreases.
-Construction reduces the uncontrolled flow of water offsite from DMA 1.1 by creating a new basin through DMA 2.1 and splitting flow between DMA 2.1 and 2.2.

DMA 2.1 collects water from the building roof, driveway and western-facing hillside prior to draining into the proposed biofiltration basin and draining to a reconstructed concrete swale at the western boundary of the site, this location is the only DMA receiving a new structural BMP (detention basin #3) as part of the project. All other DMAs rely on existing LID infrastructure.

DMA 2.2 represents the area not feasible to collect against the property line and downhill of the project development.

DMA 2.3 is moderately disturbed due to the project. The western half is being regraded to transition to the new building. Rainwater runoff will discharge via overland flow from north to south to the existing detention basin (detention basin #1), which will remain.

DMA 2.4 will surface drain similarly to 2.3, north to south to existing detention basin #2. Overall area draining to the detention basin is reduced and more impervious than the pre-project condition.

DMA 2.5 is made steeper as part of the project but the draining condition and location is unchanged.

DMA 2.6 is composed of non-pollution generating surface and uses dispersion for flow control with a total percent imperviousness of 22%.

DMA 2.7 represents the area not feasible to collect against the property line and downhill of the project development. (Outside of project disturbance limits.)

DMA 2.8 a portion of this DMA is made steeper as part of the project but the draining condition and location is unchanged. Area represented is not feasible to collect against the property line and downhill of the project development.

DMA 2.9 represents the area not feasible to collect against the property line and downhill of the project development. (Outside of project disturbance limits.)

IV. Hydrology Analysis

The hydrology calculations are based on the *County of San Diego Hydrology Manual (January 2003)*. The project site is less than one square mile, and therefore the *Rational Method* was used to calculate the peak runoff rate, time of concentration, and intensity. The 10-year and 100-year frequency storms were taken into consideration for storm drain design. All equations used in the hydrology study are identified in Table 3.

Because the net decrease in impervious surface the total flow decreased relative to the existing condition. However the points of discharge varied due to changes in grading required by the development. The storm drain pipes are sized for the 10-year storm. In events exceeding the 10-year storm, storm water runoff will sheet flow to provided overflow swales which have been designed to exceed the 100 year storm. The hydrology results for existing and proposed conditions are detailed in Table 1 and Table 2.

Existing Conditions								
Drainage Area No.	Area (acres)	% Impervious	C	Tc	I10	I100	Q10 (cfs)	Q100 (cfs)
1.1	0.709	0.0%	0.35	38.41	1.38	2.05	0.34	0.51
1.2	1.722	61.9%	0.69	39.88	1.35	2.00	1.60	2.38
1.3	0.793	68.8%	0.73	24.98	1.82	2.71	1.05	1.56
1.4	0.087	0.0%	0.35	6.28	4.43	6.59	0.13	0.20
1.5	0.350	0.0%	0.35	21.87	1.98	2.95	0.24	0.36
1.6	0.123	20.2%	0.46	14.60	2.57	3.83	0.15	0.22
1.7	0.280	0.0%	0.35	25.85	1.78	2.65	0.17	0.26

Table 1: Existing Condition Hydrology Results for 10-Year and 100-Year Storm

Proposed Conditions								
Drainage Area No.	Area (acres)	% Impervious	C	Tc	I10	I100	Q10 (cfs)	Q100 (cfs)
2.1	0.848	64.1%	0.70	14.95	2.54	3.77	1.51	2.24
2.2	0.195	48.8%	0.62	19.29	2.15	3.20	0.26	0.38
2.3	0.842	70.0%	0.74	27.25	1.72	2.56	1.06	1.58
2.4	1.228	62.1%	0.69	25.46	1.80	2.67	1.53	2.27
2.5	0.302	0.0%	0.35	21.87	1.98	2.95	0.21	0.31
2.6	0.157	22.9%	0.48	13.72	2.68	3.98	0.20	0.30
2.7	0.091	0.0%	0.35	25.85	1.78	2.65	0.06	0.08
2.8	0.250	0.2%	0.35	15.30	2.50	3.71	0.22	0.33
2.9	0.149	27.1%	0.50	12.29	2.88	4.28	0.21	0.32

Table 2: Proposed Condition Hydrology Results for 10-Year and 100-Year Storm

V. Hydraulic Analysis

The hydraulic calculation was conducted using Flowmaster software. Given the project minimum pipe slopes are driven by constructability and the minimum slope of 2% we've run the hydraulic calculation for the project maximum case of 2.27 cfs.

Size	Slope	Q100 (cfs)	Q_{FULL} (cfs)
8"	2.0%	2.27	2.39

Table 3: Hydraulic Calculation Summary

Given the pipe size and small quantity of water the limiting case documents sufficient capacity in the pipe. Further calculations can be made available upon request.

Appendix A – Drainage Area Maps

Please refer to Exhibit 1 and Exhibit 2.

Appendix B – Hydrology Calculations

Equations Used	
1.	$C = 0.90 \times (\%\ \text{Impervious}) + C_p \times (1 - \%\ \text{Impervious})$ C = 0.35 for soil type D
2.	$T_c = \frac{1.8 * (1.1 - C) * sqrt(D)}{(s)^{\frac{1}{3}}}$
3.	$I = 7.44 * P_6 * D^{-0.645}$
4.	$Q = C * I * A$

Table 4: Equations Used in Hydrology Study

Definition of Variables	
C	Area- Weighted Runoff Coefficient, proportion of rainfall that runs off the surface
% Impervious	The percentage of project site area that is hardscape
P_6(in)	The adjusted 6-hour storm rainfall amount
D	In Equation 2, D is the watercourse distance in feet In Equation 3, D is the duration in minutes (use t_c);
s (%)	Slope along watercourse distance
T_c(min)	Time of concentration (minimum 5 minutes)
I (in/hr)	Average rainfall Intensity for a selected storm frequency
A (acres)	Drainage Area
Q (cfs)	Peak discharge in cubic feet per second

Table 5: Definition of Variables in Hydrology Study Equations

Existing Conditions								
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Table 6: Hydrology Calculations for 10-Year and 100-Year Storm for Existing Conditions

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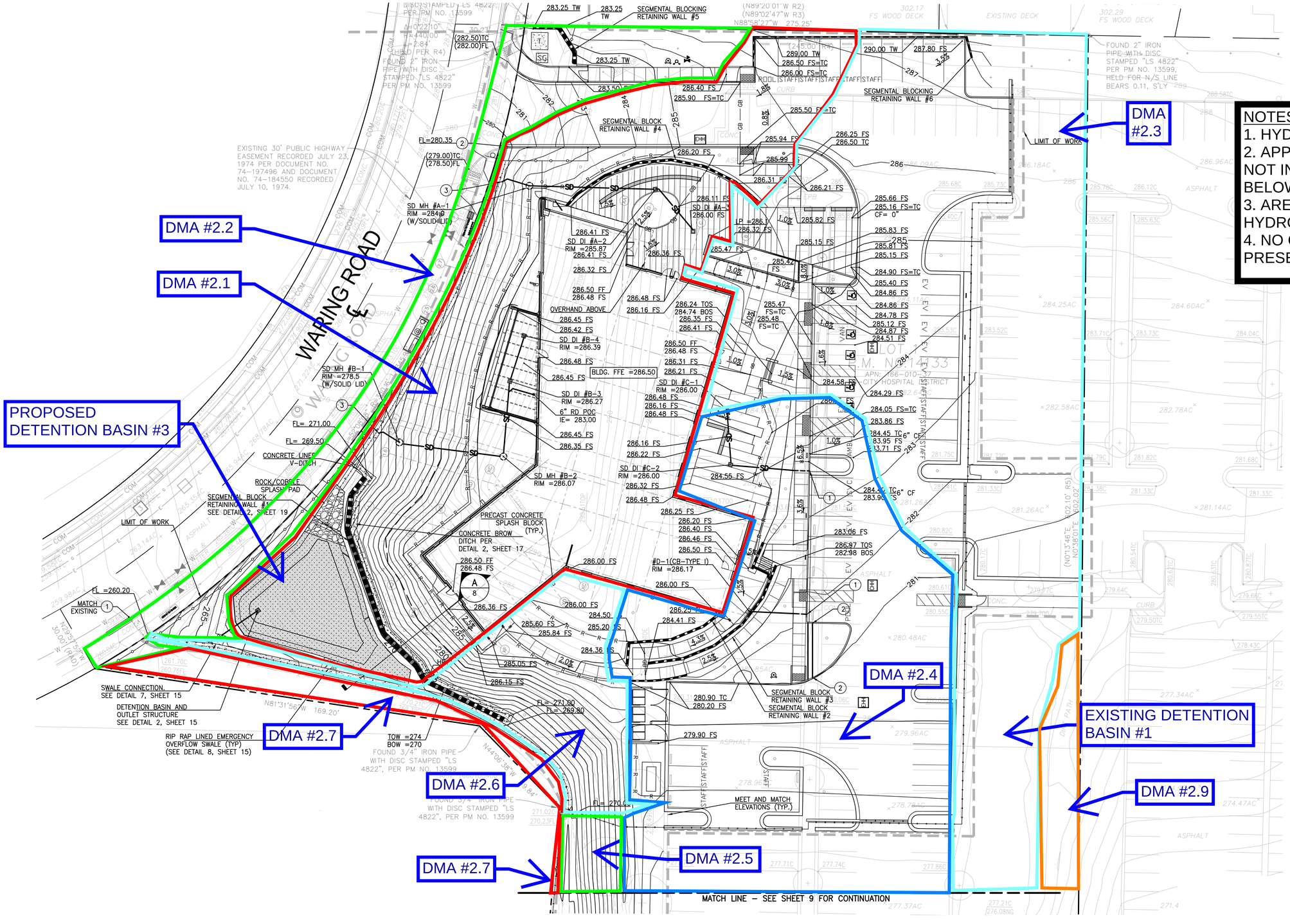
2.9	0.149	27.1%	0.50	12.29	2.88	4.28	0.21	0.32

Table 7: Hydrology Calculations for 10-Year and 100-Year Storm for Proposed Conditions

DMA EXHIBIT 1 (PROPOSED CONDITION)

TRI-CITY MEDICAL CENTER PSYCHIATRIC HOSPITAL FACILITY - NORTH



NOTES
1. HYDROLOGIC SOILS GROUP D
2. APPROX. DEPTH TO GROUNDWATER = NOT INCOUNTERED TO A DEPTH OF ~ 20' BELOW GRADE.
3. AREA IS PRE-DEVELOPED, NO NATURAL HYDROLOGIC FEATURES PRESENT.
4. NO CRITICAL COARSE SEDIMENT AREAS PRESENT.

N

0 10' 20'
SCALE: 1"=20'

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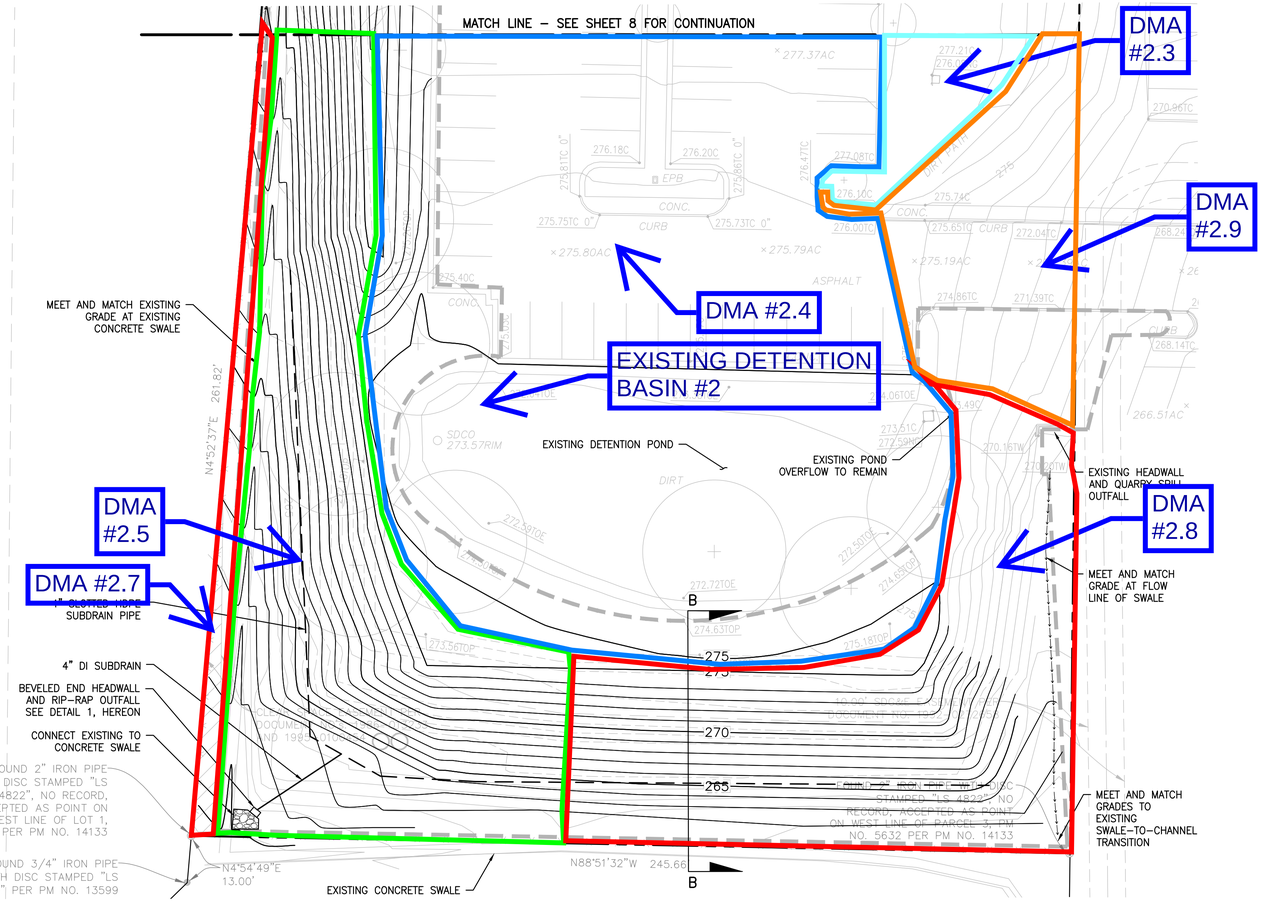
elakin
01/21/2022

DMA EXHIBIT 1 (PROPOSED CONDITION)

TRI-CITY MEDICAL CENTER PSYCHIATRIC HOSPITAL FACILITY - SOUTH



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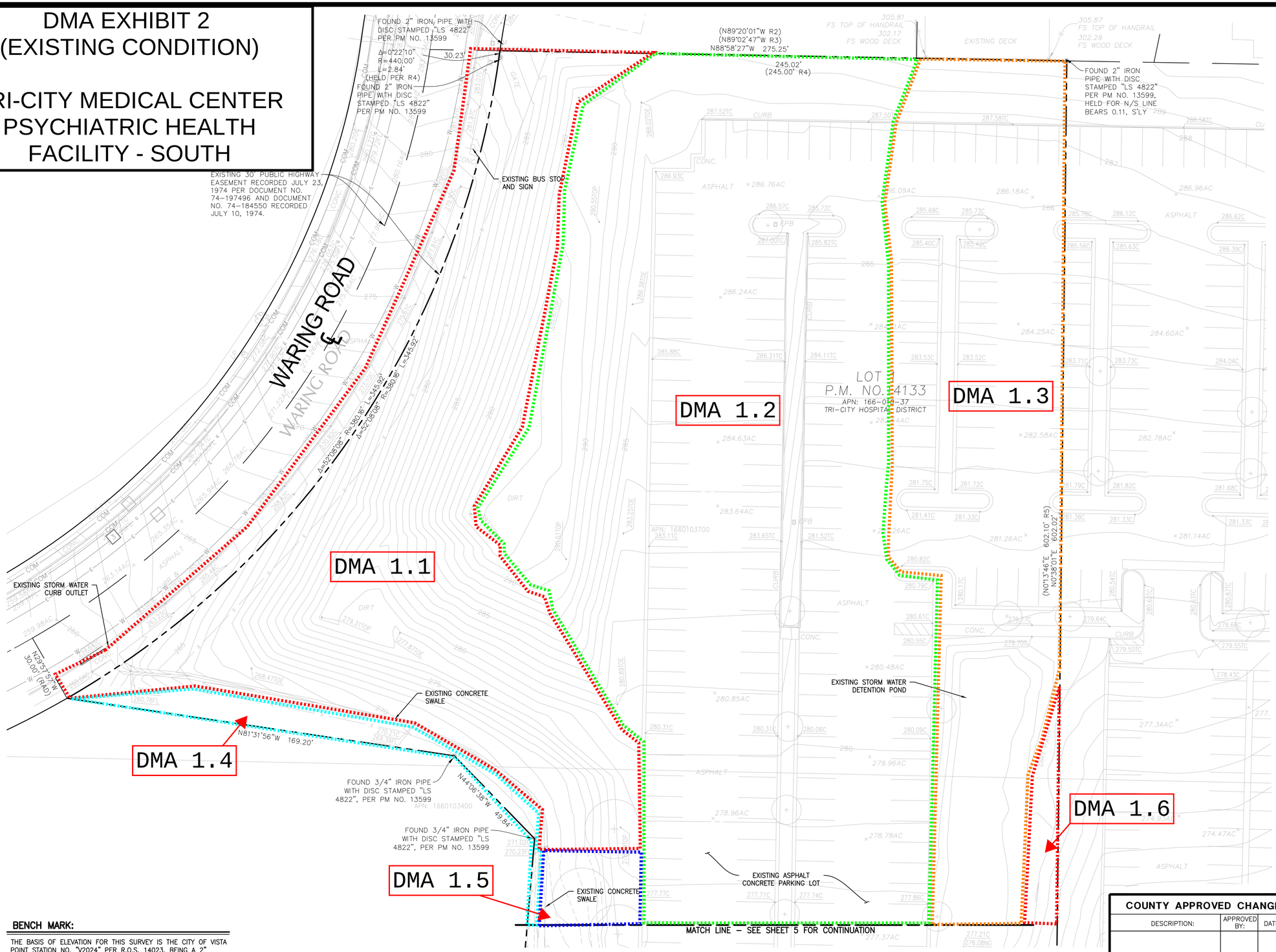
DMA EXHIBIT 2
(EXISTING CONDITION)

TRI-CITY MEDICAL CENTER PSYCHIATRIC HEALTH FACILITY - SOUTH



EXISTING IMPROVEMENTS

SYMBOL	IMPROVEMENT
	PROPERTY LINE/RIGHT OF WAY LINE
	LOT LINE
	CURB/BACK OF CURB/GUTTER (PVT)
X	FENCE/GATE
100	MAJOR CONTOUR
102	MINOR CONTOUR
G	GAS
W	WATER (PVT)
E	ELECTRIC (PVT)
	BUS STOP SIGN
	LIGHT POLE

ABBREVIATIONS

GUARD POST	GP
INDICATES FOUND MONUMENT AS NOTED	
SIDEWALK	SWK
HANDICAPPED RAMP	HCR
NORTH	N
NORTHEAST	NE
SOUTH	S
SOUTHEAST	SE
EAST	E
SOUTHWEST	SW
WEST	W
NORTHWEST	NW
NORTHEASTERLY	NELY
SOUTHEASTERLY	SELY
SOUTHWESTERLY	SWLY
NORTHWESTERLY	NWLY
HANDICAPPED	HC
TRASH ENCLOSURE	TE
WROUGHT IRON	W.I.
BUILDING HEIGHT	B.H.
COLUMN	CLM
DRIVEWAY	DWY
CONTROL	CTRL
CENTER	CTR
ENCLOSURE	ENCL
BACK OF WALL	BW
MECHANICAL	MECH
PROPERTY LINE	PL
PROPERTY CORNER	PC
RADIAL BEARING	(RAD)
DELTA ANGLE	Δ=
RADIUS	R=
LENGTH	L=
MOTORCYCLE	M.C.
FLAG POLE	FP
PLANTER	PNTR
UNKNOWN MANHOLE	UMH
UNKNOWN RISER	UR
UNKNOW CONTROL BOX	UCB
UNKNOWN CLEAN OUT	UCO
UNKNOWN VAULT	UVT
RECORD OF SURVEY	R.O.S.
PARCEL MAP	P.M.

SHEET NOTE:

1. THIS EXISTING CONDITIONS PLAN HAS BEEN CREATED BASED ON PROJECT SPECIFIC SURVEY, SITE VISIT NOTES AND RECORDS INFORMATION. CONTRACTOR SHALL FIELD VERIFY INFORMATION AS PART OF THE CONSTRUCTION PROCESS AND ALERT THE DESIGNER OF RECORD WHEN CHANGES ARE OBSERVED.

N

0 10' 20'

SCALE: 1"=20'

BENCH MARK:

THE BASIS OF ELEVATION FOR THIS SURVEY IS THE CITY OF VISTA POINT STATION NO. "V2024" PER R.O.S. 14023. BEING A 2" ALUMINUM CAP ON ⅝" REBAR, FLUSH WITH AC PAVEMENT, STAMPED "HUNSAKER & ASSOC. G.P.S CONTROL POINT 2024". LOCATED AT THE INTERSECTION OF THUNDER DRIVE AND GENIE DRIVE.

COUNTY APPROVED CHANGES

DESCRIPTION:	APPROVED BY:	DATE:

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Suite 2100
Los Angeles, CA 90017
O: 213.418.0201
www.kpff.com

PRIVATE CONTRACT

SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	21 SHEETS
4		

PRIORITY DEVELOPMENT PROJECT EXISITING CONDITION – NORTH SHEETS FOR

TRI-CITY MEDICAL CENTER
PSYCHIATRIC HEALTH FACILITY

CALIFORNIA COORDINATE INDEX 380-1700

APPROVED FOR WILLIAM P. MORGAN
COUNTY ENGINEER

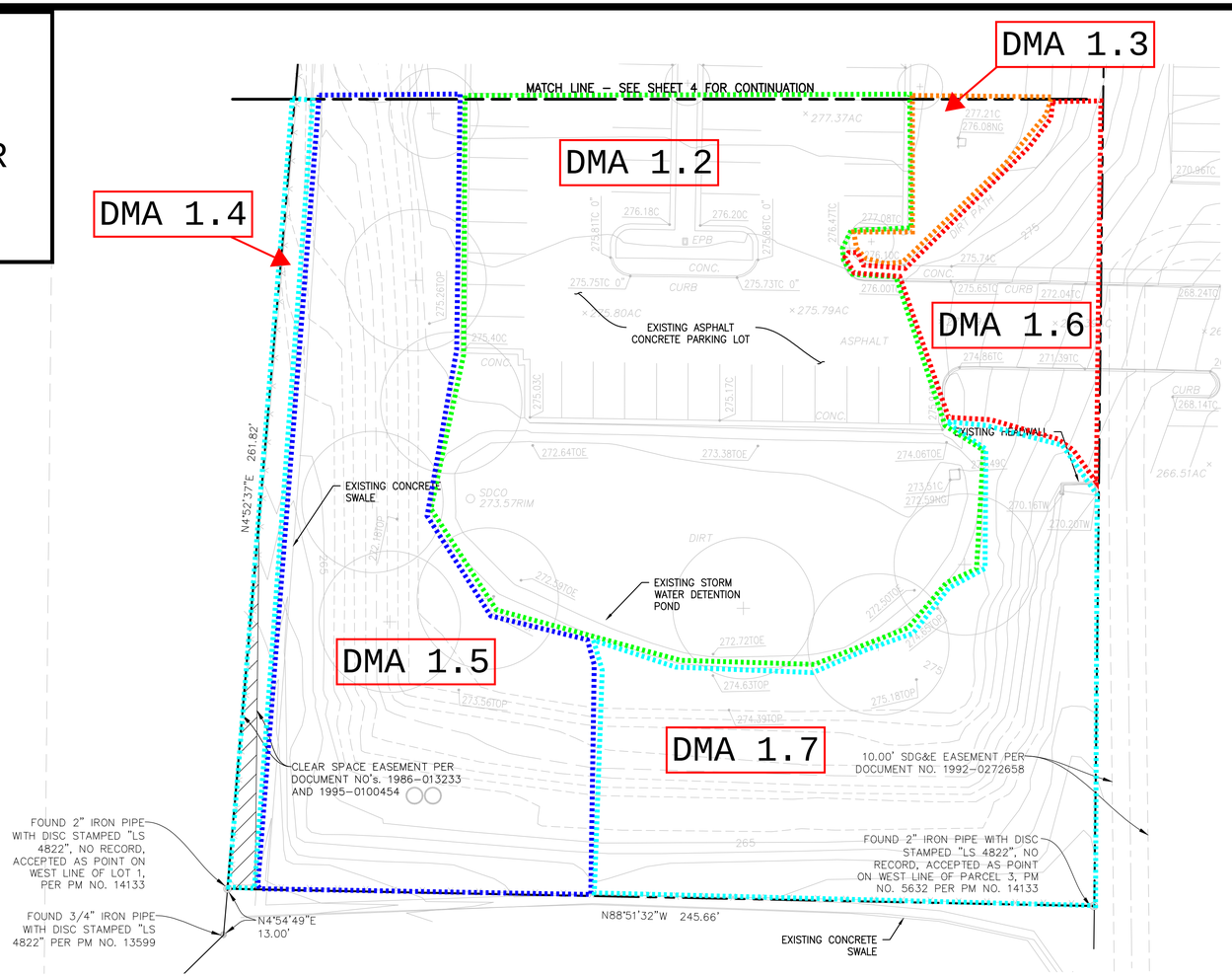
ENGINEER OF WORK
JEFF GAVAZZA, PE
R.C.E. C39894

GRADING PERMIT NO:
PDS2021-LDGRMJ-30378

ENGINEER'S NAME: EVAN LAKIN
PHONE NO. (213)266-5266 // EMAIL: EVAN.LAKIN@KPFF.COM

DMA EXHIBIT 2
(EXISTING CONDITION)

TRI-CITY MEDICAL CENTER
PSYCHIATRIC HEALTH
FACILITY - SOUTH



EXISTING IMPROVEMENTS

SYMBOL	IMPROVEMENT
— — —	PROPERTY LINE/RIGHT OF WAY LINE
———	LOT LINE
	CURB/BACK OF CURB/GUTTER (PVT)
-X-	FENCE/GATE
XXX	MAJOR/MINOR CONTOUR
-G-	GAS
-W-	WATER (PVT)
-E-	ELECTRIC (PVT)
	BUS STOP SIGN
	LIGHT POLE

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COUNTY APPROVED CHANGES

DESCRIPTION:	APPROVED BY:	DATE:

PRIVATE CONTRACT

SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	SHEETS
5		21

PRIORITY DEVELOPMENT PROJECT EXISITING CONDITION – NORTH SHEET FOR:

TRI-CITY MEDICAL CENTER
PSYCHIATRIC HEALTH FACILITY

CALIFORNIA COORDINATE INDEX 380-1700

APPROVED FOR WILLIAM P. MORGAN
COUNTY ENGINEER

ENGINEER OF WORK
JEFF GAVAZZA, PE
R.C.E. C39894

GRADING PERMIT NO:
PDS2021-LDGRMJ-30378

ENGINEER'S NAME: EVAN LAKIN
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