Appendix I:
Utilities and Service Systems Supporting Information

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CITY OF PLEASANTON

TECHNICAL MEMORANDUM

TRACT 8569 (PONDEROSA HOMES) PROJECT

HYDRAULIC ANALYSIS

FINAL

June 2024

AKEL ENGINEERING GROUP, INC.

AKEL
ENGINEERING GROUP, INC.

June 4th, 2024

City of Pleasanton, Engineering Department
P.O. Box 520, 200 Old Bernal Avenue
Pleasanton, CA, 94566

Attention: Michael Stella, P.E./QSD
Senior Civil Engineer, Land Development

Subject: Technical Memorandum – Hydraulic Analysis for Tract 8569 (Ponderosa Homes)

We are pleased to submit this technical memorandum documenting the hydraulic modeling and analysis for Tract 8569 - Ponderosa Homes (Project). This analysis incorporates development information received from the City of Pleasanton (City) Staff and utilizes the City's distribution system evaluation criteria.

The following memorandum documents the hydraulic analysis to determine if the existing and proposed infrastructure adheres to the City's design criteria for pipeline velocities, system pressures, and the available fire flow.

1.0 PROJECT DEVELOPMENT

The Project consists of 30 single-family residential (SFR) lots south of Dublin Canyon Road near Laurel Creek Road. The project has significant elevation changes (pad elevation ranges from 446 feet to 596 feet) so an analysis was performed to determine the required infrastructure to connect to the City's Dublin Canyon Pressure Zone and the Moller 770 Pressure Zone. **Appendix A** contains the water utility plan for the Project.

2.0 EVALUATION CRITERIA AND WATER USE FACTORS

The hydraulic analysis will utilize the City's water system performance and design criteria to identify system capacity deficiencies, size water mains, and determine impacts to storage reservoirs and pump stations. **Table 1** documents the performance and design criteria and includes peaking factors and required fire flows for the development.

3.0 PROJECTED DOMESTIC WATER DEMANDS

The number of proposed units along with the domestic water demand factors were used to calculate the water demands for the Project. A single-family residential water demand factor of 390 gallon per day per unit was used for estimating the water demands for the Project. The average day demand

(ADD) is estimated at 8.1 gallons per minute (gpm), and the maximum day demand (MDD) is estimated at 15.4 gpm (1.90xADD). The development demand summary is documented on **Table 2**. The fire flow requirement for single-family residences is 1,500 gpm for a duration of 2 hours.

4.0 HYDRAULIC MODELING ANALYSIS

The hydraulic analysis utilized the calibrated hydraulic model to evaluate three connection alternatives to the existing system as documented on **Figure 1** and summarized as follows:

- **Alternative 1**: Connection to Dublin Canyon Pressure Zone.
- **Alternative 2:** Connection to Dublin Canyon Pressure Zone via a Hydro-Pneumatic Pump Station.
- **Alternative 3:** Connection to the Moller 770 Pressure Zone.

The proposed water system pipelines and other recommend infrastructure will be included for each scenario and an analysis will be performed for average day demands (ADD), maximum day demands (MDD), peak hour demands (PHD), and during MDD plus a 1,500 gpm fire flow for 2 hours (MDD+FF). There are 2 lots that will connect separately from the rest of the units and directly to the Dublin Canyon Pressure Zone.

Alternative 1 – Dublin Canyon Connection Results:

Alternative 1 is a direct connection to the Dublin Canyon Pressure Zone near Dublin Canyon Road and Canyon Meadows Drive as documented on **Figure 2**.

- **Average Day Demand Evaluation:** Under average day demands, the hydraulic model predicts the Project will experience service pressures of approximately 25 - 88 psi as documented on **Figure 2**. Most of the lots will be under the pressure design criteria of 40 psi.

- **Maximum Day Demand Evaluation:** Under maximum day demands, the hydraulic model predicts the Project will experience service pressures of approximately 22 ~ 84 psi as documented on **Figure 2**. Most of the lots will be under the pressure design criteria of 40 psi.

- **Peak Hour Demand Evaluation:** Under peak hour demands, the hydraulic model predicts the Project will experience service pressures of approximately 20 ~ 84 psi as documented on **Figure 2**. Most of the lots will be under the pressure design criteria of 40 psi.

- **Maximum Day Demand plus Fire Flow Evaluation:** The fire flow analysis consisted of using the MDD in the hydraulic model and applying hypothetical fire flows. The analysis indicates that the proposed hydrant locations and pipelines are unable to supply the 1,500-gpm fire flow requirement. The available fire flows at a pressure greater than 20 psi are documented on **Figure 2.**

- **Pipeline Velocities:** The maximum pipeline velocities predicted during peak hour demands are also documented on Figure 2. The proposed 8-inch mains are under the pipeline criteria of 10 fps during PHDs with a maximum velocity of approximately 0.1 fps.

The Dublin Canyon Pressure Zone is unable to provide sufficient service pressures and fire flow protection due to the elevation gain of the project.

Alternative 2 – Dublin Canyon Connection + Hydro-Pneumatic Pump Station Results:

Alternative 2 is a connection to the Dublin Canyon Pressure Zone near Dublin Canon Road and Canyon Meadows Drive with a hydro-pneumatic pump station to supply the domestic water demand and fire flow as documented on Figure 3.

- **Average Day Demand Evaluation:** Under average day demands, the hydraulic model predicts the Project will experience service pressures of approximately 50 - 88 psi as documented on Figure 3.

- **Maximum Day Demand Evaluation:** Under maximum day demands, the hydraulic model predicts the Project will experience service pressures of approximately 45 ~ 84 psi as documented on Figure 3.

- **Peak Hour Demand Evaluation:** Under peak hour demands, the hydraulic model predicts the Project will experience service pressures of approximately 40 ~ 84 psi as documented on Figure 3.

- **Maximum Day Demand plus Fire Flow Evaluation:** The fire flow analysis consisted of using the MDD in the hydraulic model and applying hypothetical fire flows. The analysis indicates that the proposed hydrant locations and pipelines can supply the 1,500-gpm fire flow requirement. The available fire flows at a pressure greater than 20 psi are documented on Figure 3.

- **Pipeline Velocities:** The maximum pipeline velocities predicted during peak hour demands are also documented on Figure 3. The proposed 8-inch mains are under the pipeline criteria of 10 fps during PHDs with a maximum velocity of approximately 0.1 fps.

The proposed hydro-pneumatic pump station will require a firm capacity of 26 gpm (1 duty + 1 standby pump) to supply the domestic water demands and a 1,500 gpm fire flow pump.

Alternative 3 – Moller 770 Connection Results:

Alternative 3 is a connection to the Moller 770 Pressure Zone via a new 10-inch pipeline in the Laurel Creek Emergency Vehicle Access Road and connecting to the existing system in Crosby Drive as documented on Figure 4.

- **Average Day Demand Evaluation:** Under average day demands, the hydraulic model predicts the Project will experience service pressures of approximately 80 - 116 psi as documented on **Figure 4**.

- **Maximum Day Demand Evaluation:** Under maximum day demands, the hydraulic model predicts the Project will experience service pressures of approximately 77 ~ 113 psi as documented on **Figure 4**.

- **Peak Hour Demand Evaluation:** Under peak hour demands, the hydraulic model predicts the Project will experience service pressures of approximately 77 ~ 113 psi as documented on **Figure 4**.

- **Maximum Day Demand plus Fire Flow Evaluation:** The fire flow analysis consisted of using the MDD in the hydraulic model and applying hypothetical fire flows. The analysis indicates that the proposed hydrant locations and pipelines can supply the 1,500-gpm fire flow requirement. The available fire flows at a pressure greater than 20 psi are documented on **Figure 4.**

- **Pipeline Velocities:** The maximum pipeline velocities predicted during peak hour demands are also documented on **Figure 4**. The proposed 8-inch mains are under the pipeline criteria of 10 fps during PHDs with a maximum velocity of approximately 0.1 fps.

The connection to the Moller 770 Pressure Zone will require approximately 2,450 feet of 10-inch pipeline in the Laurel Creek Emergency Vehicle Access Road connecting to the existing 12-inch main in Crosby Drive to supply the project. Due to the steep terrain and potential for soil creep, it is recommended that a fully restrained pipeline be utilized.

5.0 STORAGE AND PUMPING INFRASTRUCTURE IMPACTS

The total required storage criteria includes provisions for Operation (25% of MDD), Emergency (50% of MDD), and Fire Flow. The required storage for Tract 8569 is summarized as follows:

Project Required Storage:

- Operational Storage: 0.006 MG
- Emergency Storage: 0.011 MG
- Fire Flow Storage: 0.18 MG
- Total Storage Impacts: 0.20 MG

Alternative 1 and 2 – Dublin Canyon Storage Impacts:

The current fire flow storage requirement in the Dublin Canyon Pressure Zone is 0.42 MG (3,500 gpm x 2 hrs), which is larger than the Tract 8569 requirement, therefore no additional fire storage is required for the Project resulting with a total storage requirement of 0.017 MG. The Dublin Canyon

Pressure Zone has a surplus of 0.12 MG and can accommodate Tract 8569 storage requirement as documented on Table 3.

Alternative 3 – Moller 770 Storage Impacts:

The current fire flow storage requirement in the Moller 770 Pressure Zone is 0.24 MG (2,000 gpm x 2 hrs), which is larger than the Tract 8569 requirement, therefore no additional fire storage is required for the Project resulting with a total storage requirement of 0.017 MG. The Moller Pressure Zone has a surplus of 0.29 MG and can accommodate Tract 8569 storage requirement as documented on Table 3.

6.0 PUMP STATION IMPACTS

The pumping requirement criteria is 150% of the maximum day demand. This results in a pumping requirement of 23 gpm for Tract 8569.

Alternative 1 and 2 – Dublin Canyon Pump Station Impacts:

The Dublin Canyon Pressure Zone has a surplus of 990 gpm and can accommodate the Tract 8569 pumping requirement as documented on Table 4.

Alternative 3 – Moller 770 Storage Pump Station Impacts:

The Moller 770 Pressure Zone has a surplus of 230 gpm and can accommodate the Tract 8569 pumping requirement as documented on Table 4.

7.0 ANALYSIS SUMMARY

The hydraulic analysis evaluated the existing and proposed pipelines to verify the distribution mains and service pressures were within the City's performance and design criteria.

Hydraulic Analysis Summary: The hydraulic analysis indicates the following:

- **Alternative 1**: The Dublin Canyon Pressure Zone does not maintain a high enough hydraulic grade so pressures and available fire flows in the Project will be under criteria (Figure 2).
- **Alternative 2**: Tract 8569 will require a hydro-pneumatic pump station connected to the Dublin Canyon Pressure Zone to maintain the required pressures and fire flows in the project (Figure 3). The proposed hydro-pneumatic pump station will require a firm capacity of 26 gpm (1 duty + 1 standby pump) to supply the domestic water demands and a 1,500 gpm fire flow pump.
- **Alternative 3**: Connecting Tract 8569 to the Moller 770 Pressure Zone will require approximately 2,450 feet of 10-inch pipeline in the Laurel Creek Emergency Vehicle Access Road connecting to the existing 12-inch main in Crosby Drive to supply the project (Figure 4). Additionally, due to the steep terrain and potential for soil creep, it is recommended that a fully restrained pipeline be utilized.

Existing System Impacts:

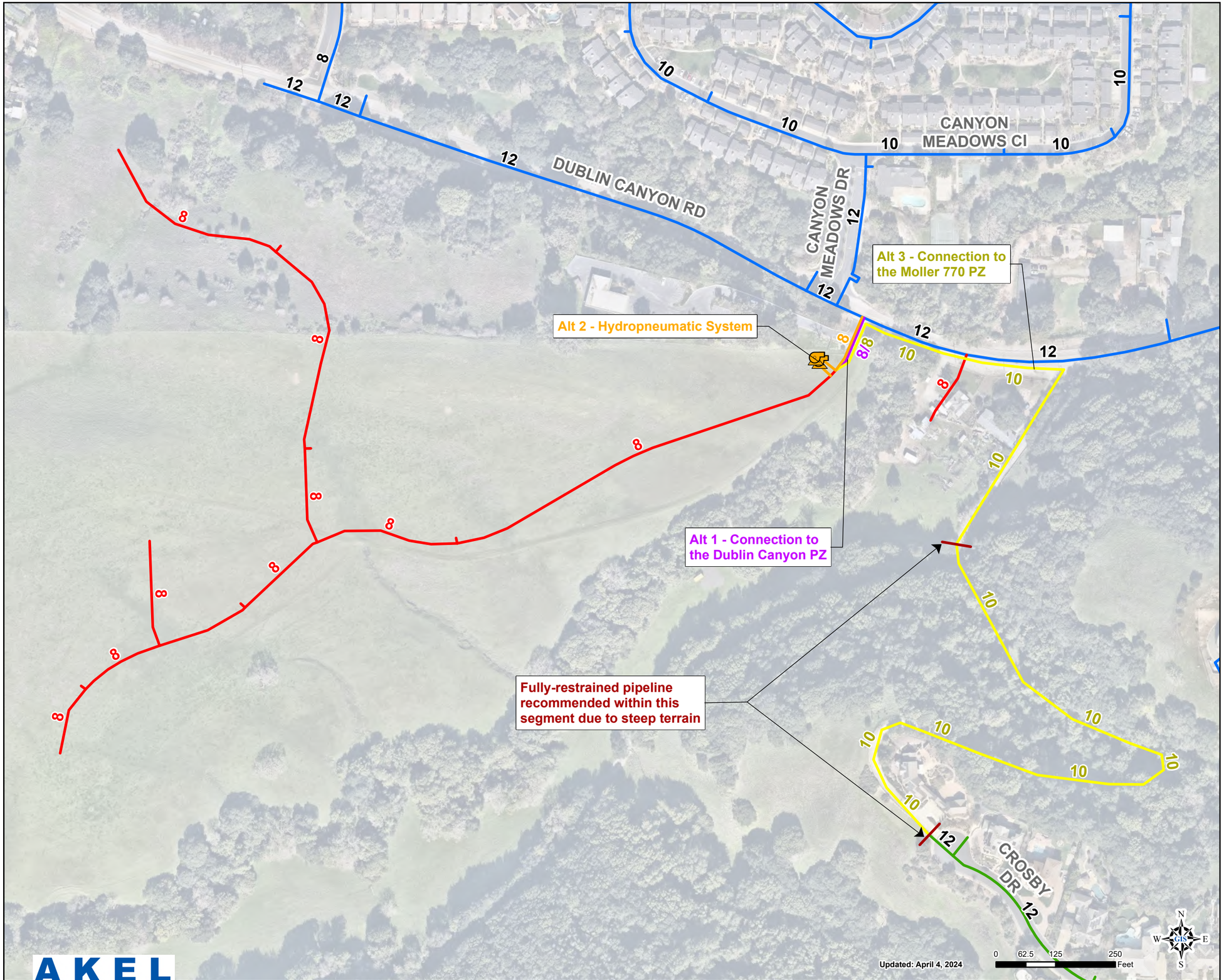
- The existing system pipelines only saw a minor increase in velocities with the addition of the project. No additional existing system pipeline improvements are recommended.
- The project will increase the storage requirement in either the Dublin Canyon or Moller 770 Pressure Zone by 0.017 MG. Both pressure zones have sufficient storage capacity to meet the increased requirement.
- The project will increase the pumping capacity requirement by approximately 23 gpm in either Dublin Canyon or the Moller 770 Pressure Zone. Both pressure zones have sufficient capacity for the increased requirement.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Senior Principal

FIGURES



Legend

Connection Alternatives

- Alternative 2 Pump Station

Pipes

- Alternative 1
- Alternative 2
- Alternative 3
- Onsite Pipes

Existing Pipes by Pressure Zone

- Dublin Canyon
- Moller 770

PRELIMINARY

Figure 1
Hydraulic Analysis Alternatives

Tract 8569
City of Pleasanton

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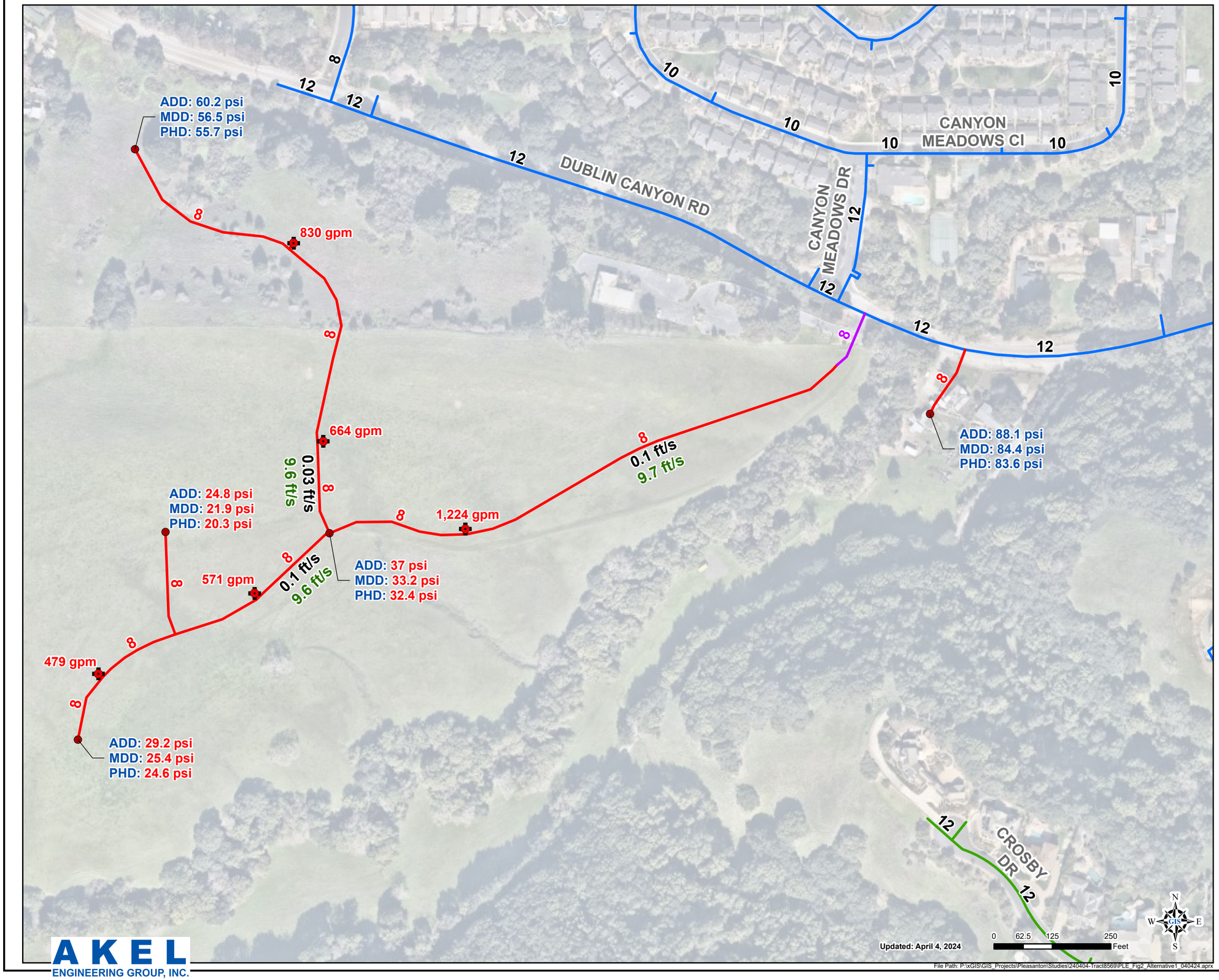

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Legend

Proposed System

- Fire Hydrants
- Pressure Junctions

1.2 ft/s MDD Velocity

1.2 ft/s MDD + FF Velocity

Pipes

- Alternative 1
- Onsite Pipes

Existing Pipes by Pressure Zones

- Dublin Canyon
- Moller 770

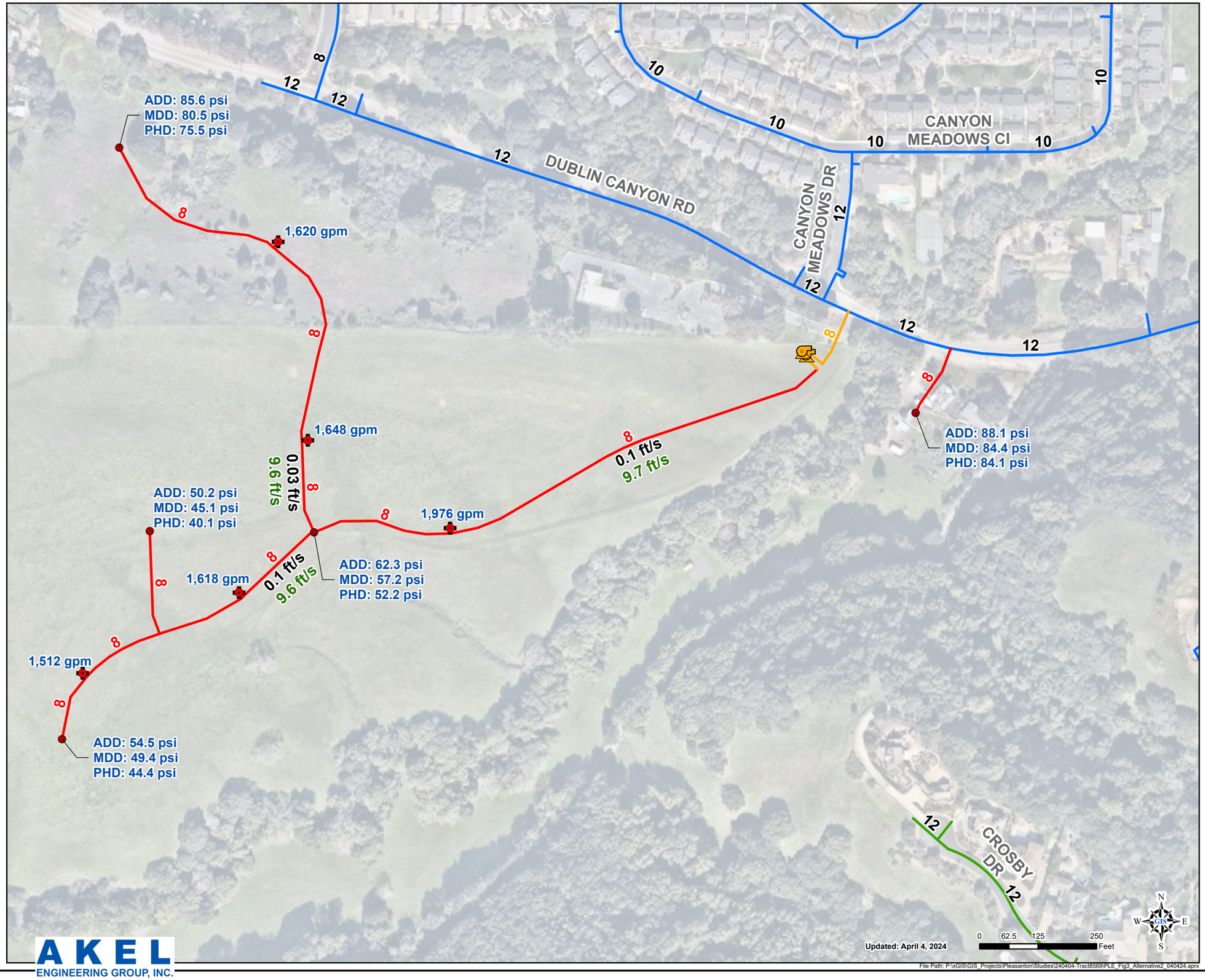
PRELIMINARY

Figure 2
Alternative 1 Analysis

Tract 8569
City of Pleasanton

THE CITY OF PLEASANTON

AKEL ENGINEERING GROUP, INC.



Legend

Proposed System

- Fire Hydrants
- Alternative 2 Pump Station
- Pressure Junctions

1.2 ft/s MDD Velocity

1.2 ft/s MDD + FF Velocity

Pipes

- Alternative 2
- Onsite Pipes

Existing Pipes by Pressure Zone

- Dublin Canyon
- Moller 770

PRELIMINARY

Figure 3
Alternative 2 Analysis

Tract 8569
City of Pleasanton

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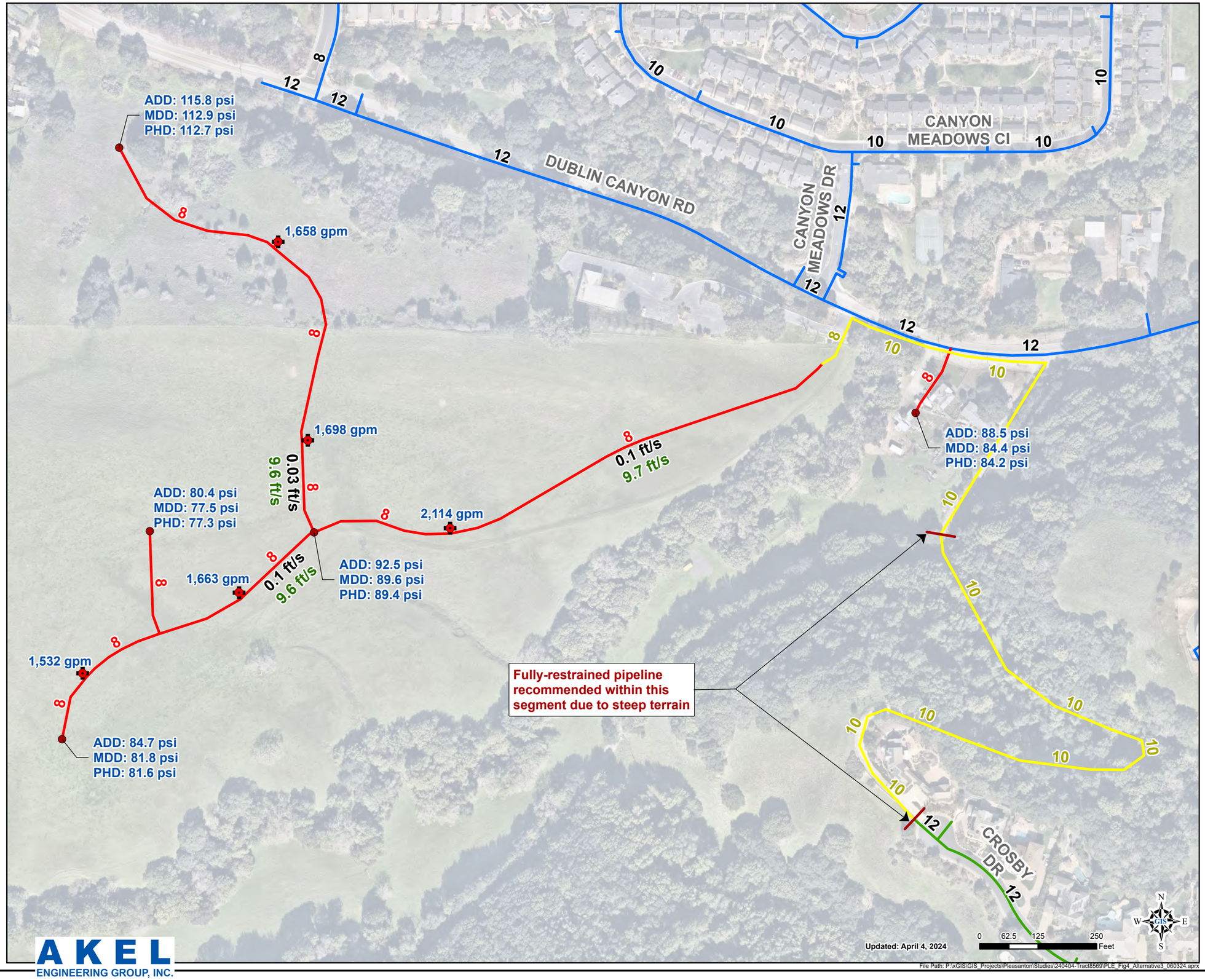


Legend

Proposed System

- Fire Hydrants
- Pressure Junctions

1.2ft/s MDD Velocity

1.2ft/s MDD + FF Velocity

Pipes

- Alternative 3
- Onsite Pipes

Existing Pipes by Pressure Zone

- Dublin Canyon
- Moller 770

PRELIMINARY

Figure 4
Alternative 3 Analysis

Tract 8569
City of Pleasanton

THE CITY OF PLEASANTON

AKEL ENGINEERING GROUP, INC.

TABLES

Table 1 Planning and Design Criteria Summary

Tract 8569 - Ponderosa Homes Project Hydraulic Analysis

City of Pleasanton

PRELIMINARY

Design Parameter	2024 Master Plan Criteria	
Supply	Supply to meet Maximum Day Demand with largest unit out or service	
Storage	Total Required Storage = Operational + Fire + Emergency	
	Operational Storage	25% of Maximum Day Demand
	Emergency Storage	50% of Maximum Day Demand
	Fire Storage (Use most critical land use within pressure zone, see fire flow requirement table)	
Distribution Mains	Distribution mains should be designed to satisfy the following criteria (except under fire flow conditions):	
	Maximum Pipeline Velocity:	10 ft/s
	Maximum Pipeline Headloss:	10 ft/1,000 ft
	Pipeline "C" Factor of 130 should be used for new pipelines	
	Minimum Pipe Size: 8-inches	
Pump Stations	Meet 150 Percent of Maximum Day Demand	
	Hydropneumatic systems to meet Peak Hour or Maximum Day Demand plus fire flow, whichever is larger.	
PRVs	PRVs should be designed to meet:	
	Peak Hour Demand + Fire Flow	
Service Pressures	Minimum Pressures:	
	Peak Hour Demand	40 psi
	MDD + Fire Flows	20 psi
Demand Peaking Factors	Maximum Month Demand	1.6 x Average Day Demand
	Maximum Day Demand	1.9 x Average Day Demand
	Peak Hour Demand (system wide)	3.2 x Average Day Demand
	Pressure Zone Peak Hour factors vary (see Appendix)	
	Minimum Month Demand	0.5 x Average Day Demand
	Peak Production Factor	2.1 x Average Day Demand
Fire Flows	Rural Residential	1,500 gpm for 2 hours (0.18 MG)
	Single-family Residential	2,000-2,500 gpm for 2 hours (0.24 - 0.30 MG)
	Multi-family Residential	2,500 gpm for 2 hours (0.30 MG)
	Social/Recreation	2,500 gpm for 2 hours (0.30 MG)
	Schools/Commercial/Public/Institution	3,500 gpm for 2 hours (0.42 MG)
	Industrial	5,000 gpm for 4 hours (1.2 MG)
	Fairgrounds	5,000 gpm for 4 hours (1.2 MG)

Table 2 Water Demand Estimate and Fire Flow Requirement

Tract 8569 - Ponderosa Homes Project Hydraulic Analysis

City of Pleasanton

PRELIMINARY

	Units	ADD[1]		MDD [2]		PHD [3]	
Domestic Water		(gpd)	(gpm)	(gpd)	(gpm)	(gpd)	(gpm)
Single-Family Residential	30	11,700	8.1	22,230	15.4	37,440	26.0
Total	**30**	**11,700**	**8.1**	**22,230**	**15.4**	**37,440**	**26.0**
Fire Flow							
	Single-Family Residential			1,500 gpm for 2 hours			

AKEL ENGINEERING GROUP, INC.

4/3/2024

Notes:

1. The domestic water demand factor for the single-family residential unit and accessory dwelling unit is estimated as 390 gpd/DU.
2. Maximum day demand factor = 1.9 x ADD
3. Peak hour demand factor = 3.2 x ADD

Table 3 Storage Capacity Analysis

Tract 8569 - Ponderosa Homes Project Hydraulic Analysis

City of Pleasanton

PRELIMINARY

Pressure Zone	Maximum Storage Capacity	Existing Storage Capacity Analysis								Storage Capacity Analysis with Tract 8569	
		Maximum Day Demand	Fire Flow			25% MDD Operational	50% MDD Emergency	Total Storage Requirements	Storage Analysis Surplus/Deficient	Tract 8569 Storage Requirement[1]	Storage Analysis Surplus/Deficient
	(MG)	(mgd)			(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
Alternative 1 and 2 Storage Analysis											
Dublin Canyon	0.67	0.18	Commercial/ School	3,500 gpm x 2 hr	0.42	0.04	0.09	**0.6**	**0.12**	**0.017**	**0.10**
Alternative 3 Storage Analysis											
Moller 770	0.89	0.48	SFR	2,000 gpm x 2 hr	0.24	0.12	0.24	**0.6**	**0.29**	**0.017**	**0.27**

Note:

4/5/2024

1. The Tract 8569 fire flow requirement is lower than the existing requirement, thus no additional fire flow storage required

Table 4 Booster Station Capacity Analysis

Tract 8569 - Ponderosa Homes Project Hydraulic Analysis

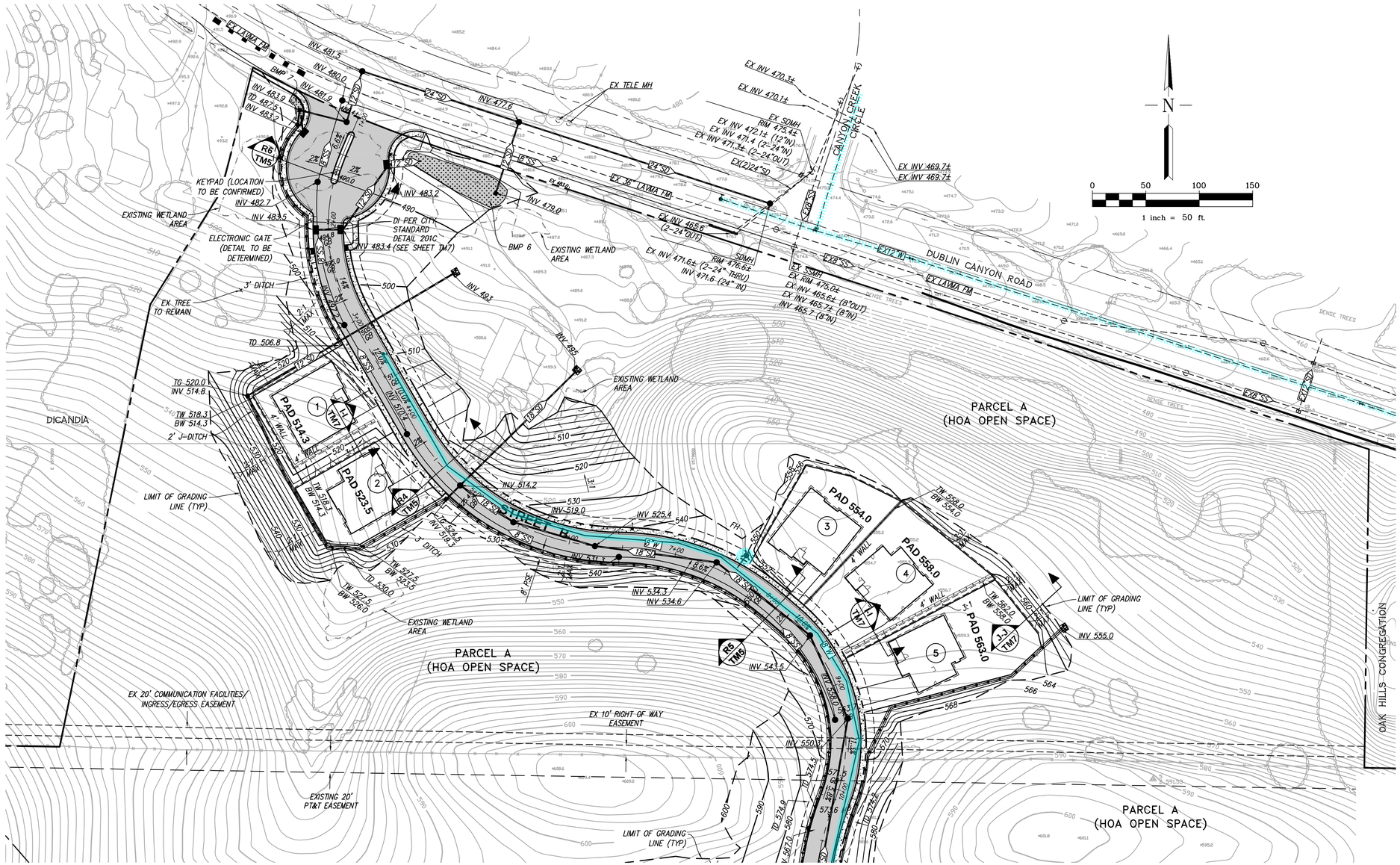
City of Pleasanton

PRELIMINARY

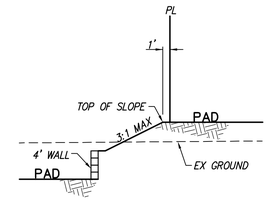
Pressure Zone (Supplied)	Booster Station Name(s)	Booster Station Firm Capacity (gpm)	Existing System Booster Station Capacity Analysis			Booster Station Capacity Analysis with Tract 8569	
			Total Demand Requirement (gpm)	Pump Station Requirement (150% MDD) (gpm)	Surplus/Deficiency +/- (gpm)	Tract 8569 Pumping Requirement (gpm)	Surplus/Deficiency with Development +/- (gpm)
Alternative 1 and 2 Storage Analysis							
Dublin Canyon	Dublin Canyon	1,175	122	182	**993**	**23**	**969**
Alternative 3 Storage Analysis							
Moller 770	Laurel Creek	723	331	496	**227**	**23**	**203**

4/5/2024

Appendix A



SEE SHEET TM8



SECTION I-I
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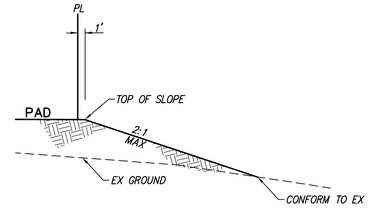

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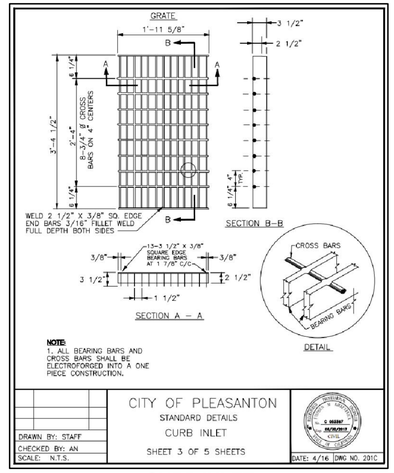

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NOTE:

SEE SHEET TM12 FOR OVERHEAD LINES EXHIBIT.

ESTIMATED EARTHWORK QUANTITIES		
ITEMS	**CUT (C.Y.)**	**FILL (C.Y.)**
LOTS, STREETS, AND BIORETENTION AREA	*127,800*	*142,200*
FOUNDATION SPOILS	*1,050*	*–*
TRENCH SPOILS	*7,800*	*–*
SWELL OF CUT MATERIAL (ASSUME 5%)	*6,830*	*–*
TOTAL	*143,480*	*142,200*

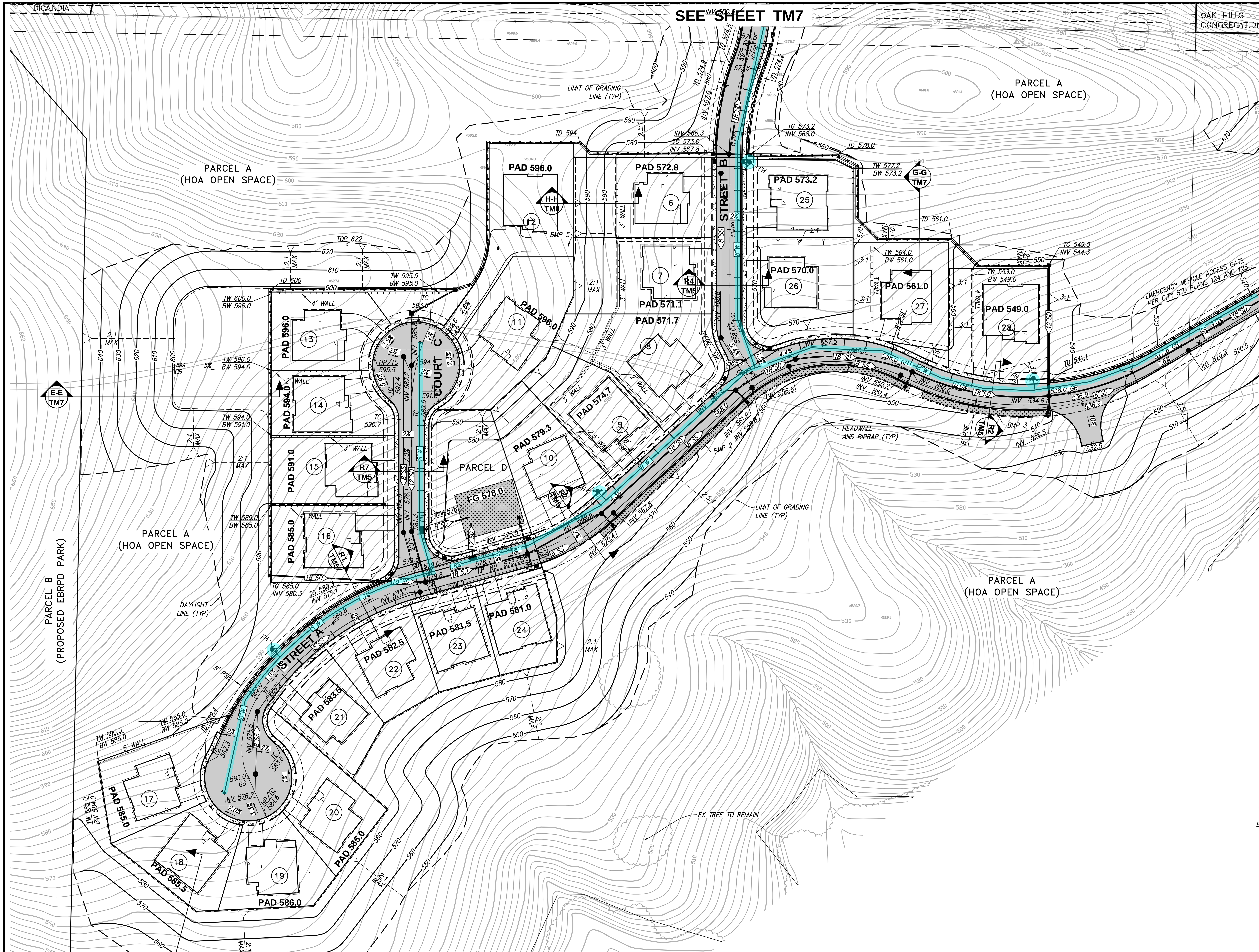
EARTHWORK NOTES:
ALL QUANTITIES SHOWN ON THIS PLAN ARE APPROXIMATE. CALCULATED CUT AND FILL ARE TO "MASS GRADE" AND EXISTING GROUND. THE ACTUAL AMOUNT OF EARTH MOVED IS VARIABLE DEPENDENT ON COMPACTION, CONSOLIDATION, STRIPPING REQUIREMENTS, AND THE CONTRACTOR'S METHOD OF OPERATION.

GRADING AND UTILITY PLAN
TRACT 8569 - HIDDEN CANYON (LESTER PROPERTY)

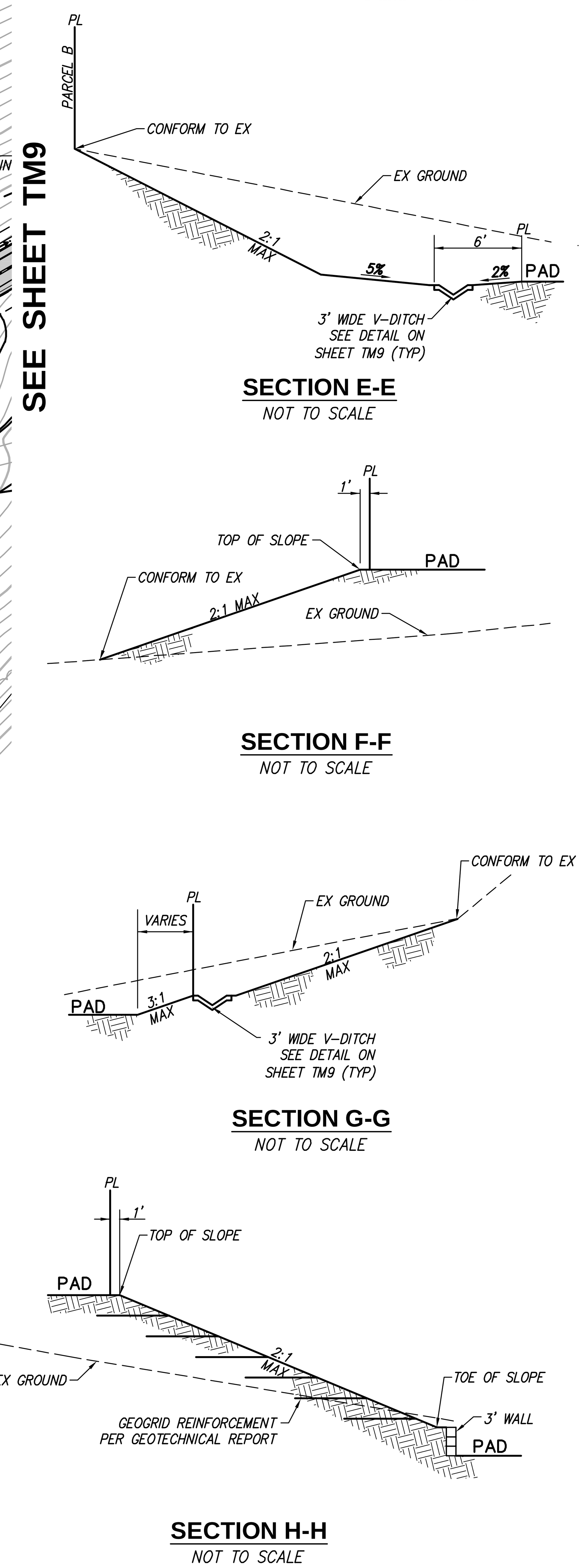
CITY OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA

RJA
RUGGERI-JENSEN-AZAR
ENGINEERS ▪ PLANNERS ▪ SURVEYORS
4690 CHABOT DRIVE, SUITE 200 PLEASANTON, CA 94588
PHONE: (925) 227-9100 FAX: (925) 227-9300

DATE: JANUARY 31, 2024 JOB NO. 131074 SHEET TM7 OF 16



SEE SHEET TM7
SEE SHEET TM9
OAK HILLS CONGREGATION
PARCEL A (HOA OPEN SPACE)
PARCEL B (PROPOSED EBRPD PARK)
PARCEL D
STREET A
STREET B
COURT C
PAD 596.0
PAD 572.8
PAD 573.2
PAD 570.0
PAD 561.0
PAD 549.0
PAD 571.1
PAD 571.7
PAD 574.7
PAD 579.3
PAD 594.0
PAD 591.0
PAD 585.0
PAD 582.5
PAD 581.5
PAD 581.0
PAD 583.5
PAD 585.5
PAD 586.0
FG 578.0
LIMIT OF GRADING LINE (TYP)
DAYLIGHT LINE (TYP)
HEADWALL AND RIPRAP (TYP)
EMERGENCY VEHICLE ACCESS GATE PER CITY STD PLANS 124 AND 125
EX TREE TO REMAIN
1 inch = 50 ft.



GRADING AND UTILITY PLAN

TRACT 8569 - HIDDEN CANYON (LESTER PROPERTY)

CITY OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA

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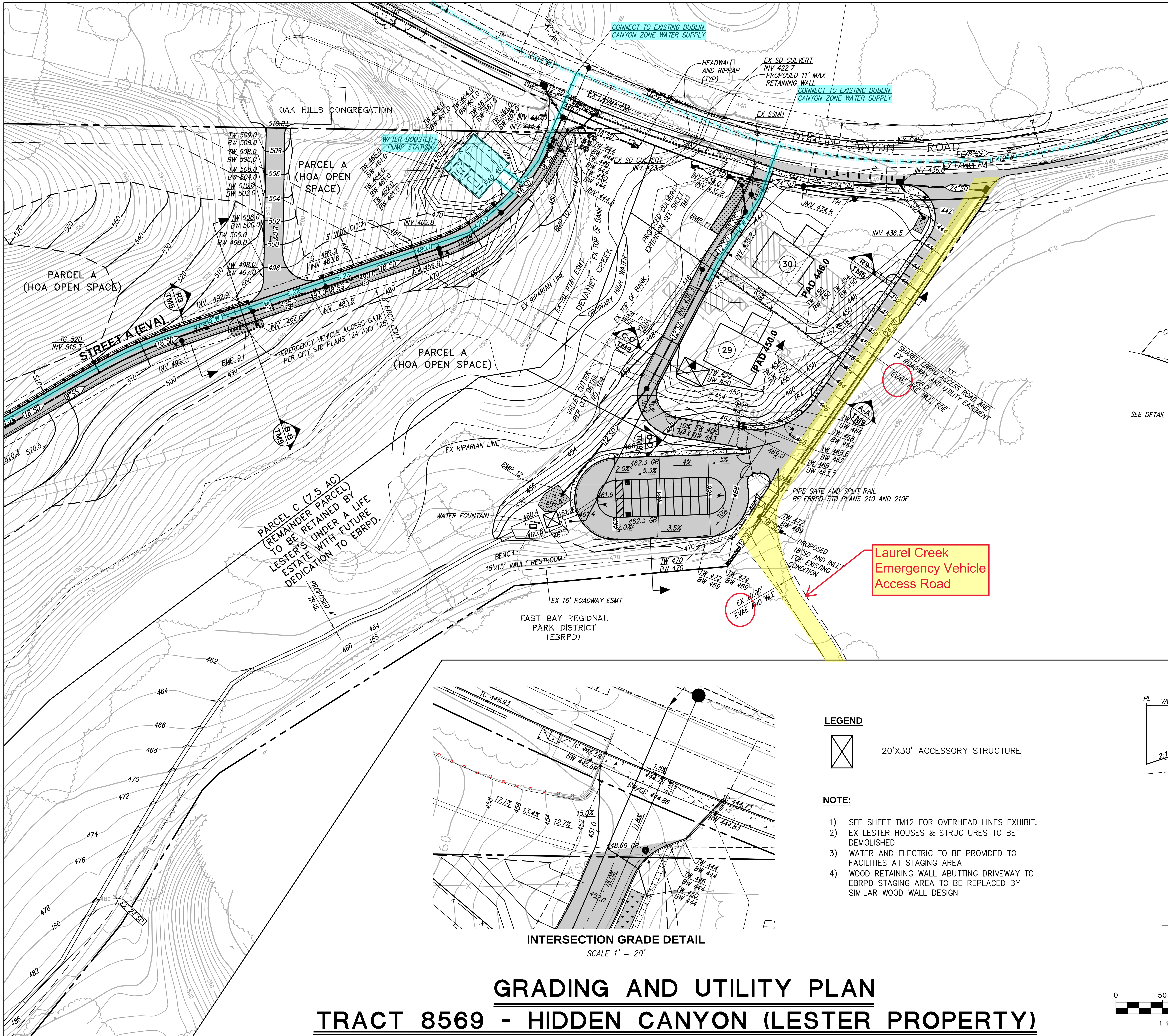
DATE: JANUARY 31, 2024 JOB NO. 131074 SHEET TM8 OF 16

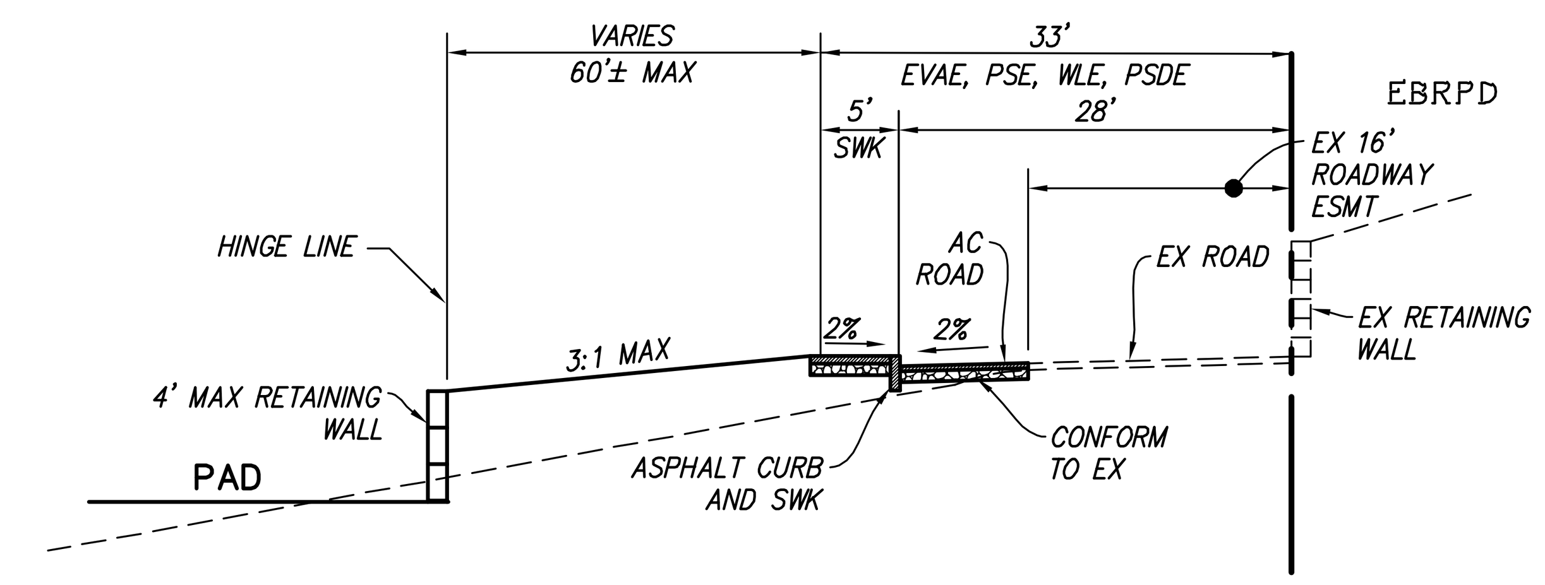

CONNECT TO EXISTING DUBLIN CANYON ZONE WATER SUPPLY
OAK HILLS CONGREGATION
WATER BOOSTER PUMP STATION
DUBLIN CANYON ROAD
PARCEL A (HOA OPEN SPACE)
STREET A (EVA)
SEE SHEET TM8
PARCEL C (7.5 AC) (REMAINDER PARCEL) TO BE RETAINED BY LESTER'S UNDER A LIFE ESTATE WITH FUTURE DEDICATION TO EBRPD.
EAST BAY REGIONAL PARK DISTRICT (EBRPD)
EX 16' ROADWAY ESMT
DEVANEY CREEK
SHARED EBRPD ACCESS ROAD AND EX ROADWAY AND UTILITY EASEMENT
PIPE GATE AND SPLIT RAIL BE EBRPD STD PLANS 210 AND 210F
PROPOSED 18"SD AND INLET FOR EXISTING CONDITION
Laurel Creek Emergency Vehicle Access Road
WATER FOUNTAIN
BENCH
15'x15' VAULT RESTROOM
EMERGENCY VEHICLE ACCESS GATE PER CITY STD PLANS 124 AND 125
PROPOSED 4' TRAIL
PAD 446.0
PAD 450.0
INTERSECTION GRADE DETAIL
SCALE 1' = 20'

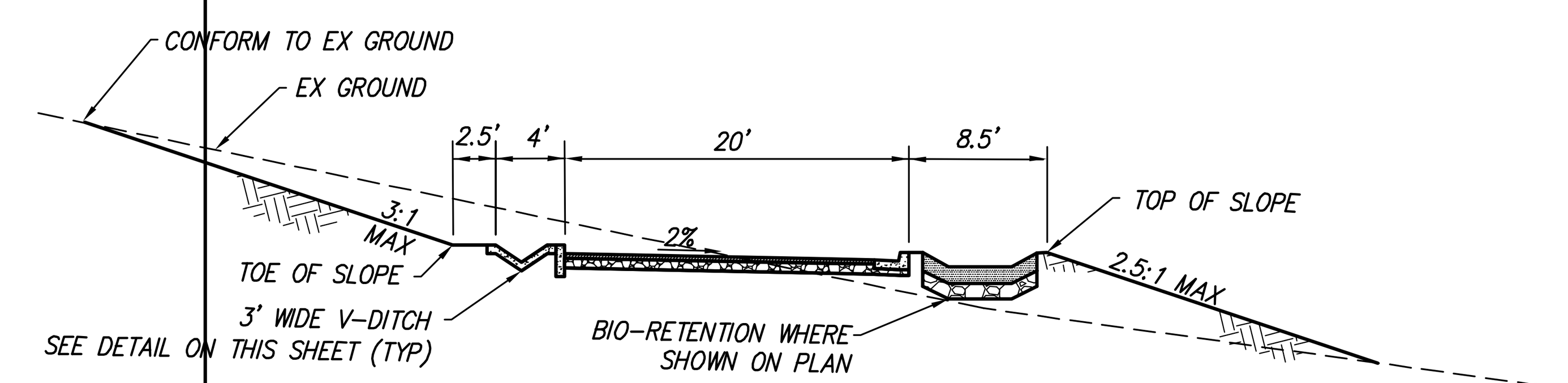
LEGEND

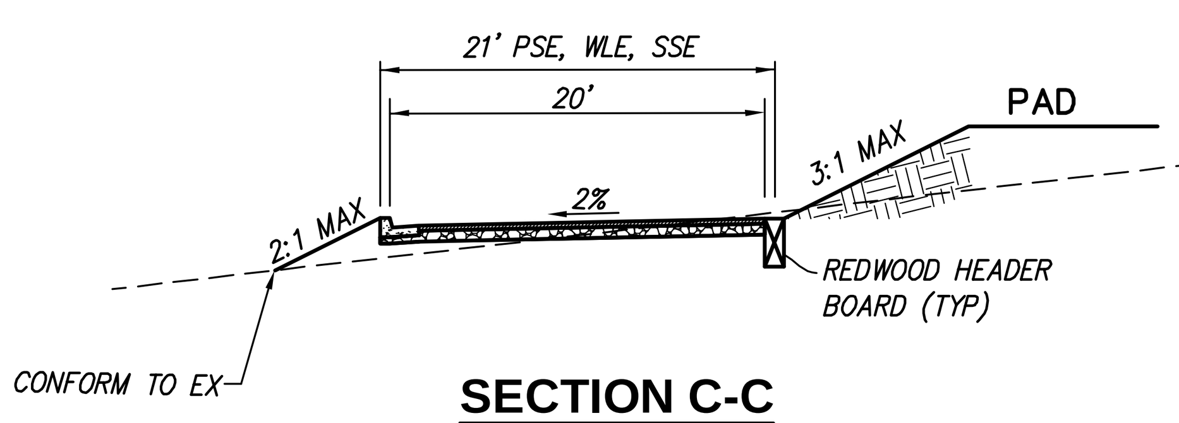
☒	20'X30' ACCESSORY STRUCTURE

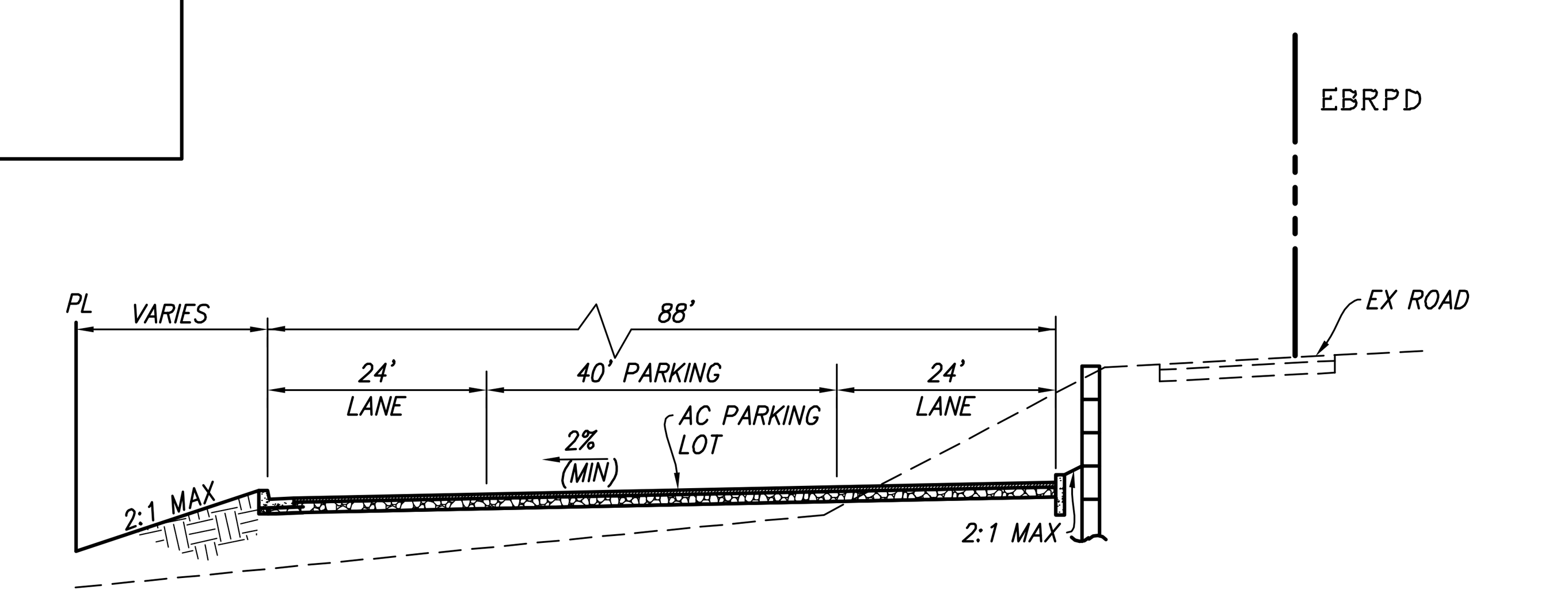
NOTE:

1) SEE SHEET TM12 FOR OVERHEAD LINES EXHIBIT.
2) EX LESTER HOUSES & STRUCTURES TO BE DEMOLISHED
3) WATER AND ELECTRIC TO BE PROVIDED TO FACILITIES AT STAGING AREA
4) WOOD RETAINING WALL ABUTTING DRIVEWAY TO EBRPD STAGING AREA TO BE REPLACED BY SIMILAR WOOD WALL DESIGN









GRADING AND UTILITY PLAN

TRACT 8569 - HIDDEN CANYON (LESTER PROPERTY)

CITY OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA

0 50 100 150
1 inch = 50 ft.

RJA
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