



ATTACHMENT D

MITIGATED NEGATIVE DECLARATION

APPENDIX F - BASE FLOOD ELEVATION MEMORANDUM

Appendix F

Base Flood Elevation Memorandum



October 30th, 2024

Kyrenne Chua
Civil Engineer
City of San Marcos, CA

Regarding: COSTCO GAS STATION – Entitlement 1st plan check comments

Dear Miss Chua,

This analysis shows that the FEMA defined base flood elevation (BFE) as shown on the letter of map revision (LOMR) No. 12-09-1029P, its associated supporting data and profiles and the associated Flood Insurance Rate Map (FIRM) No. 06073C0793H, will not be altered by the proposed development. This report also shows that any change in elevation of flood waters due to the gas station development is insignificant. The procedure used is summarized in the following paragraphs. Please refer to Figure 1 for a graphic representation of the various important elevations.

The project site contains both a flood plain and a floodway. The southerly edge of the 100-year flood plain as shown on the FIRM map, extends beyond the southerly portion of the property, and includes the existing warehouse building. The most northerly side of the site, where the proposed gas station is located, is outside the 100-year flood plain. The floodway is confined to the north side of the existing business center and is south of the proposed gas station location, being contained within the parking lot. The floodway flows from east to west across the site.

All referenced elevations on both the FEMA documents and the grading plans reviewed by the city use the NAVD 88 datum.

Per the FIRM map, the BFE across the site varies from approximately 545.5 at the east edge of the property to 545 at the west edge of the existing business center at Section "C". (Note that this is slightly less precise than the elevations obtained using the flood profile in Figure 1). This is profiled on the Flood Profile for the Northern Split from the LOMR and is attached as Figure 1 in this letter. The relevant elevations have been drawn onto the profile (Fig 1).

It is important to note that the elevation of the flowline of the floodway, as shown on Figure 1 is approximately 1.4-feet higher than the accurate topographic data obtained by local survey and used for the plans. Also from figure 1, the depth of the 100-year flood surface over the FEMA floodway channel invert is 1.4-feet. It can be concluded that this proposed development cannot affect the mapped BFE in any way.

A more conservative approach is to find the proposed effect on the flow depth of the flood waters and use the measured topo data. That analysis is below.

full circle thinking®

Careful study of Figure 1 and the proposed grading reveals the following:

1. The proposed parking lot grading does not differ significantly from the existing conditions. Some areas being slightly higher or lower to control water quality runoff.
2. The only items that could possibly have a detrimental effect on the water surface elevation is the addition and reconfiguration of the parking lot islands which will have the effect of displacing some flood water volume.
3. The affected swath of flood water is shown on Attachment 3 of this report.
4. Referencing the affected area using the proposed grading plan for the gas station and determining the difference in parking lot island volumes from the existing to the proposed condition, and then dividing that change in volume over the flood plain area, determines the change in flood water elevation. Attachment 1 shows the volumes of the parking lot island for both the proposed 6-inch standard curb height and an alternate 4-inch curb height. The resulting calculated change in water surface elevations are: 0.01 ft, using a 6" curb height, and 0.00 ft, using a 4" curb height, as shown in Attachment #1. The calculated results are derived using the data from the FEMA LOMR study data cited above. None of the source data justifies or supports calculations to the hundredth of a foot. Calculated results indicates that any possible change in water surface elevation using either curb height has no significant effect on the existing flood water level.
5. Considering hydrodynamic effects from flow velocity at 6.4 fps and assuming that the 4-inch curb fully stop localized flow in the planter vicinity (which does not happen, the water is diverted around the bullnose end), the change in height across the floodway is 0.02' assuming 100% of the difference in velocity head is converted to static head. See hydraulic calcs in Attachment 5. Since the parking lot islands are approximately 5-inches (0.4') lower than the existing parking lot elevation (to divert low flows for water quality) there will be a net drop in the total energy line resulting in no increase in base flood height due to hydrodynamic affects.

Therefore, it can be safely determined that the change in water surface elevation resulting from the proposed improvement will not have any impact on the Base Flood Elevation (BFE).

I trust this review is sufficient to allay any concerns about possible changes to the water surface elevation within the flood zone.

Prepared by:

Ken Zimmerman, PE
Technical Manager

Reviewed by:

Mark Nero, P.E.
Senior Project Manager
Fusco Engineering Inc.

Figures and Attachments:

Attachment 1 Volume Calculations

Attachment 2 Existing Conditions

Attachment 3 Proposed Conditions

Attachment 4 National Flood Hazard Layer FIRMette

Figure 1 FEMA Flood Profile, Northern Split

Figure 2 FEMA Floodway Data, Northern Split

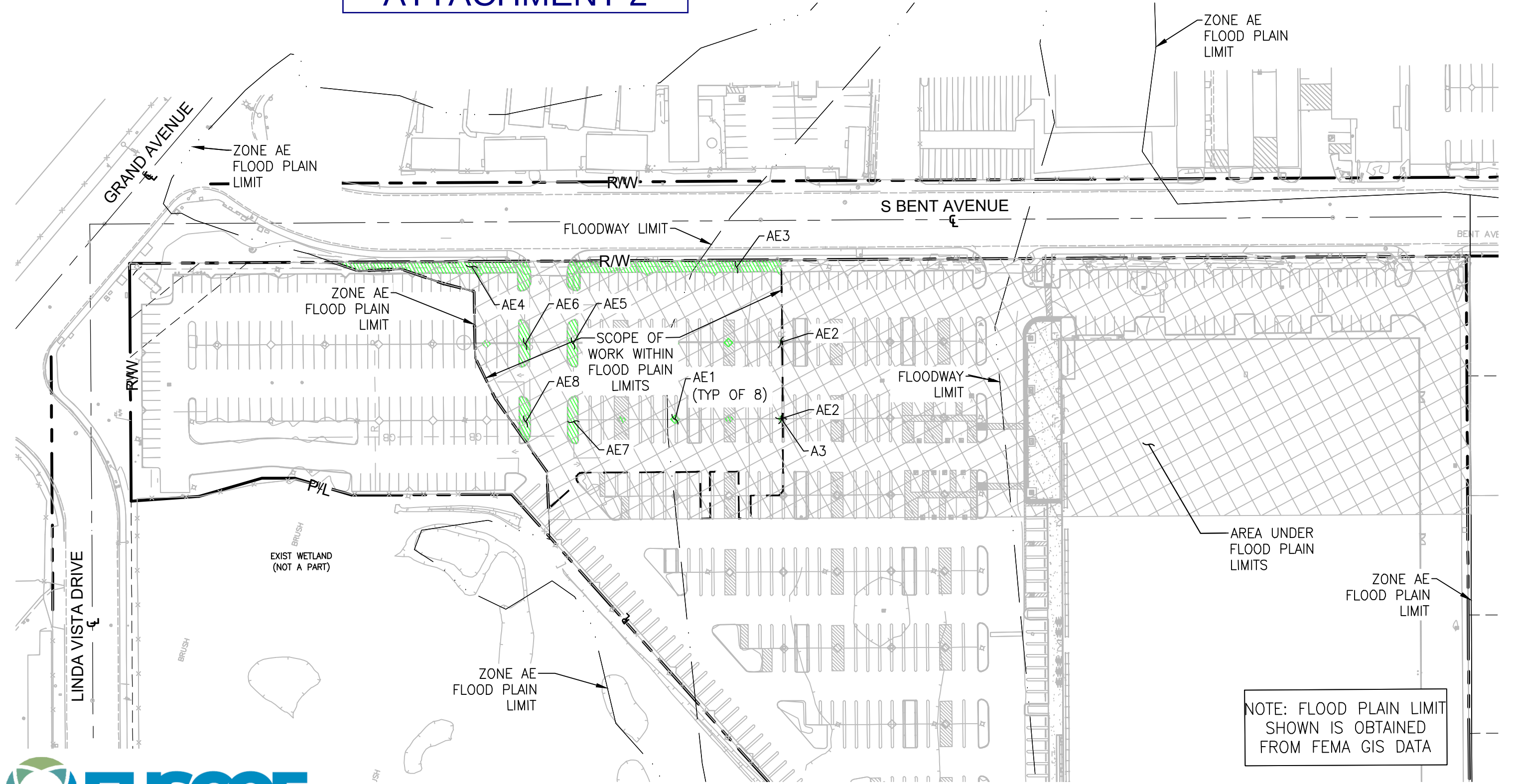
Attachment 5 Flood Way Hydraulic Calcs

Attachment 6 Precise Grading Plan

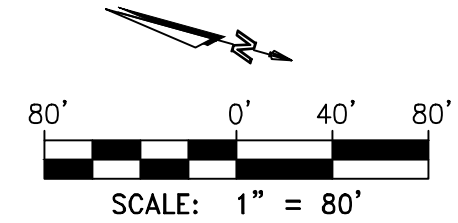
ATTACHMENT 1

Proposed Conditions			Existing Conditions		
Island areas <					

ATTACHMENT 2



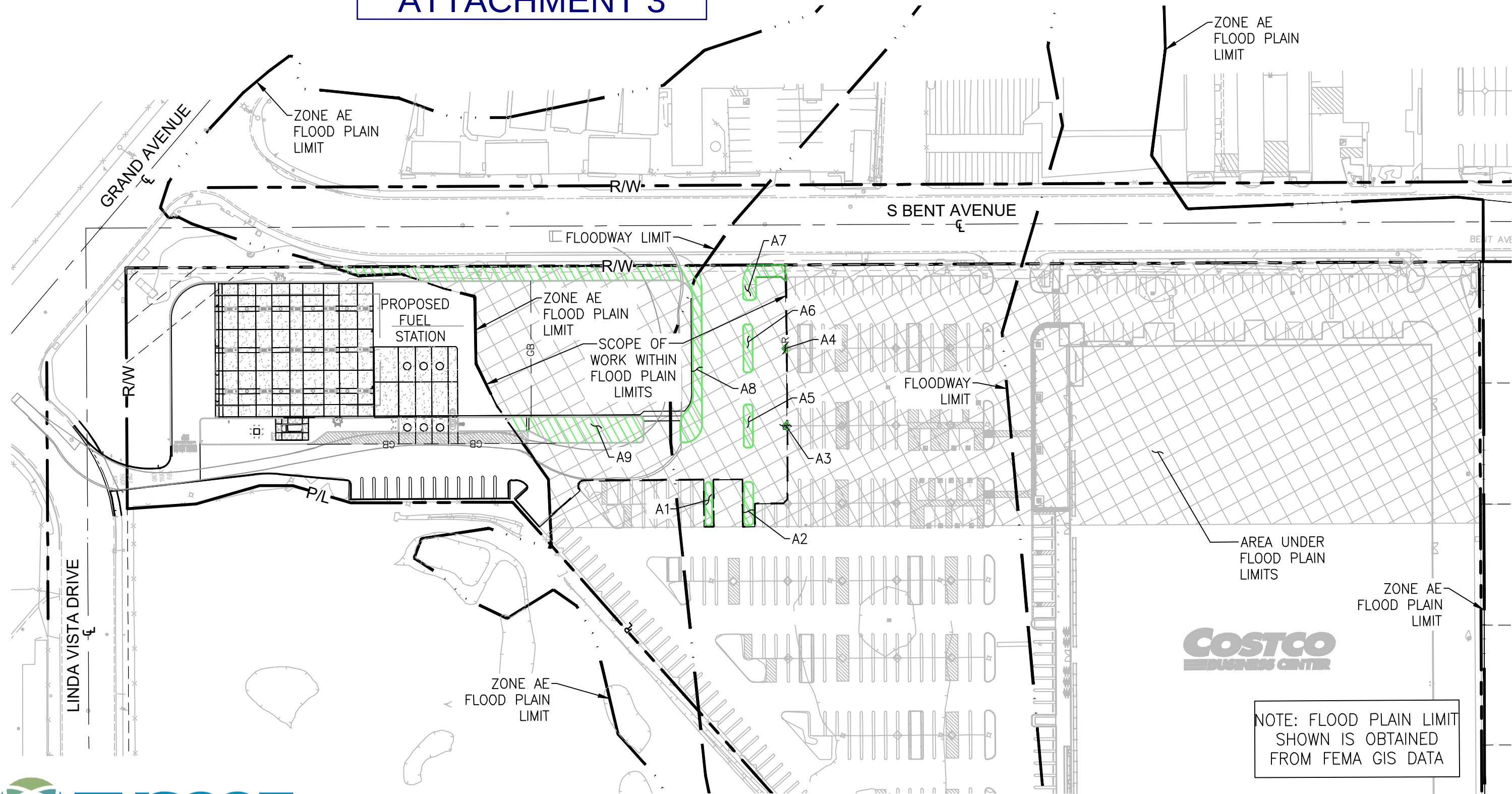
15535 Sand Canyon Ave Suite 100
Irvine, California 92618 949.474.1960
fuscoe.com



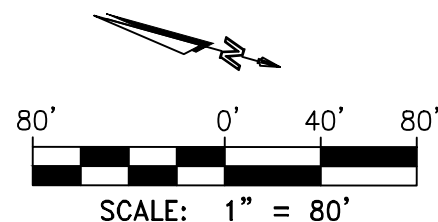
EXISTING CONDITIONS
01/09/24
◇ EXIST PLANTERS WITHIN FLOODWAY
6" CURB - VOLUME = 2,550 CF

FLOOD ZONE EXHIBIT
COSTCO GAS STATION
SAN MARCOS

ATTACHMENT 3



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PROPOSED CONDITIONS

01/09/24

- PROPOSED PLANTER LOCATIONS WITHIN FLOOD PLAIN
- 6" CURB - VOLUME = 4,250 CF
- 4" CURB - VOLUME = 2,800 CF

FLOOD ZONE EXHIBIT
COSTCO GAS STATION
SAN MARCOS

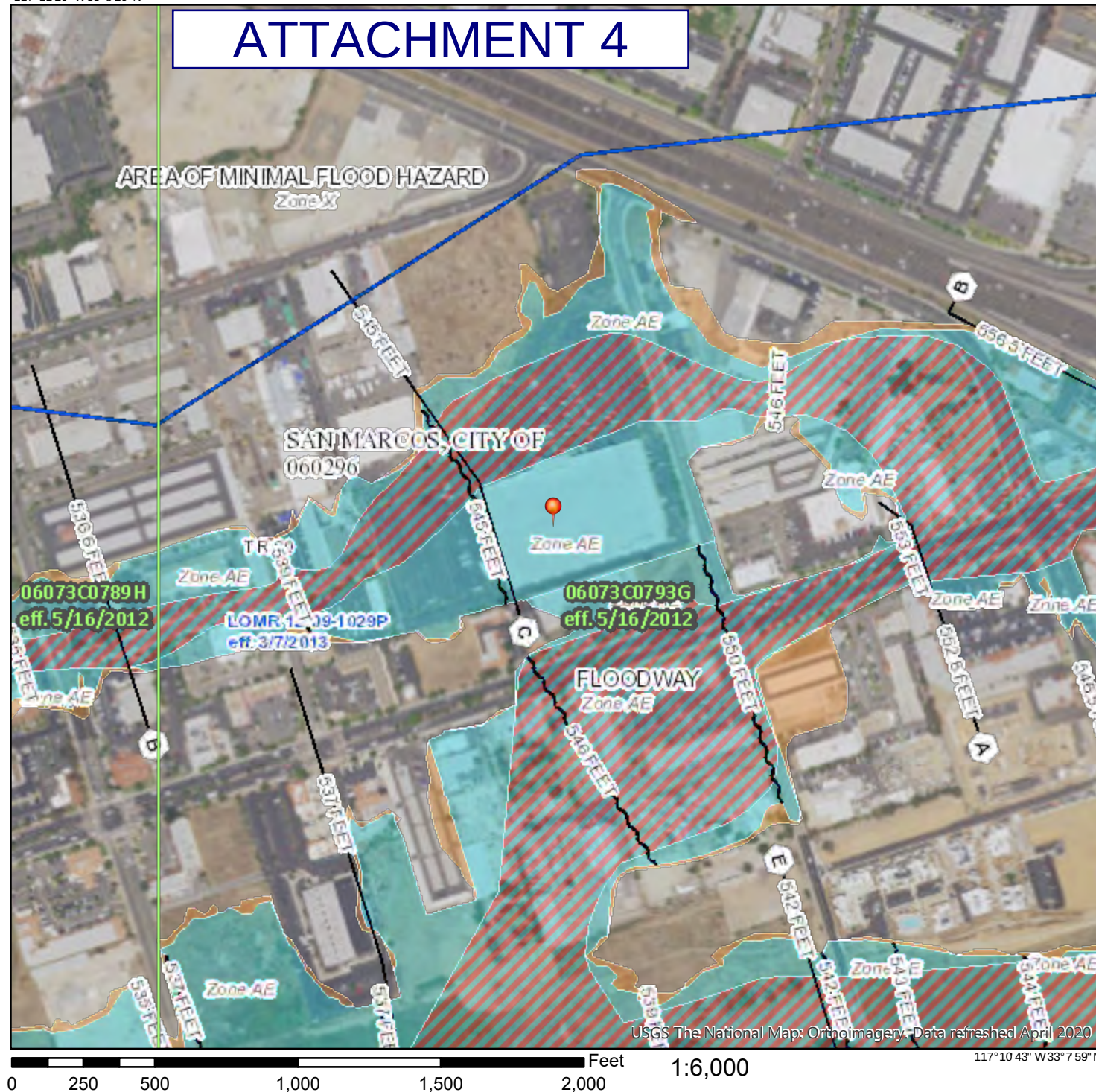
SHEET 1 OF 1

National Flood Hazard Layer FIRMette



117° 11' 20" W 33° 8' 29" N

ATTACHMENT 4



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/25/2020 at 5:03 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

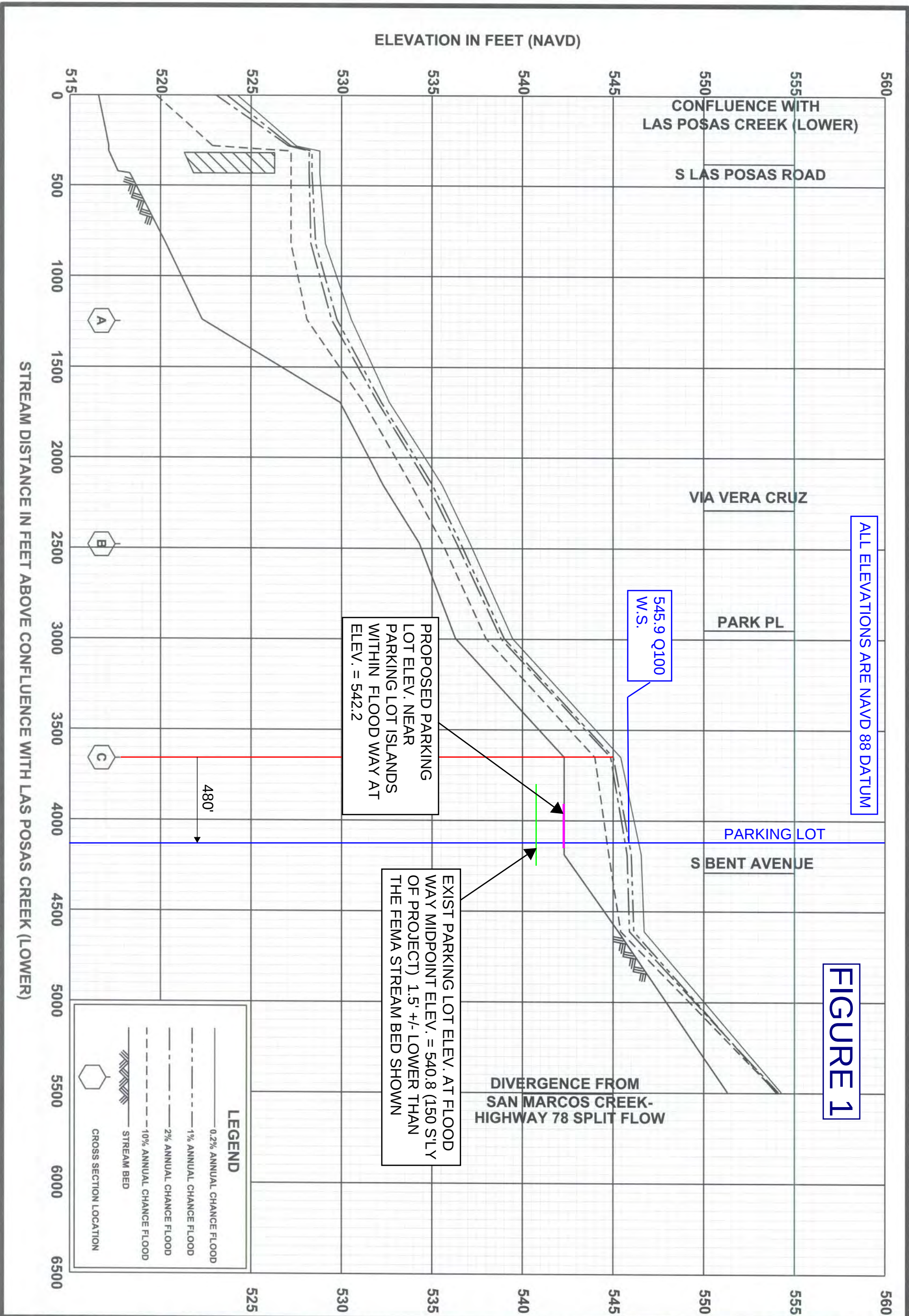


FIGURE 2

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
San Marcos Creek - Highway 78 Split Flow								
A	2,651 ¹	138	265	7.9	552.8	552.8	552.8	0.0
B	3,470 ¹	216	452	8.2	556.5	556.5	556.5	0.0
C	4,440 ¹	168	433	8.6	562.3	562.3	562.3	0.0
Northern Split								
A	1,248 ²	100	438	4.9	529.8	529.8	530.7	0.9
B	2,480 ²	155	289	7.4	536.6	536.6	536.6	0.0
C	3,660 ²	230	333	6.4	545.0	545.0	545.0	0.0

¹ Feet above Confluence with San Marcos Creek

² Feet above Confluence with Las Posas Creek (Lower)

**REVISED TO
REFLECT LOMR
EFFECTIVE: March 7, 2013**

T
A
B
L
E
1
3

FEDERAL EMERGENCY MANAGEMENT AGENCY
SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

FLOODWAY DATA

SAN MARCOS CREEK-HIGHWAY 78 SPLIT FLOW -
NORTHERN SPLIT

ATTACHMENT 5

FLOOD WAY HYDRAULICS

$$V_0 = 6.4 \text{ ft/s} \quad (\text{Per FEMA Fig 2})$$

$$A_0 = 333 \text{ ft}^2 \quad (\text{Per FEMA Fig 2})$$

$$KE_0 = \frac{1}{2} \left(\frac{V_0^2}{g} \right)$$

$$= \frac{(6.4 \text{ ft/s})^2}{2 \cdot 32.2 \text{ ft/s}^2}$$

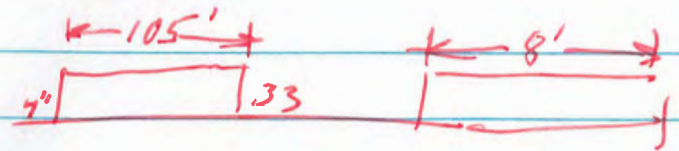
$$= \frac{40.96}{64.4}$$

$$= 0.636 \text{ ft}$$

$$Q_0 = VA = 6.4 \text{ ft/s} (333 \text{ ft}^2)$$

$$= 2131.2 \text{ ft}^3/\text{s}$$

FLOWRATE IN FLOODWAY



PARKING LOT ISLAND X-SECTION

$$A_{corb} = 0.33(10.5) + 0.35(8)$$

$$= 6.2 \text{ ft}^2$$

$$A_1 = A_0 - A_{corb}$$

$$= 333 - 6.2$$

$$= 326.8 \text{ ft}^2$$

FLOODWAY X-SECTION AREA WITH DISPLACEMENT BY PARKING LOT ISLANDS

$$Q_1 = V_1 A_1$$

Q doesn't change so $Q_0 = Q_1$

$$V_1 = \frac{Q_1}{A_1} = \frac{2131.2 \text{ ft}^3/\text{s}}{326.8 \text{ ft}^2} = 6.52 \text{ ft/s}$$

FLOODWAY VELOCITY WITH PKING LOT ISLANDS

$$KE_1 = \frac{1}{2} \left(\frac{V_1^2}{g} \right)$$

$$= \frac{(6.5 \text{ ft/s})^2}{2 \cdot 32.2 \text{ ft/s}^2}$$

$$= \frac{42.25}{64.4}$$

$$= 0.656 \text{ ft}$$

FLOW ENERGY WITH PKING LOT ISLANDS

$$\Delta E = KE_1 - KE_0$$

$$= 0.656 - 0.636$$

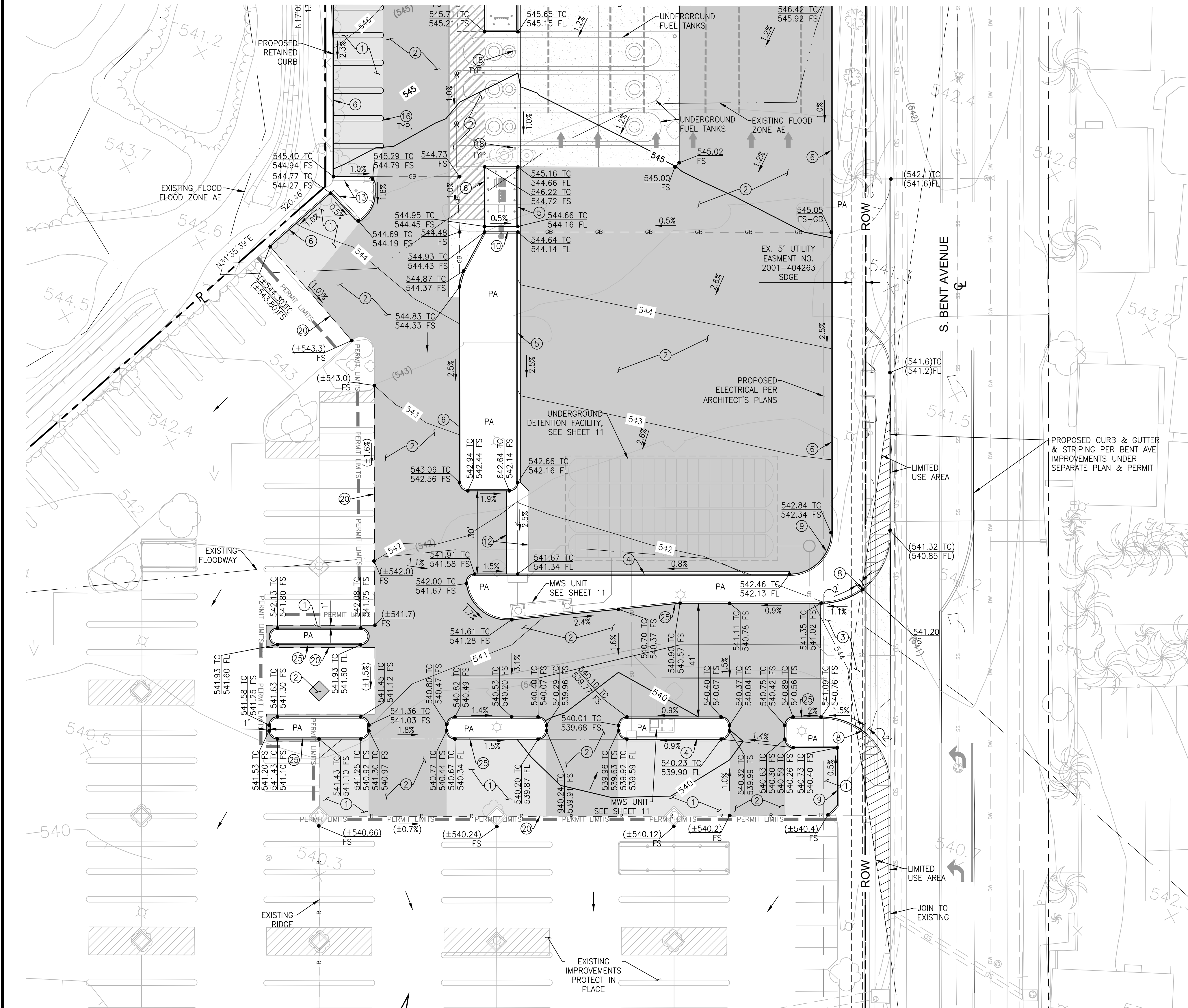
$$= 0.02$$

$$\Delta h = \Delta E$$

$$= 0.02$$

FLOW ENERGY WITH PKING LOT ISLANDS

SEE SHEET 6



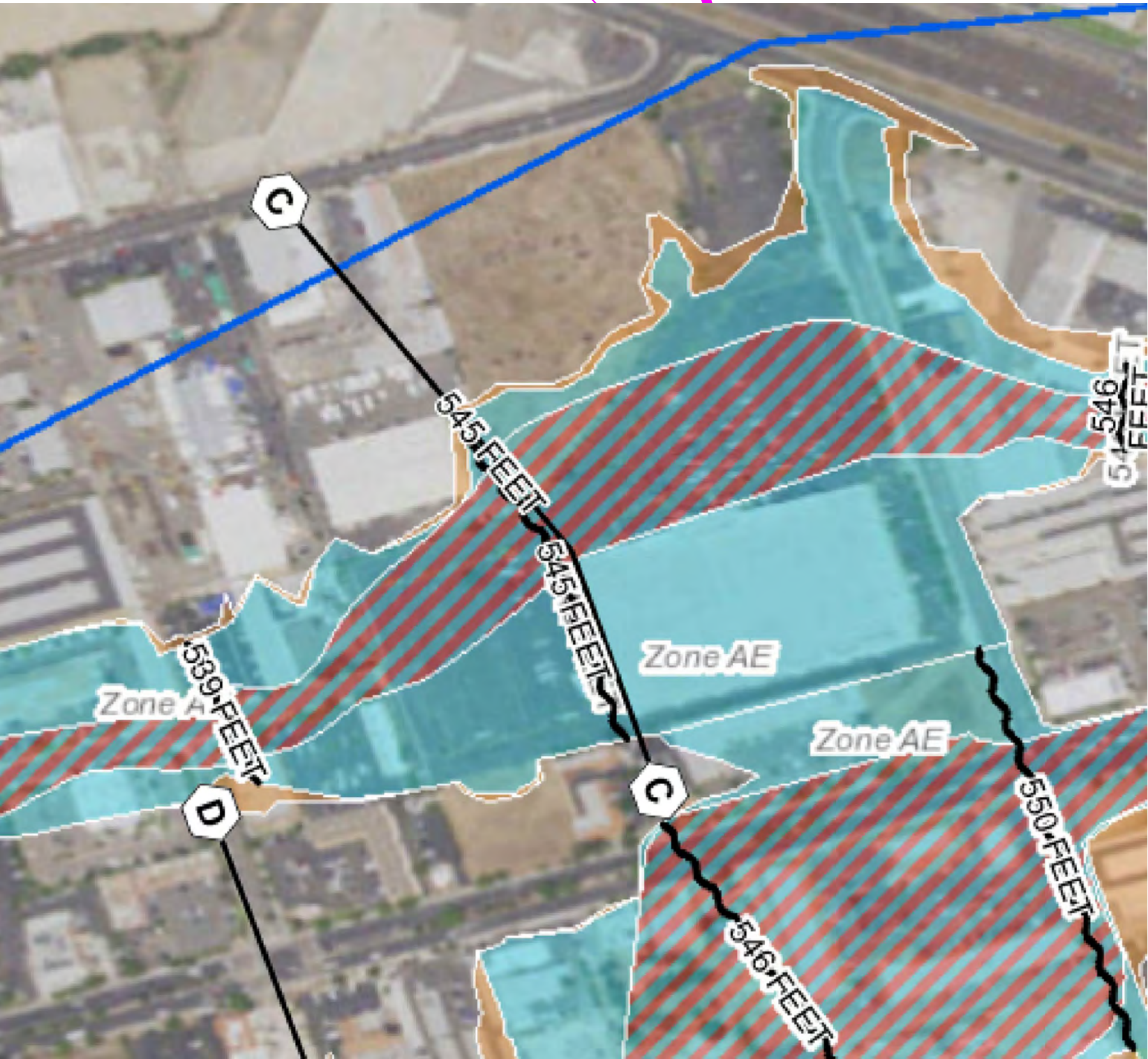
GRADING NOTES:

1. DAMAGE TO EXISTING PROPERTY OUTSIDE OF IMPROVEMENT AREAS ARE TO BE REPAIRED TO THE OWNER'S SATISFACTION AT THE CONTRACTOR'S EXPENSE.
2. STRIPING AND SIGNING OF THE PARKING LOT PER ARCHITECT'S PLANS.
3. ENSURE THAT ALL PROPOSED PAVEMENT JOINS EXISTING PAVEMENT FLUSH WITH NO EXPOSED VERTICAL FACES OR EDGES. CONCRETE GRADE AND SLOPES ARE SUBJECT TO ADA INSPECTION.
4. CURB RADIUS ARE 3' AT FACE OF CURB UNLESS NOTED OTHERWISE.
5. THE REGULATORY FLOODWAY SHOWN PER LOMR NO:12-09-1029P, DATED MARCH 7, 2013.

PRECISE GRADING NOTES

NO.	DESCRIPTION
(1)	CONSTRUCT 3" AC OVER 5" CLASS II BASE PER GEOTECHNICAL RECOMMENDATIONS (PARKING STALL)
(2)	CONSTRUCT 5" AC OVER 6.5" CLASS II BASE PER GEOTECHNICAL RECOMMENDATIONS (DRIVE AISLE)
(3)	CONSTRUCT 7" PCC PAVEMENT OVER 4" CLASS II BASE PER GEOTECHNICAL RECOMMENDATIONS
(4)	CONSTRUCT 4" CURB & GUTTER PER MODIFIED COSTCO STD. DETAIL 08-17, SEE DETAIL 4 ON SHEET 9, JOINTS PER SPPWC 112-2
(5)	CONSTRUCT 6" CURB & GUTTER PER COSTCO STD. DETAIL 08-17, SEE DETAIL 4 ON SHEET 9, JOINTS PER SPPWC 112-2
(6)	CONSTRUCT 6" CURB ONLY PER COSTCO STD. DETAIL 08-17, SEE DETAIL 6 ON SHEET 9, JOINTS PER SPPWC 112-2
(7)	CONSTRUCT 0" CURB PER DETAIL 7 ON SHEET 9, JOINTS PER SPPWC 112-2
(8)	CONSTRUCT 0" TO 6" CURB TRANSITION PER DETAIL 8 ON SHEET 9
(9)	CONSTRUCT 4" TO 6" CURB TRANSITION PER DETAIL 9 ON SHEET 9
(10)	CONSTRUCT 24" WIDE CONCRETE CHANNEL PER DETAIL 10 ON SHEET 9
(11)	CONSTRUCT 3" WIDE RIBBON GUTTER PER DETAIL 11 ON SHEET 9
(12)	CONSTRUCT 8" WIDE RIBBON GUTTER PER DETAIL 12 ON SHEET 9
(13)	CONSTRUCT 12" WIDE CONCRETE STRIP PER COSTCO STD. DETAIL 08-18, SEE DETAIL 13 ON SHEET 9
(14)	CONSTRUCT 6" CONCRETE SIDEWALK; THICKNESS, COLOR, TEXTURE, AND SCORING PER COSTCO STD DETAIL 09-11, SEE DETAIL 14 ON SHEET 9
(15)	CONSTRUCT LOCAL DEPRESSION PER CITY OF SAN MARCOS STD. XXXXXX
(16)	PROPOSED STALL STRIPING, SIGNAGE, AND PAVEMENT MARKINGS PER ARCHITECT'S PLANS
(17)	INSTALL CART CORRAL PER ARCHITECT'S PLANS
(18)	INSTALL BOLLARDS PER ARCHITECT'S PLANS
(19)	INSTALL WIRE BARRIER PER ARCHITECT'S PLANS
(20)	SAWCUT STRAIGHT AND CLEAN
(21)	CONSTRUCT CONTROLLER ENCLOSURE PER ARCHITECT'S PLANS, FOR AN ENLARGED DETAIL OF GRADING AROUND THE ENCLOSURE, SEE DETAIL ON SHEET 8
(22)	CONSTRUCT 0" TO 5" CURB TRANSITION PER DETAIL 22 ON SHEET 9
(23)	CONSTRUCT 5" TO 4" CURB TRANSITION PER DETAIL 23 ON SHEET 9
(25)	CONSTRUCT 4" CURB ONLY PER COSTCO STD. DETAIL 08-17, SEE DETAIL 6 ON SHEET 9, JOINTS PER SPPWC 112-2

AREA OF PROPOSED GAS STATION



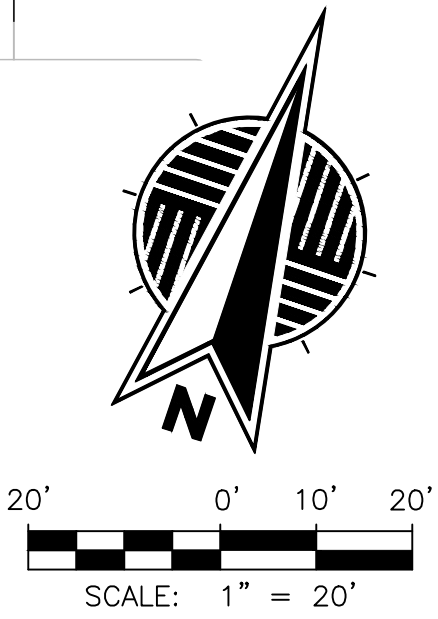
NOT TO SCALE

PREPARED BY:

FUSCOE
ENGINEERING

15535 Sand Canyon Ave, Suite 100
Irvine, California 92618
949.474.1960
fuscoe.com

MARK NERO RCB NO.80066 EXP. 09/30/26



Underground Service Alert of Southern California Call: TOLL FREE 811	RECOMMENDED FOR APPROVAL		APPROVED FOR CONSTRUCTION		ENGINEER OF WORK		BENCH MARK		CITY OF SAN MARCOS		IPXX-XXXX	
	By: Kyrenne Chua, Principal Civil Engineer R.C.E.: 91911 exp.: 3/31/2025		By: Isaac Etchamendy, City Engineer R.C.E.: 81294 exp.: 9/30/2025		By: FUSCOE ENGINEERING, INC Date:08/20/24 Name: MARK NERO R.C.E.: 80066 exp.: 9/30/26		Description: 3" BRASS DISC IN STD ST C/L WELL MON ENCLOSURE, STAMPED "CSM RCE 16421" Location: AT INT LINDA VISTA DR & GRAND AVE, PT FD & TIED USING GPS ON ROS 13928 Record From: RECORD OF SURVEY 13928 Elev.: 543.629 Datum: NGVD29		CONCEPTUAL GRADING PLANS FOR: COSTCO GAS STATION PRECISE GRADING PLAN		PLANNING PROJECT NO. SDPXX-XXXX	
											Sheet 7 of 20	