

**PRELIMINARY HYDROLOGY STUDY
TTM 19253
901 E. Katella Avenue
ORANGE, CALIFORNIA, 92867**

Prepared For:

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Prepared: August 2022

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Tentative Tract Map No. 19253

**Preliminary Hydrology Study
For
TTM 19253
901 E. Katella Avenue
Orange, CA 92867**

ACKNOWLEDGEMENT AND SIGNATURE PAGE

This Preliminary Hydrology Study prepared by C&V Consulting, Inc. under the supervision of Ryan Bittner, P.E.

Ryan Bittner, PE 68167
C&V Consulting, Inc.

Date

1.0 SITE DESCRIPTION:

The proposed site is located at 901 E. Katella Avenue, in the City of Orange, County of Orange. The proposed development encompasses one (1) parcel consisting of approximately 2.71 gross acres. The parcel is bounded by existing commercial offices to the east, existing single family residential to the north, N. Cambridge Street to the west and existing commercial, and E. Katella Avenue and existing commercial to the south. The existing site is currently occupied by an abandoned AT&T office building in the southwest quadrant, a parking lot in the remaining three quadrants, and landscape area surrounding the site. There is an overhang, a cell phone tower, and two (2) transformers onsite east of the building. No other buildings and/ or structures are present onsite. There is an existing block wall surrounding the parking lot on all sides, except along the border with the building. The existing site is served by two (2) existing driveway approaches: one (1) on N. Cambridge Street and one (1) on E. Katella Avenue. There is a wrought iron vehicular gate at each driveway entry. There are two (2) concrete walkways that connect the building to the public sidewalk on E. Katella Avenue.

Per the City of Orange Zoning Map, dated September 2020, the site is located within a Commercial Professional (C-P) zone. According to the municipal code, this zone permits “lower intensity office, general retail and service commercial business.”

Per the City of Orange General Plan, revised December 2015, the proposed site would be classified as Medium Density Residential. This designation provides for “multi-family townhouses, condominiums, and apartments featuring some form of internal open space in areas with good access to major circulation routes, business districts, and public open space areas.”

2.0 PURPOSE OF STUDY:

The study will estimate the amount of stormwater run-off generated from the project in the existing pre-developed and post-developed conditions. Furthermore, streets and the onsite drainage system have been designed to accommodate the design storm per the Orange County Hydrology Manual. Building finished floors have also been designed to maintain a minimum 1-foot clearance above the 100-year storm.

3.0 EXISTING CONDITIONS:

The existing site is relatively flat and mostly covered by impervious asphalt pavement and a large office building. Based on the ALTA topographic information, the site elevation ranges from approximately 241.8 feet above sea level (msl) in the southeast corner to 236.3 feet in the northwest corner. Overall, the site primarily flows in the north and westerly direction toward N. Cambridge Avenue. Stormwater flow is concentrated within v-gutters at the centers of the parking lot drive aisles. The area west and south of the existing building appear to slope away from the building to the west and south toward the public right-of-way, respectively. No offsite run-on drainage or cross lot drainage is entering the site. Existing block screen walls are located onsite along the northern and eastern and portions of the site along the property lines within the project boundary. In addition, there

are an existing block walls in the rear yards of eight (8) out of the nine (9) private lots along the north property line, creating a double-wall condition. The existing offsite private walks will likely have to be protected in place.

This site is located within the Santa Ana River Watershed per the Orange County Flood Control District (OCFCD) Drainage System Map No. 21. Existing stormwater runoff sheet flows in the westerly direction before entering the public right-of-way of N. Cambridge Street through an existing v-gutter at the driveway, then continues in the northly direction within the gutter of the public street. Per the OCFCD Drainage Maps, surface runoff from the site continues in the northerly direction to N. Cambridge Street then is conveyed in the catch basin directly north of the intersection with Trenton Avenue. Stormwater then enters the existing underground storm drain system and continues to the OCFCD El Modena Storm Channel, converging with the Collins Storm Channel, Santa Ana River, and ultimately discharging to the Pacific Ocean

4.0 PROPOSED CONDITIONS:

The proposed project consists of (52) residential condominium units, including 2 single family detached condominium units and the rest being duplexes. There will be a 3' right-of-way dedication along Cambridge Street to the city of Orange, which accounts for the difference in project area between the pre-developed and post-developed conditions. The entire property will be owned and maintained by the homeowner's association (HOA). The lots include drives, parking, landscaping, walkways, and common areas.

Site runoff will be conveyed through concrete v-gutters then collected by two (2) onsite catch basins and an onsite area drain system that will be routed to the proposed Biofiltration Vault treatment device prior to discharge to the public right-of-way via a stormwater sump pump system. Treated runoff and overflow will be conveyed through a proposed parkway drain to the public right-of-way of Cambridge Street. Upon entering Cambridge Street, site runoff will follow the existing historical drainage pattern.

5.0 METHODOLOGY:

All drainage areas were analyzed using the County of Orange Local Drainage and Hydrology Manual and the Advanced Engineering Software (AES). The site is comprised of 3 sub-areas to satisfy the Orange County Hydrology Manual. The sub-area was analyzed for acreage, land-use, peak flow rates, and time of concentration according to the Rational Method. The percentage of pervious was calculated for the existing and proposed conditions.

In accordance with the Orange County Hydrology Manual all habitable structures have a finished floor elevation to allow one foot of freeboard during the 100-year storm event. The onsite curb opening catch basin and parkway drain have been sized to convey runoff from the 25- and 100-year storm event, respectively. Calculations supporting these sizes are located in Appendix C of this report.

6.0 RESULTS:

The results from this hydrology and hydraulic analysis demonstrate the following:

- The drainage design for this site meets or exceeds the requirements as described in the Orange County Hydrology Manual
- Flow rates have decreased in the proposed developed condition

The existing and proposed conditions peak flowrates and times of concentration are summarized in the table below.

	Q₂₅ (cfs)	Q₁₀₀ (cfs)	T_c (min)*
Existing	8.58	11.17	5.48
Proposed	7.95	10.31	9.32
% Decrease	-7.3%	-7.7%	--

* T_c values are based on the results of the 100-year storm event.

Catch Basin Sizing

Catch basin sizing has been analyzed for the 25-year storm event based on a sump design. Refer to Attachment C for calculations.

Parkway Drain Sizing

Catch basin sizing has been analyzed for the 100-year storm even. Refer to Attachment C for calculations.

100-Year Water Surface Elevation

Proposed finished floors will be set at least 1' above the 100-year water surface elevation in the proposed drive aisles. Depth of flow calculations to be provided prior to final approval.

7.0 CONCLUSION:

The results from this hydrology and hydraulics study utilizing methods provided by Orange County demonstrate that the proposed condition of the site generates a decrease in site runoff compared to the existing condition of the site.

Runoff will be conveyed by concrete v-gutters and an onsite area drain system, collected by two (2) onsite catch basins and routed to the proposed Biofiltration vault treatment device. The flows in excess of the 25 -year storm event will enter the stormwater sump pump which outlets onto Cambridge Street through a parkway drain. Stormwater runoff discharged from the site will match the existing historic drainage pattern. Therefore, no significant impacts are anticipated due to this proposed development on the existing downstream drainage facilities.

8.0 DESIGN PARAMETERS:

1. The property is in the City of Orange, in Orange County.
2. The onsite drainage area was analyzed for a 25- and 100-year storm event using Rational Method Analysis per the County of Orange Hydrology Manual.
3. The project area is located in Soil Group D according to Figure XVI-2a of the Orange County Technical Guidance Document and the NRCS Web Soil Survey.
4. The existing site analysis utilized “Commercial” per the AES software.
5. The proposed site analysis utilized “Condominium” per the AES software.
6. 100-year storm event flood level protection analysis required for habitable structures per the requirements of the Orange County Hydrology Manual.

9.0 REFERENCES

1. Orange County Hydrology Manual dated October 1986
2. Hydraflow Express Extension for Autodesk AutoCAD Civil 3D
3. Orange County Flood Control District Design Manual 2000
4. Orange County Technical Guidance Document (TGD), 2013
5. Orange County Technical Guidance Document Figure XVI-2a, NRCS Hydrologic Soils Groups
6. Advanced Engineering Software (AES) Copyright, 1983-2014
7. HydraFlow Express Extension for Autodesk Civil 3D 2022

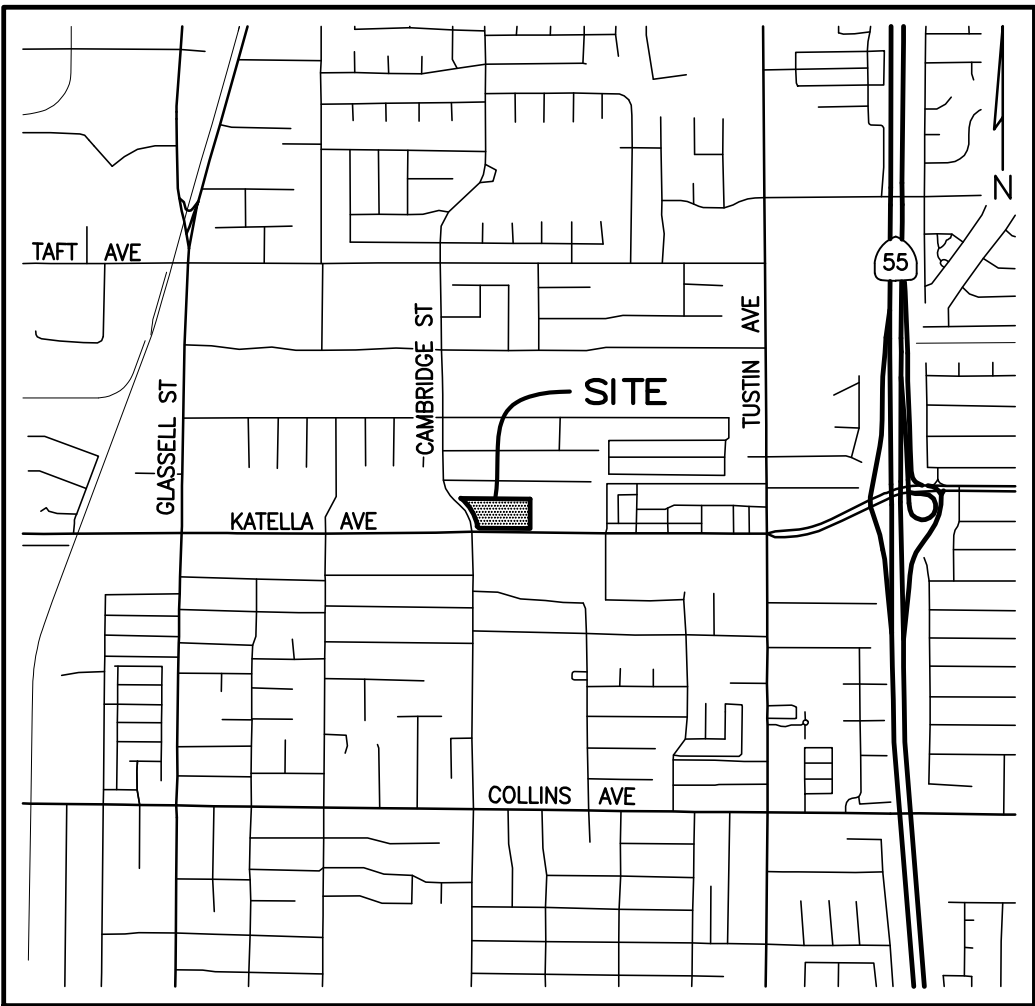
Appendix A

Hydrology Maps

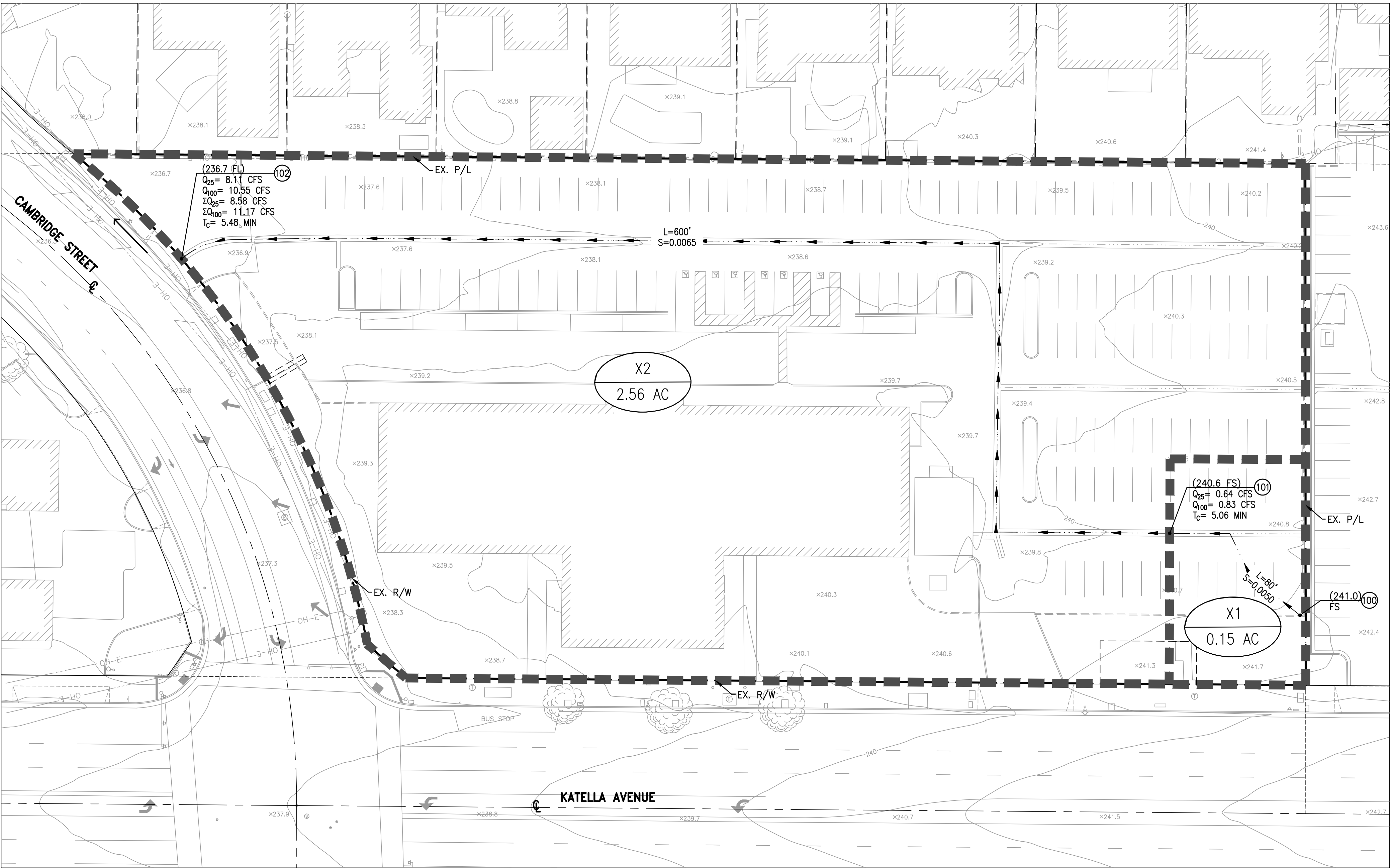
Existing Conditions Hydrology Map

EXISTING CONDITIONS HYDROLOGY MAP

901 E. KATELLA AVENUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA

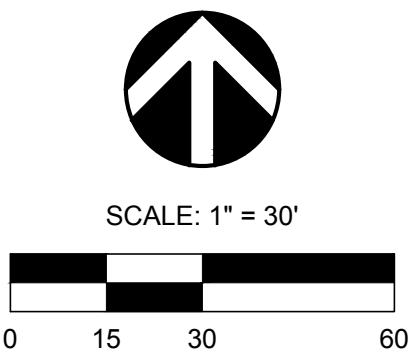


VICINITY MAP
NOT TO SCALE



- LEGEND**
- EXISTING RIGHT-OF-WAY/ BOUNDARY
 - DRAINAGE SUB AREA BOUNDARY
 - LONGEST FLOW PATH
 - FLOW DIRECTION
 - DRAINAGE AREA ID
 - DRAINAGE AREA IN ACRES
 - INITIAL SUBAREA NODE
 - SPOT ELEVATION
 - PEAK RUNOFF (CFS)
 - TIME OF CONCENTRATION (MIN)
 - EXISTING PERVIOUS AREA

- NOTES:**
- ASSUME ALL SOIL GROUP D
 - SITE IS LOCATED WITHIN THE LOWER SANTA ANA RIVER WATERSHED
 - GENERAL PLAN LAND USE: MEDIUM DENSITY RESIDENTIAL
 - EXISTING ZONING: COMMERCIAL PROFESSIONAL (C-P)



REVISIONS					
NO	DATE	INITIAL	DESCRIPTION	APP	DATE

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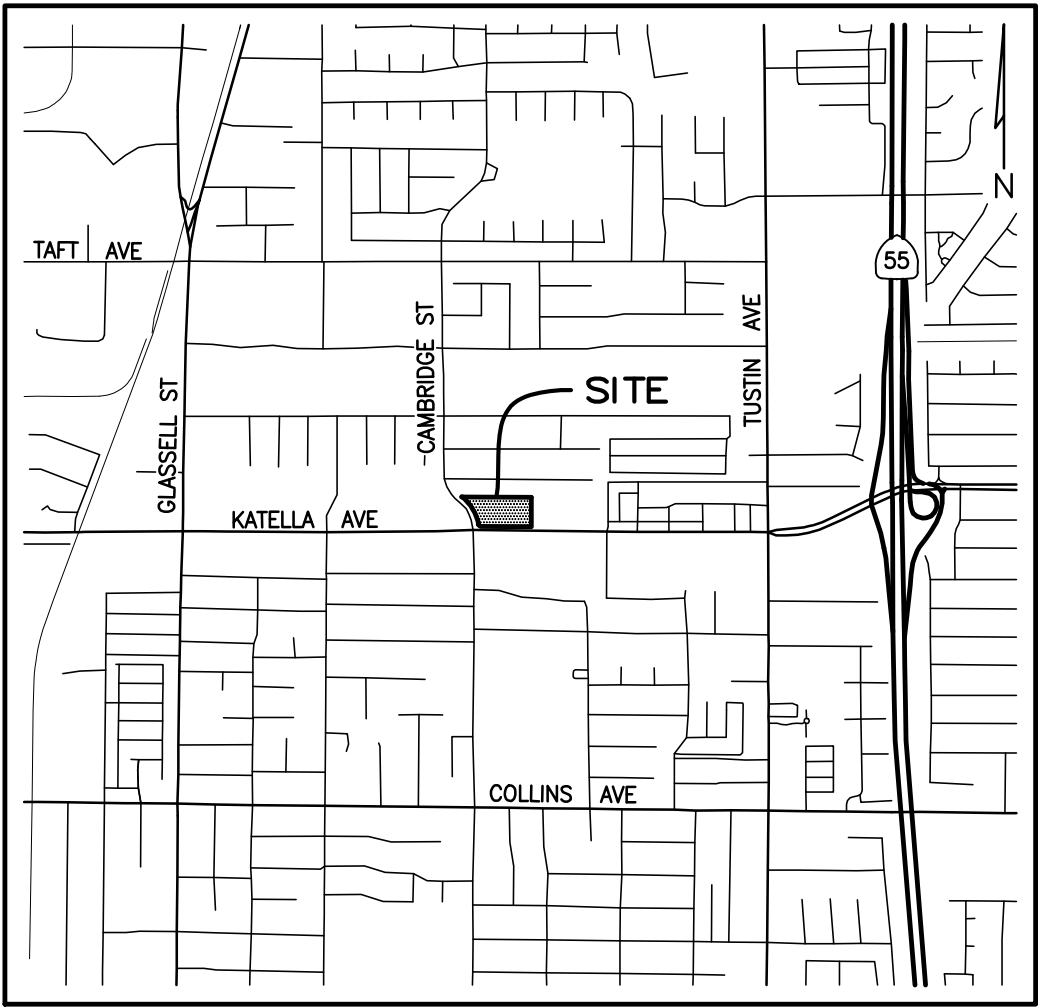


EXISTING CONDITIONS HYDROLOGY MAP			
901 E. KATELLA AVENUE			
			SHEET 1 OF 1
SCALE: AS SHOWN	DRAWN BY: MC	CHECKED BY: JH	
CITY OF ORANGE			

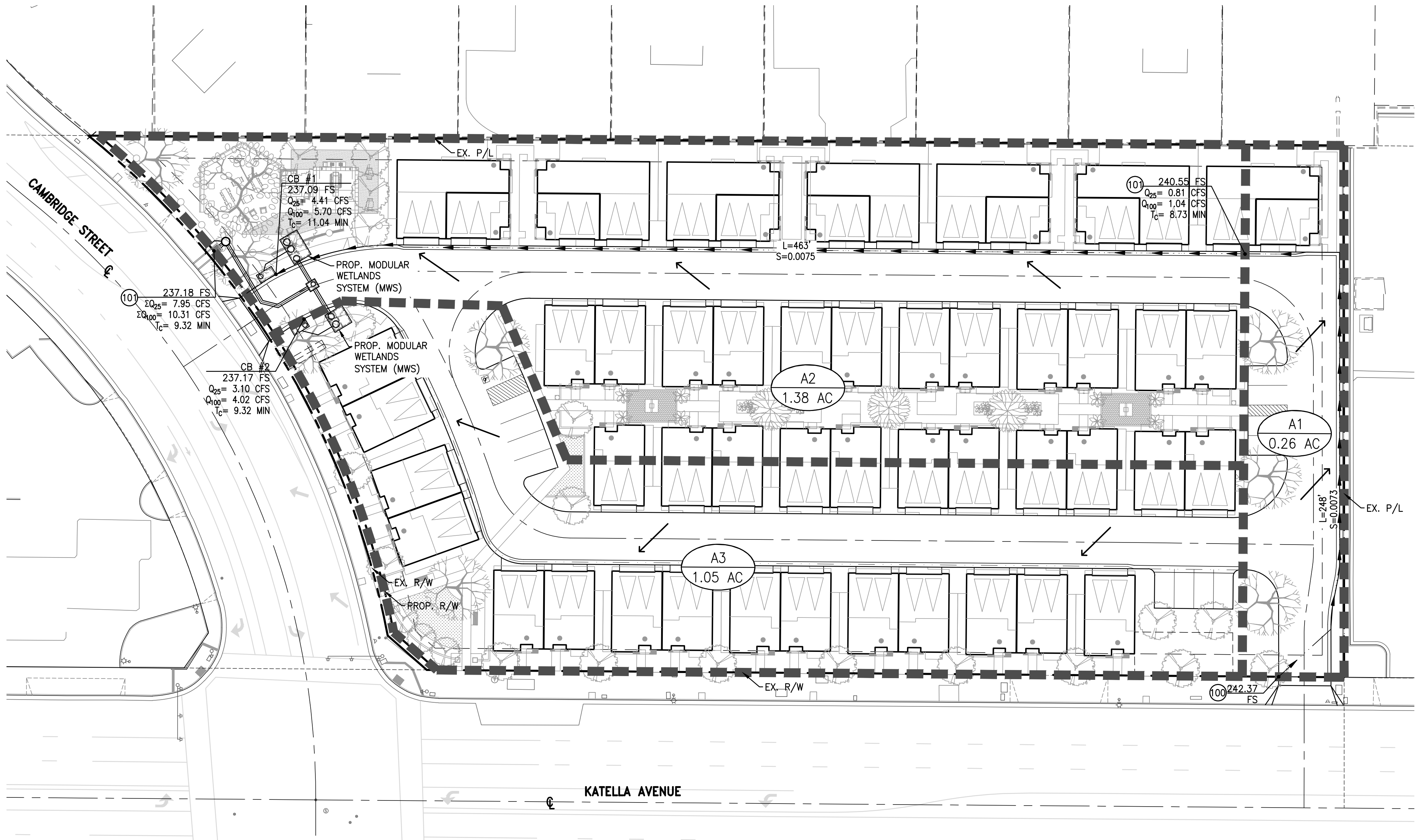
Proposed Conditions Hydrology Map

PROPOSED CONDITIONS HYDROLOGY MAP

901 E. KATELLA AVENUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA



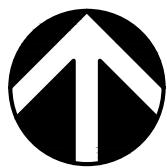
VICINITY MAP
NOT TO SCALE



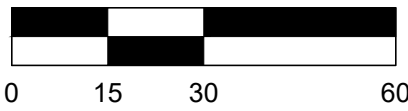
LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- FLOW DIRECTION
- DRAINAGE AREA ID
- DRAINAGE AREA IN ACRES
- INITIAL SUBAREA NODE
- SPOT ELEVATION
- PEAK RUNOFF (CFS)
- TIME OF CONCENTRATION (MIN)
- PROPOSED PERVIOUS AREA
- PROPOSED ASPHALT CONCRETE PAVEMENT
- PROPOSED PCC PAVEMENT
- PROPOSED ENHANCED PAVEMENT

- NOTES:
- ASSUME ALL SOIL GROUP D
 - SITE IS LOCATED WITHIN THE LOWER SANTA ANA RIVER WATERSHED
 - GENERAL PLAN LAND USE: MEDIUM DENSITY RESIDENTIAL
 - EXISTING ZONING: COMMERCIAL PROFESSIONAL (C-P)



SCALE: 1" = 30'



REVISIONS					
NO	DATE	INITIAL	DESCRIPTION	APP	DATE

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**PROPOSED CONDITIONS
HYDROLOGY MAP**
901 E. KATELLA AVENUE

SHEET 1 OF 1

SCALE: AS SHOWN DRAWN BY: MC CHECKED BY: JH

CITY OF ORANGE

Appendix B

Hydrology Calculations

Existing 25- & 100-Year Hydrology Calculations

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2014 Advanced Engineering Software (aes)
Ver. 21.0 Release Date: 06/01/2014 License ID 1580

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 901 E. KATELLA AVENUE *
* EXISTING Q25 *
* *

FILE NAME: IN13X25.DAT
TIME/DATE OF STUDY: 17:42 08/09/2022

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00
ELEVATION DATA: UPSTREAM(FEET) = 241.00 DOWNSTREAM(FEET) = 240.60

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.062

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.790

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.15	0.20	0.100	75	5.06

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 0.64

TOTAL AREA(ACRES) = 0.15 PEAK FLOW RATE(CFS) = 0.64

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 92

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 240.60

DOWNSTREAM NODE ELEVATION(FEET) = 236.70

CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00

"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050

PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0050

PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200

MAXIMUM DEPTH(FEET) = 0.07

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.514

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	2.56	0.20	0.100	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.91

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 17.85

AVERAGE FLOW DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00

"V" GUTTER FLOW TRAVEL TIME(MIN.) = 0.56 T_c (MIN.) = 5.62

SUBAREA AREA(ACRES) = 2.56 SUBAREA RUNOFF(CFS) = 10.35

EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10

TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 10.96

** PIPE SIZED TO MAXIMIZE V-GUTTER FLOW AT DOWNSTREAM NODE **

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 2.79

PIPE-FLOW(CFS) = 0.64
 PIPEFLOW TRAVEL TIME(MIN.) = 3.58 Tc(MIN.) = 8.65
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.538
 SUBAREA AREA(ACRES) = 2.56 SUBAREA RUNOFF(CFS) = 8.11
 EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED Fm(INCH/HR) = 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.10 AREA-AVERAGED Ap = 0.19
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 8.58
 NOTE: V-GUTTER CAPACITY MAY BE EXCEEDED
 V-GUTTER HYDRAULICS BASED ON MAINLINE Tc :
 V-GUTTER HYDRAULICS COMPUTED USING ESTIMATED FLOW(CFS) = 7.94

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) = 28.86 DEPTH*VELOCITY(FT*FT/SEC) = 2.02
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 680.00 FEET.

=====
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 2.7 TC(MIN.) = 5.62
 EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED Fm(INCH/HR)= 0.02
 AREA-AVERAGED Fp(INCH/HR) = 0.10 AREA-AVERAGED Ap= 0.194
 PEAK FLOW RATE(CFS) = 8.58

=====
 END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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Ver. 21.0 Release Date: 06/01/2014 License ID 1580

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 901 E. KATELLA AVENUE *
* EXISTING Q100 *
* *

FILE NAME: IN13X100.DAT
TIME/DATE OF STUDY: 17:49 08/09/2022

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
NO.	(FT)	(FT)				
=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00
ELEVATION DATA: UPSTREAM(FEET) = 241.00 DOWNSTREAM(FEET) = 240.60

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 5.062

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.144

SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
COMMERCIAL	D	0.15	0.20	0.100	91	5.06

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

SUBAREA RUNOFF(CFS) = 0.83

TOTAL AREA(ACRES) = 0.15 PEAK FLOW RATE(CFS) = 0.83

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 92

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 240.60

DOWNSTREAM NODE ELEVATION(FEET) = 236.70

CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00

"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050

PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0050

PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200

MAXIMUM DEPTH(FEET) = 0.07

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.870

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	D	2.56	0.20	0.100	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.100

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.55

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 23.82

AVERAGE FLOW DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00

"V" GUTTER FLOW TRAVEL TIME(MIN.) = 0.42 T_c (MIN.) = 5.48

SUBAREA AREA(ACRES) = 2.56 SUBAREA RUNOFF(CFS) = 13.48

EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED F_m (INCH/HR) = 0.02

AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.10

TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 14.27

** PIPE SIZED TO MAXIMIZE V-GUTTER FLOW AT DOWNSTREAM NODE **

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 3.00

PIPE-FLOW(CFS) = 0.83
PIPEFLOW TRAVEL TIME(MIN.) = 3.33 Tc(MIN.) = 8.39
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.598
SUBAREA AREA(ACRES) = 2.56 SUBAREA RUNOFF(CFS) = 10.55
EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED Fm(INCH/HR) = 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.10 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 11.17
NOTE: V-GUTTER CAPACITY MAY BE EXCEEDED
V-GUTTER HYDRAULICS BASED ON MAINLINE Tc :
V-GUTTER HYDRAULICS COMPUTED USING ESTIMATED FLOW(CFS) = 10.34

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00
FLOW VELOCITY(FEET/SEC.) = 37.60 DEPTH*VELOCITY(FT*FT/SEC) = 2.63
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 680.00 FEET.

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.7 TC(MIN.) = 5.48
EFFECTIVE AREA(ACRES) = 2.71 AREA-AVERAGED Fm(INCH/HR)= 0.02
AREA-AVERAGED Fp(INCH/HR) = 0.10 AREA-AVERAGED Ap= 0.194
PEAK FLOW RATE(CFS) = 11.17

=====

=====

END OF RATIONAL METHOD ANALYSIS



Proposed 25- & 100-Year Hydrology Calculations

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2014 Advanced Engineering Software (aes)
Ver. 21.0 Release Date: 06/01/2014 License ID 1580

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 901 E. KATELLA AVENUE *
* PROPOSED Q25 *
* *

FILE NAME: IN13P25.DAT
TIME/DATE OF STUDY: 16:00 08/10/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL								
	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
NO.	(FT)	(FT)						
===	=====	=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 248.00
ELEVATION DATA: UPSTREAM(FEET) = 242.37 DOWNSTREAM(FEET) = 240.55

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 8.729

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.519

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
CONDOMINIUMS	D	0.26	0.20	0.350	75	8.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.350

SUBAREA RUNOFF(CFS) = 0.81

TOTAL AREA(ACRES) = 0.26 PEAK FLOW RATE(CFS) = 0.81

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 92

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 240.55

DOWNSTREAM NODE ELEVATION(FEET) = 237.09

CHANNEL LENGTH THRU SUBAREA(FEET) = 463.00

"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050

PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0050

PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200

MAXIMUM DEPTH(FEET) = 0.07

* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.353

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	1.38	0.20	0.350	75

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 0.350

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.73

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.94

AVERAGE FLOW DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00

"V" GUTTER FLOW TRAVEL TIME(MIN.) = 0.78 T_c (MIN.) = 9.51

SUBAREA AREA(ACRES) = 1.38 SUBAREA RUNOFF(CFS) = 4.08

EFFECTIVE AREA(ACRES) = 1.64 AREA-AVERAGED F_m (INCH/HR) = 0.07

AREA-AVERAGED F_p (INCH/HR) = 0.20 AREA-AVERAGED A_p = 0.35

TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 4.85

** PIPE SIZED TO MAXIMIZE V-GUTTER FLOW AT DOWNSTREAM NODE **

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 3.12

PIPE-FLOW(CFS) = 0.81
 PIPEFLOW TRAVEL TIME(MIN.) = 2.48 Tc(MIN.) = 11.21
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.055
 SUBAREA AREA(ACRES) = 1.38 SUBAREA RUNOFF(CFS) = 3.71
 EFFECTIVE AREA(ACRES) = 1.64 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.11 AREA-AVERAGED Ap = 0.64
 TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 4.41
 NOTE: V-GUTTER CAPACITY MAY BE EXCEEDED
 V-GUTTER HYDRAULICS BASED ON MAINLINE Tc :
 V-GUTTER HYDRAULICS COMPUTED USING ESTIMATED FLOW(CFS) = 3.60

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) = 13.09 DEPTH*VELOCITY(FT*FT/SEC) = 0.92
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 711.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
 MAINLINE Tc(MIN.) = 9.51
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.353
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	1.05	0.20	0.350	75

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 3.10
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.13 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 7.95
 =====

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 2.7 TC(MIN.) = 9.51
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.13 AREA-AVERAGED Ap = 0.530
 PEAK FLOW RATE(CFS) = 7.95
 =====

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
(c) Copyright 1983-2014 Advanced Engineering Software (aes)
Ver. 21.0 Release Date: 06/01/2014 License ID 1580

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* 901 E. KATELLA AVENUE *
* PROPOSED Q100 *
* *

FILE NAME: IN13P100.DAT
TIME/DATE OF STUDY: 16:22 08/10/2022

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
DATA BANK RAINFALL USED
ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL								
	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
NO.	(FT)	(FT)						
===	=====	=====	=====	=====	=====	=====	=====	=====
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 248.00

ELEVATION DATA: UPSTREAM(FEET) = 242.37 DOWNSTREAM(FEET) = 240.55

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 8.729

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.496

SUBAREA T_c AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
CONDOMINIUMS	D	0.26	0.20	0.350	91	8.73

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350

SUBAREA RUNOFF(CFS) = 1.04

TOTAL AREA(ACRES) = 0.26 PEAK FLOW RATE(CFS) = 1.04

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 92

>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<

=====

UPSTREAM NODE ELEVATION(FEET) = 240.55

DOWNSTREAM NODE ELEVATION(FEET) = 237.09

CHANNEL LENGTH THRU SUBAREA(FEET) = 463.00

"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050

PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0050

PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200

MAXIMUM DEPTH(FEET) = 0.07

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.329

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	1.38	0.20	0.350	91

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.56

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.95

AVERAGE FLOW DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00

"V" GUTTER FLOW TRAVEL TIME(MIN.) = 0.60 T_c (MIN.) = 9.32

SUBAREA AREA(ACRES) = 1.38 SUBAREA RUNOFF(CFS) = 5.29

EFFECTIVE AREA(ACRES) = 1.64 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.20 AREA-AVERAGED Ap = 0.35

TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 6.29

** PIPE SIZED TO MAXIMIZE V-GUTTER FLOW AT DOWNSTREAM NODE **

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 3.34

PIPE-FLOW(CFS) = 1.04
 PIPEFLOW TRAVEL TIME(MIN.) = 2.31 Tc(MIN.) = 11.04
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.930
 SUBAREA AREA(ACRES) = 1.38 SUBAREA RUNOFF(CFS) = 4.79
 EFFECTIVE AREA(ACRES) = 1.64 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.11 AREA-AVERAGED Ap = 0.64
 TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 5.70
 NOTE: V-GUTTER CAPACITY MAY BE EXCEEDED
 V-GUTTER HYDRAULICS BASED ON MAINLINE Tc :
 V-GUTTER HYDRAULICS COMPUTED USING ESTIMATED FLOW(CFS) = 4.66

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.07 FLOOD WIDTH(FEET) = 15.00
 FLOW VELOCITY(FEET/SEC.) = 16.95 DEPTH*VELOCITY(FT*FT/SEC) = 1.19
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 711.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
 MAINLINE Tc(MIN.) = 9.32
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.329
 SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
CONDOMINIUMS	D	1.05	0.20	0.350	91

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.350
 SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = 4.02
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.13 AREA-AVERAGED Ap = 0.53
 TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 10.31
 =====

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 2.7 TC(MIN.) = 9.32
 EFFECTIVE AREA(ACRES) = 2.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.13 AREA-AVERAGED Ap = 0.530
 PEAK FLOW RATE(CFS) = 10.31
 =====

END OF RATIONAL METHOD ANALYSIS



Appendix C

Hydraulic Calculations

Catch Basin Sizing

Inlet Report

CB#1_Q25

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

Slope, Sw (ft/ft)	= 0.083
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

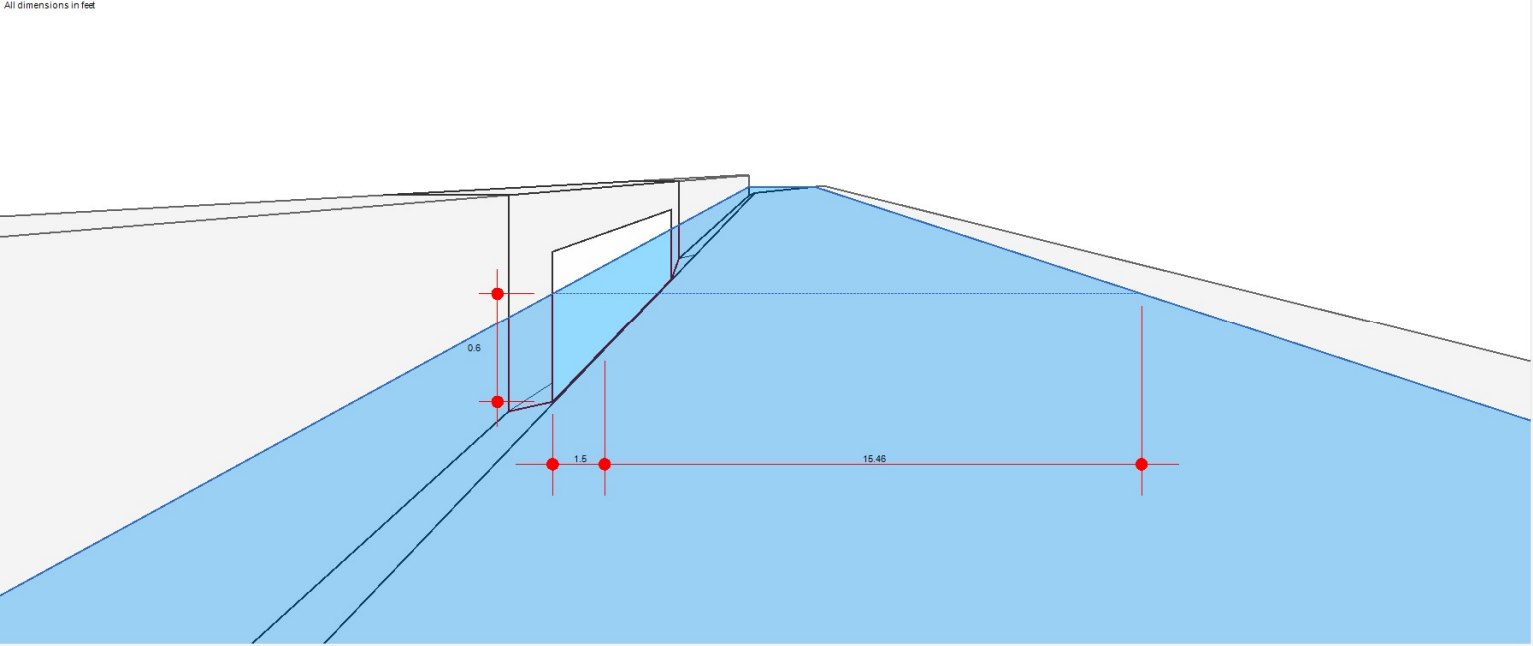
Calculations

Compute by:	Known Q
Q (cfs)	= 4.41

Highlighted

Q Total (cfs)	= 4.41
Q Capt (cfs)	= 4.41
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 7.20
Efficiency (%)	= 100
Gutter Spread (ft)	= 16.96
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-

All dimensions in feet



Inlet Report

CB#2_Q25

Curb Inlet

Location	= Sag
Curb Length (ft)	= 7.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

Slope, Sw (ft/ft)	= 0.083
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 1.50
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

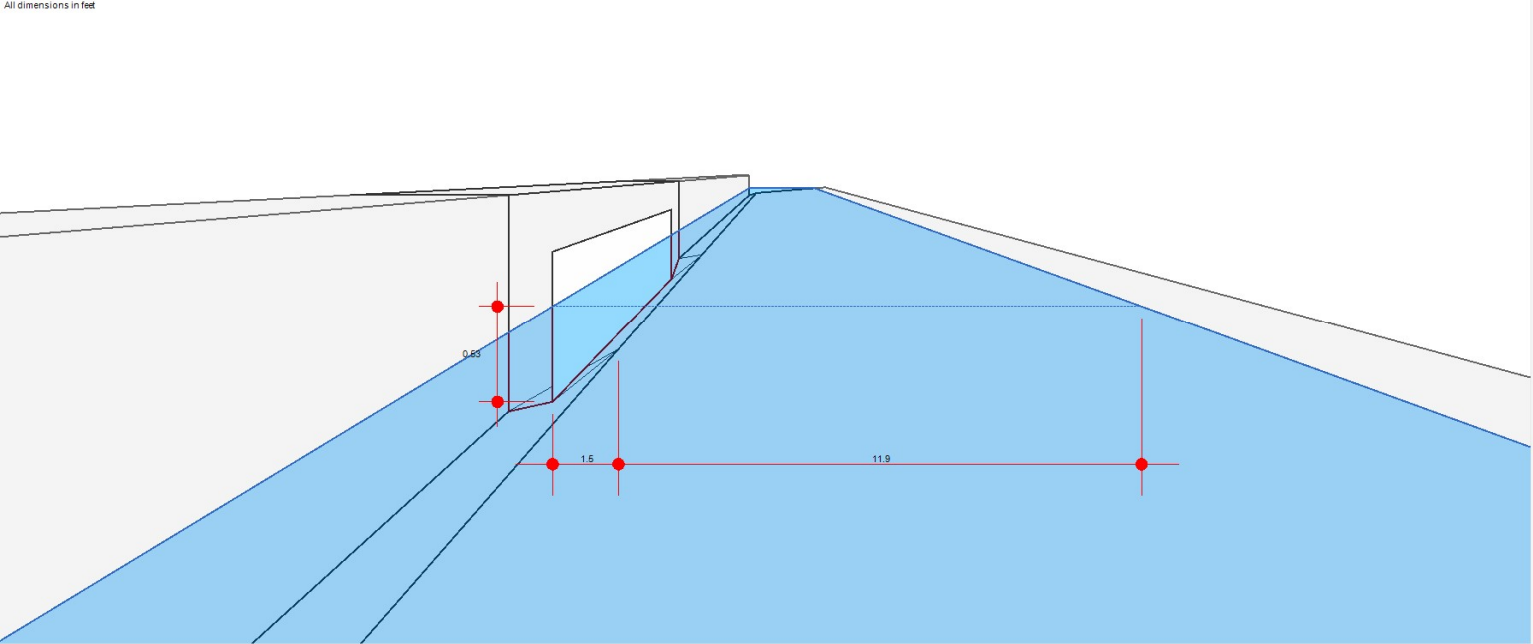
Calculations

Compute by:	Known Q
Q (cfs)	= 3.10

Highlighted

Q Total (cfs)	= 3.10
Q Capt (cfs)	= 3.10
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 6.35
Efficiency (%)	= 100
Gutter Spread (ft)	= 13.40
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-

All dimensions in feet

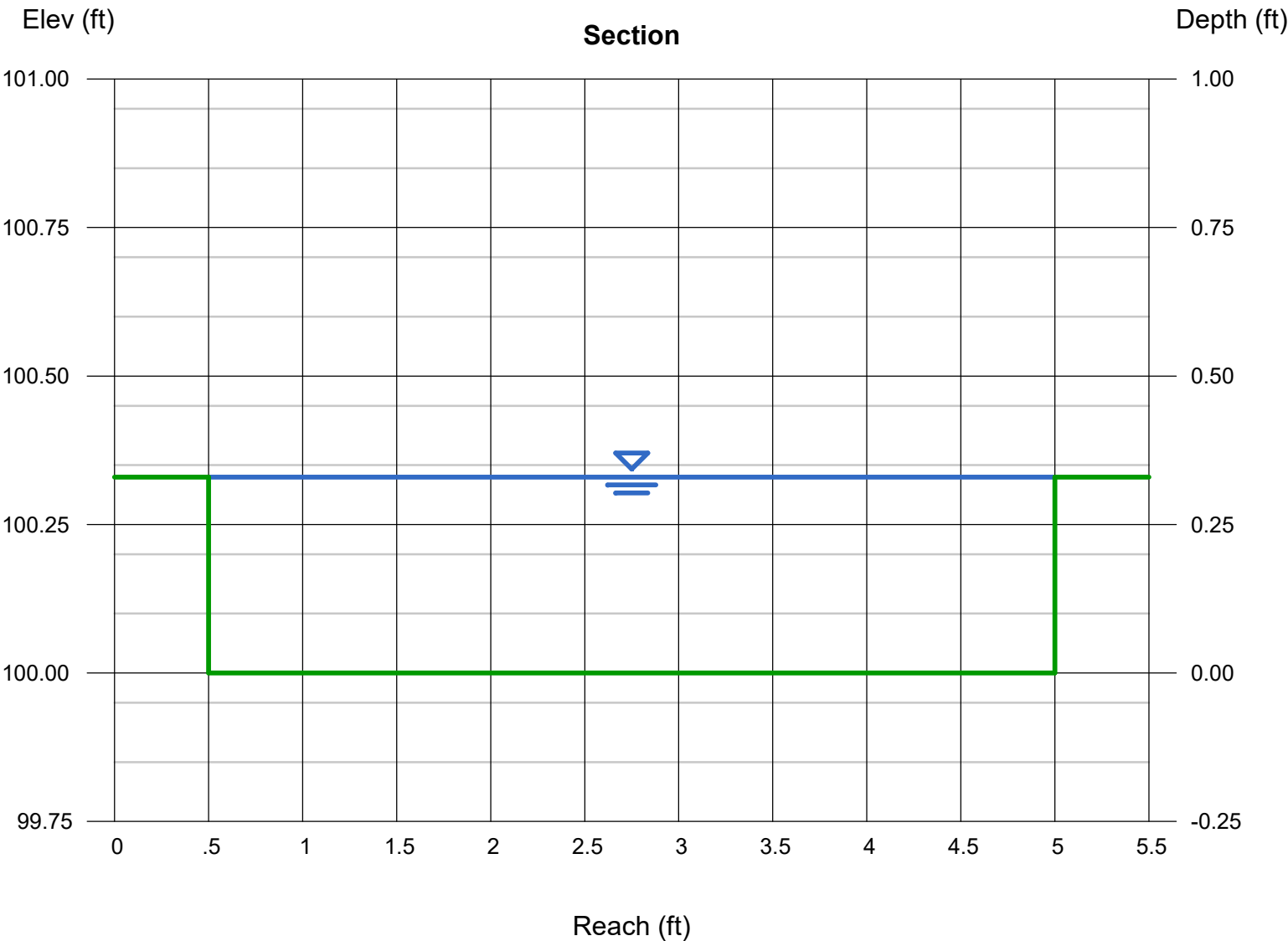


Parkway Drain Sizing

Channel Report

Parkway Drain_Q100

Rectangular		Highlighted	
Bottom Width (ft)	= 4.50	Depth (ft)	= 0.33
Total Depth (ft)	= 0.33	Q (cfs)	= 10.31
		Area (sqft)	= 1.49
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 6.94
Slope (%)	= 2.00	Wetted Perim (ft)	= 5.16
N-Value	= 0.013	Crit Depth, Yc (ft)	= 0.33
		Top Width (ft)	= 4.50
		EGL (ft)	= 1.08
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 10.31		



100-Year Water Surface Elevation

PRELIMINARY HYDROLOGY STUDY

TTM 19253

901 E. Katella Avenue

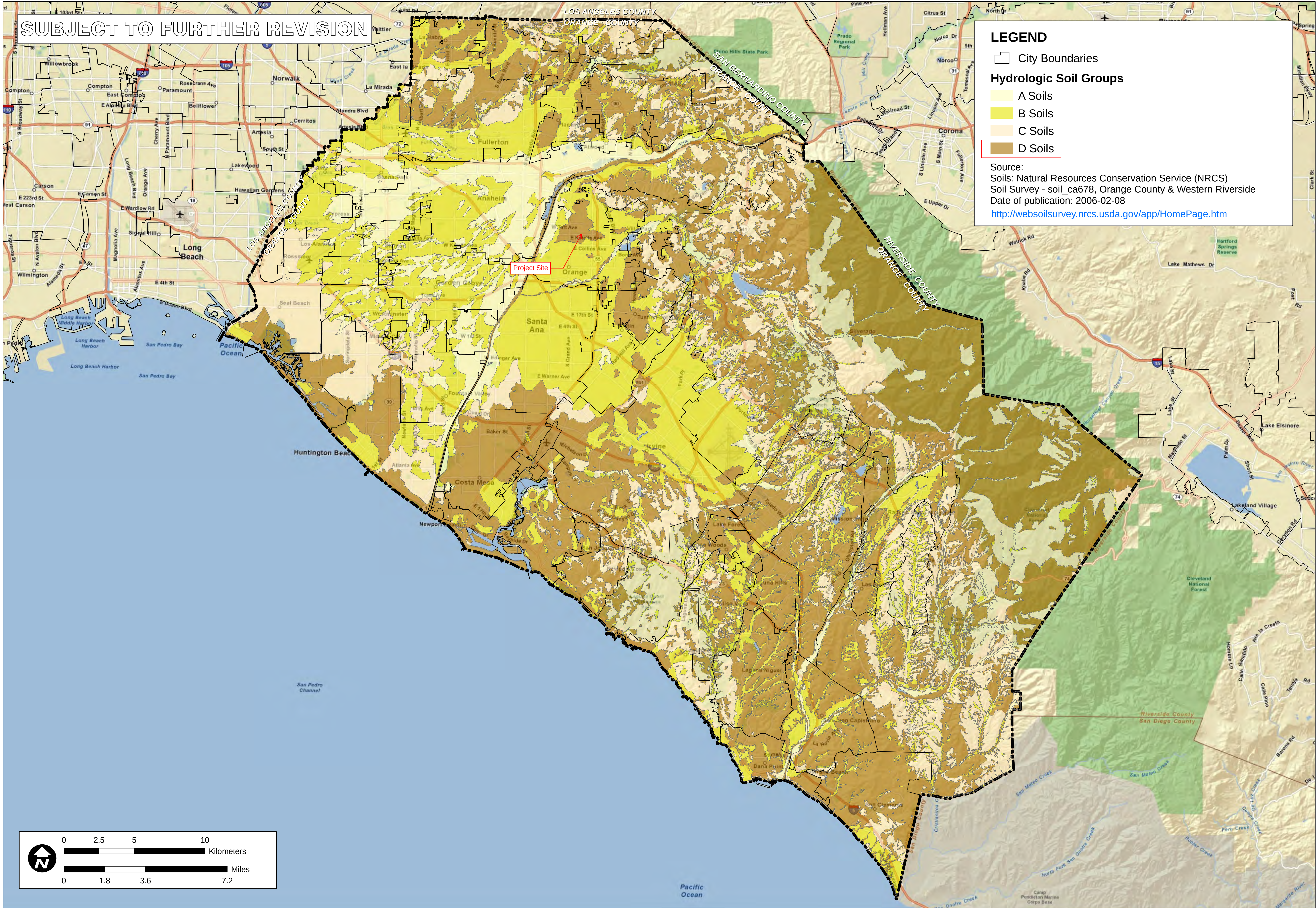
To be provided prior to final approval.

Appendix D

Reference Material

NRCS Hydrologic Soil Groups (TGD)

P:\9526E\16-GIS\Mxds\Reports\InfiltrationFeasibility_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd



ORANGE COUNTY
INFILTRATION STUDY

ORANGE CO.

CA



PACE
Advanced Water Engineering

FIGURE
XVI-2a

TITLE

NRCS HYDROLOGIC
SOILS GROUPS

JOB

SCALE 1" = 1.8 miles

DESIGNED TH

DRAWING TH

CHECKED BMP

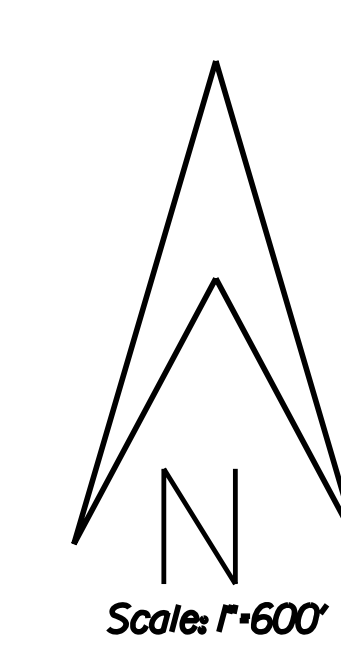
DATE 02/09/11

JOB NO. 9526-E

OCFCD Facilities Maps



21



NOTICE
This drainage map has been prepared for information purposes only. The location and ownership of facilities have been determined from available information provided by public agencies, but may not be exact. The user of this map is responsible for verifying exact location, ownership and regional versus local character of drainage facilities.
Additional information may be obtained from public plans and recorded deeds.
Character designations shown on this map are for convenience only and are not controlling. Neither the County of Orange nor the Orange County Flood Control District (OCFCD) assume any liabilities for inaccuracy of this map.
Call Alan Vu at (714) 834-5986 to notify Public Facility and Resources Department (PFRD) of additions or corrections.

ORANGE COUNTY FLOOD CONTROL DISTRICT			
BASEMAP OF DRAINAGE FACILITIES IN ORANGE COUNTY			
REVISION	DATE	SHEET NO.	DWG. NO.
APU	JAN. 12/2000	21	MAPS-113-3

Channel Drainage Area Boundary	Existing O.C.F.C.D.	Existing LOCAL
Major Sub-Area Drainage Boundary		
Minor Sub-Area Drainage Boundary		
Existing O.C.F.C.D. Facility		
Existing Local Facility		
Existing Retarding Basin or Reservoir		
Natural Watercourse		
City Limits		
Pump Station		
Catch Basin (length in feet)		
Drop Inlet or Other Entry		
Ownership (if other than city or county)		
Private		
State		
Federal		

Earth Trapezoidal Channel (base width by height in feet)
Reinforced Concrete Trapezoidal Channel (base width by height in feet)
Reinforced Concrete Rectangular Channel (base width by height in feet)
Reinforced Concrete Box (RCB) (number of bays-span by height in feet)
Reinforced Concrete Pipe (RCP) (diameter in inches)
Corrugated Metal Pipe (CMP) (diameter in inches)
Concrete Pipe (diameter in inches)
Concrete Oval Pipe (width by height in inches)
Steel Pipe (diameter in inches)
Reinforced Concrete Arch (base span by height in inches)
Corrugated Metal Arch (base span by height in inches)

21

Tentative Tract Map No. 19253

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF ORANGE IN THE COUNTY OF ORANGE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THAT PORTION OF LOT H OF THE VAN DE GRAFF TRACT, IN THE CITY OF ORANGE, COUNTY OF ORANGE, STATE OF CALIFORNIA, AS SHOWN ON A MAP THEREOF RECORDED IN BOOK 4, PAGE 440 OF MISCELLANEOUS RECORDS OF LOS ANGELES COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE SOUTHERLY LINE OF TRACT NO. 4407, AS SHOWN ON A MAP THEREOF RECORDED IN BOOK 158, PAGES 28 AND 29 OF MISCELLANEOUS MAPS, RECORDS OF SAID COUNTY, DISTANT EASTERLY 575.32 FEET THEREON, FROM THE NORTHEASTERLY CORNER OF THE LAND DESCRIBED IN DEED TO THE CITY OF ORANGE, RECORDED SEPTEMBER 26, 1963 IN BOOK 6733, PAGE 723 OF OFFICIAL RECORDS; THENCE ALONG A LINE ESTABLISHED BY THAT CERTAIN BOUNDARY LINE AGREEMENT BETWEEN ROBERT E. HOLMES AND ROBERT L. TITTLE AND OTHER RECORDED NOVEMBER 7, 1969 IN BOOK 9132, PAGE 960 OF OFFICIAL RECORDS, SOUTH 0° 55' 48" EAST 303.77 FEET TO SOUTHERLY LINE OF LOT H, THENCE WESTERLY ALONG SAID SOUTHERLY LINE TO THE CENTERLINE OF CAMBRIDGE STREET, AS SHOWN ON A MAP RECORDED IN BOOK 3, PAGE 28 OF PARCEL MAPS, RECORDS OF SAID COUNTY; THENCE NORTHERLY ALONG SAID CENTERLINE TO THE SOUTHERLY LINE OF TRACT NO. 4407; THENCE EASTERLY ALONG SAID SOUTHERLY LINE TO THE POINT OF BEGINNING.

EXCEPT THEREFROM THE INTEREST IN THAT PORTION OF SAID CAMBRIDGE STREET AS CONVEYED BY A DEED TO THE CITY OF ORANGE RECORDED SEPTEMBER 26, 1963 IN BOOK 6733, PAGE 723 OF OFFICIAL RECORDS.

ALSO EXCEPTING THEREFROM THE INTEREST IN THE SOUTHERLY 60.00 FEET AS CONVEYED BY PARCEL 3 OF THE LAND DESCRIBED IN DEED TO THE CITY OF ORANGE COUNTY RECORDED AUGUST 23, 1963 IN BOOK 6689, PAGE 430 OF OFFICIAL RECORDS OF SAID COUNTY.

APN: 375-461-41

VESTED OWNER:

PHOENIX POWER & LIGHT, LLC, A DELAWARE LIMITED LIABILITY COMPANY

DATUM STATEMENT:

ALL COORDINATES SHOWN HEREON ARE GRID VALUES BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CCS83, ZONE VI, NORTH AMERICAN DATUM OF 1983 (NAD83), 2017.50 EPOCH OCS GPS ADJUSTMENT, IN ACCORDANCE WITH THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801-8819. ALL DISTANCES SHOWN HEREON ARE GROUND VALUES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED. A GENERALIZED COMBINATION SCALE FACTOR OF 0.99998259 WAS USED FOR THIS PROJECT AT NORTHING 2242014.730, EASTING 6077675.110. TO OBTAIN GRID DISTANCES, MULTIPLY GROUND DISTANCES BY THE COMBINATION SCALE FACTOR.

NORTHING	EASTING
SACY: 2218016.19	6061432.27
OEOC: 2225550.98	6107583.77

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING N80°43'39"E BETWEEN CALIFORNIA SPATIAL REFERENCE CENTER, CSRC, CONTINUOUSLY OPERATING REFERENCE STATIONS, CORS, "SACY" AND "OEOC".

BENCHMARK STATEMENT:

ORANGE COUNTY BENCHMARK NO. 3L-47-92
ELEV: 247.49 (NAVD88 LEVELED 2010)
DESCRIBED AS: 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "3L-47-92", SET IN THE NORTHEASTERLY CORNER OF A 4 FT. BY 15 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF THE INTERSECTION OF KATELLA AVENUE AND TUSTIN AVENUE, 100 FT. EASTERLY OF THE CENTERLINE OF TUSTIN AND 52 FT. SOUTHERLY OF THE CENTERLINE OF KATELLA. MONUMENT IS SETLEVEL WITH THE SIDEWALK (TABLE A-5)

FLOOD NOTE:

THE SUBJECT PROPERTY FALLS WITHIN "ZONE X - AREA OF MINIMAL FLOOD HAZARD" PER FEMA MAP NO. 06059C0161J AND 06059C0162J, BOTH PRINTED PANELS, EFFECTIVE DECEMBER 3, 2009 (TABLE A-3).

TOPOGRAPHY NOTE:

TOPOGRAPHY AND CONTOURS SHOWN HEREON ARE BASED ON 1' CONTOUR INTERVALS FROM AERIAL PHOTOGRAMETRY FLOWN BY C&V CONSULTING INC. ON MAY 13, 2022. THE RELATIVE POSITIONAL ACCURACY OF CALLED OUT IMPROVEMENTS SHOWN ON THE SURVEY IS WITHIN 0.1' +/- OF THEIR ACTUAL LOCATIONS. (TABLE A-8 & 15)

EXISTING EASEMENTS:

THE FOLLOWING TITLE INFORMATION WAS DERIVED FROM A PRELIMINARY REPORT ISSUED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO.: 010-30084576-TC1 DATED APRIL 6, 2022 AT 7:30 A.M.

- # DENOTES PLOTTED ITEM.
- ② AN EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION
PURPOSE: PUBLIC UTILITIES AND INCIDENTAL PURPOSES
RECORDED: MAY 23, 1993 AS INSTRUMENT NO. 83-216107 OF OFFICIAL RECORDS

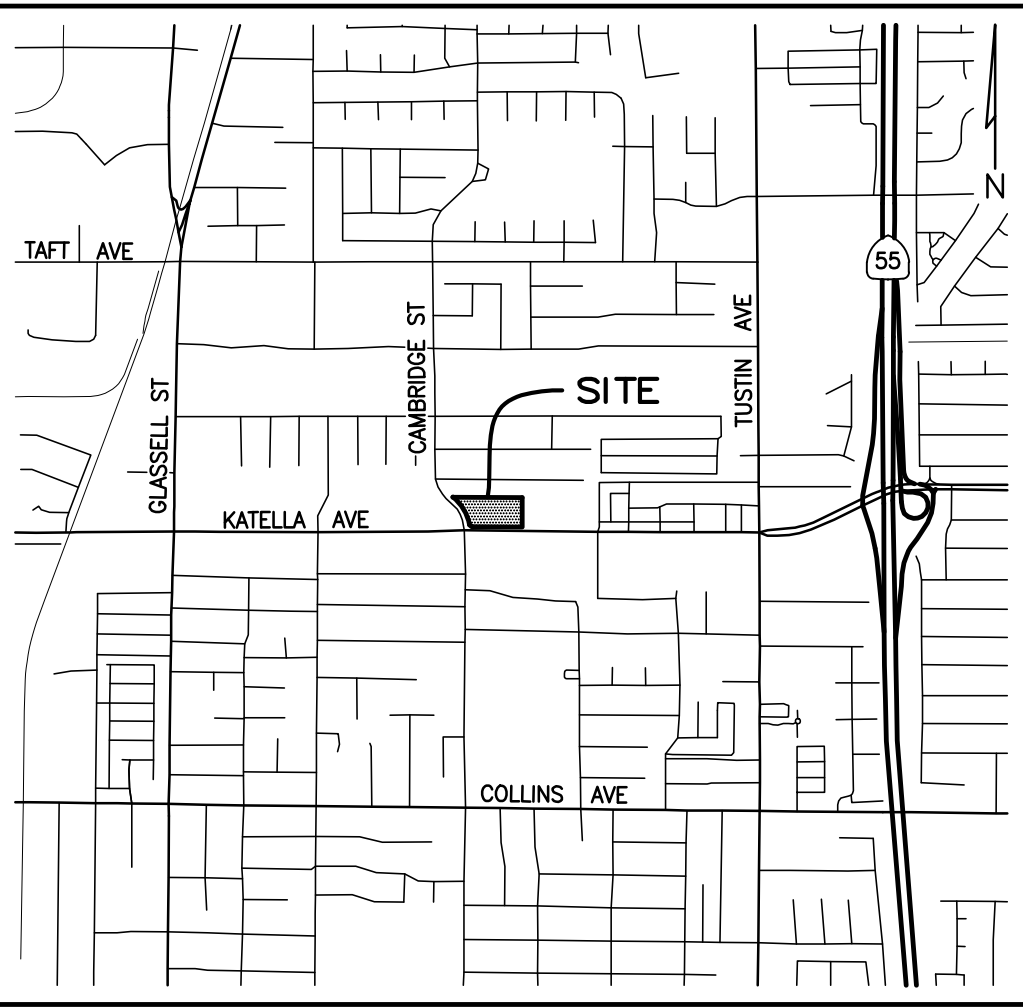
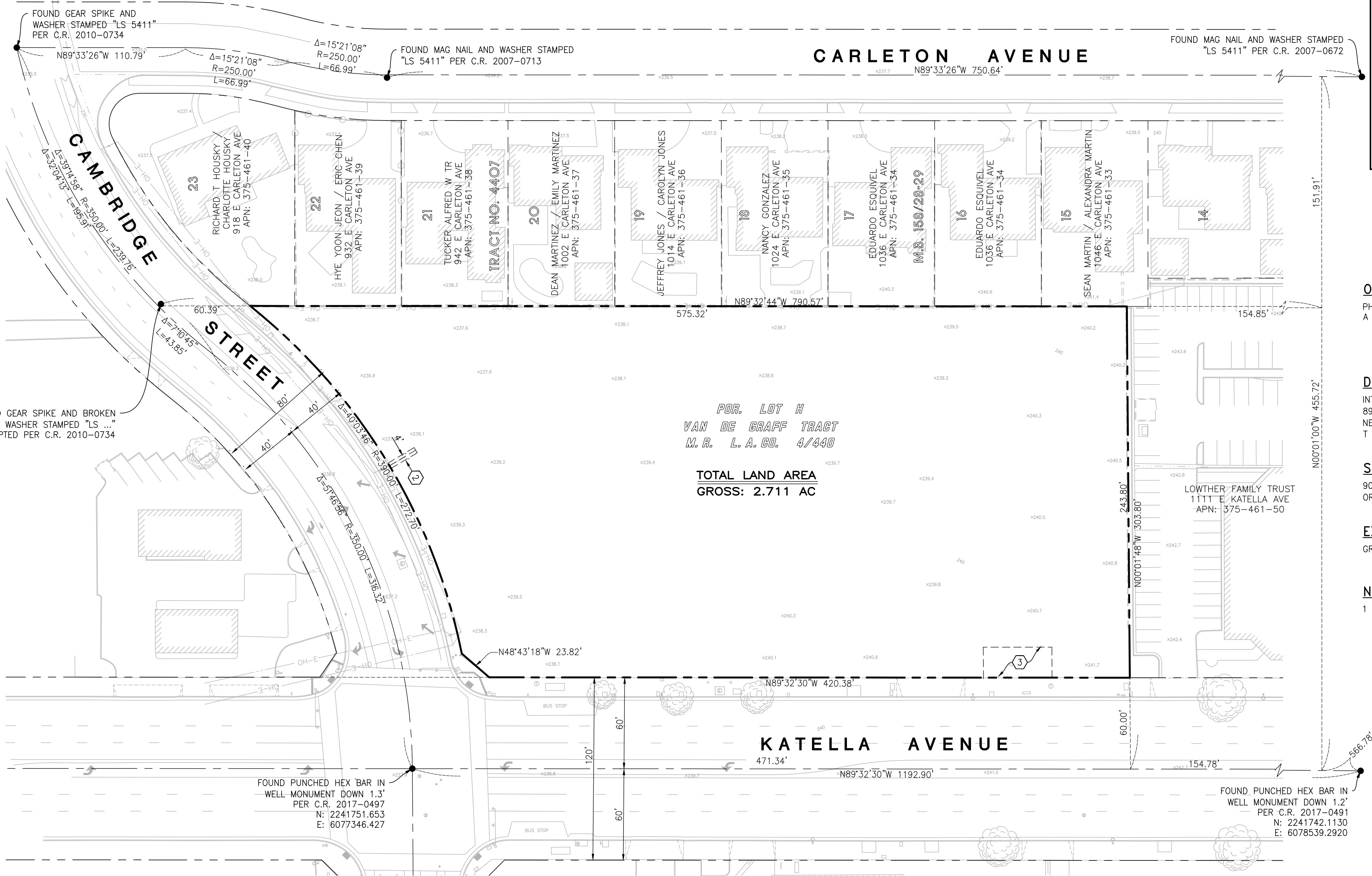
MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED: CONSENT TO GRANT OF EASEMENT
EXECUTED BY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY, A CALIFORNIA CORPORATION
RECORDING DATE: OCTOBER 3, 1983
RECORDING NO: AS INSTRUMENT NO. 83-434484 OF OFFICIAL RECORDS

- ③ AN EASEMENT FOR THE PURPOSE SHOWN BELOW AND RIGHTS INCIDENTAL THERETO AS SET FORTH IN A DOCUMENT
GRANTED TO: PACIFIC BELL TELEPHONE COMPANY, A CALIFORNIA CORPORATION
PURPOSE: PUBLIC UTILITIES
RECORDED: JULY 28, 2000 AS INSTRUMENT NO. 20000396907 OF OFFICIAL RECORDS

- 7 MATTERS CONTAINED IN THAT CERTAIN DOCUMENT
ENTITLED: HAZARDOUS SUBSTANCES CERTIFICATE AND INDEMNITY AGREEMENT
DATED: JUNE 27, 2014
EXECUTED BY: PHOENIX POWER & LIGHT, LLC, MARK A. SCHURGIN AND 1ST ENTERPRISE BANK
RECORDING DATE: JULY 03, 2014
RECORDING NO: 2014000264246 OF OFFICIAL RECORDS
(ITEM IS BLANKET IN NATURE)

TENTATIVE TRACT NO. 19253

FOR CONDOMINIUM PURPOSES
901 EAST KATELLA AVNUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA



VICINITY MAP
NOT TO SCALE

OWNER:

PHOENIX POWER & LIGHT, LLC,
A DELAWARE LIMITED LIABILITY COMPANY

CIVIL ENGINEER:

C&V CONSULTING, INC.
9830 IRVINE CENTER DRIVE
IRVINE, CA 92618
T (949) 916-3800

DEVELOPER:

INTRACORP HOMES
895 DOVE STREET, SUITE 400
NEWPORT BEACH, CA 92660
T (949) 955-2370

ARCHITECT:

C&V CONSULTING, INC.
9830 IRVINE CENTER DRIVE
IRVINE, CA 92618
T (949) 916-3800

SITE ADDRESS:

901 EAST KATELLA AVENUE
ORANGE, CA 92687

EXISTING LAND AREA:

GROSS: 2.711 AC

EXISTING LAND USE:

COMMERCIAL

NUMBER OF LOTS:

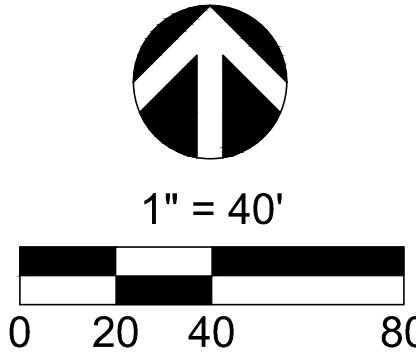
1 LOT FOR CONDOMINIUM PURPOSES

PROPOSED LAND USE:

RESIDENTIAL

UTILITY PURVEYORS:

CABLE:	TIME WARNER 303 W. APLM STREET (714) 903-4000
WATER:	CITY OF ORANGE 189 SOUTH WATER STREET (714) 744-2233
SEWER:	CITY OF ORANGE 300 EAST CHAPMAN STREET
GAS:	THE GAS CO. 1919 S STATE COLLEGE BLVD. (714) 634-3106
ELECTRICITY:	SOUTHERN CALIFORNIA EDISON (800) 655-4555
TELEPHONE:	AT&T (877) 213-1057



SHEET INDEX

- 1.....TITLE SHEET
2.....PRELIMINARY SITE PLAN
3.....PRELIMINARY GRADING PLAN
4.....PRELIMINARY UTILITY PLAN

LEGEND

- CENTERLINE
--- EX. BOUNDARY
--- PROP. BOUNDARY
--- EASEMENT
--- EX. LOT LINE

REVISIONS

NO	DATE	INITIAL	DESCRIPTION	APP	DATE

DEVELOPER:

INTRACORP HOMES

895 DOVE STREET, SUITE 400
NEWPORT BEACH, CA 92660
PHONE (949) 955-2370

SOILS ENGINEER:

GEOTEK, INC.

1548 N. MAPLE STREET
CORONA, CA 92880
PHONE (951) 710-1160

PREPARED BY :



CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING

9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618

(949) 916-3800

INFO@CVC-INC.NET

WWW.CVC-INC.NET



TENTATIVE TRACT MAP
19253

TITLE SHEET

SHEET 1 OF 4

SCALE: AS SHOWN DRAWN BY: LR CHECKED BY: JH

CITY OF ORANGE

TENTATIVE TRACT NO. 19253

FOR CONDOMINIUM PURPOSES
901 EAST KATELLA AVENUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA

PROJECT AREA:
GROSS: 2.711 AC

RESIDENTIAL PROJECT SUMMARY:

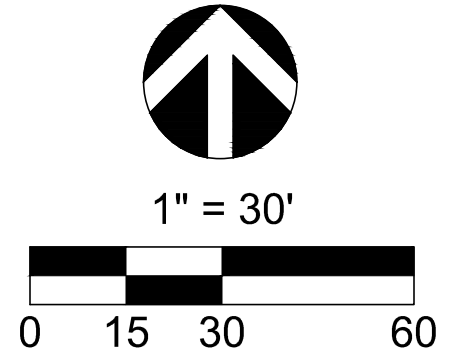
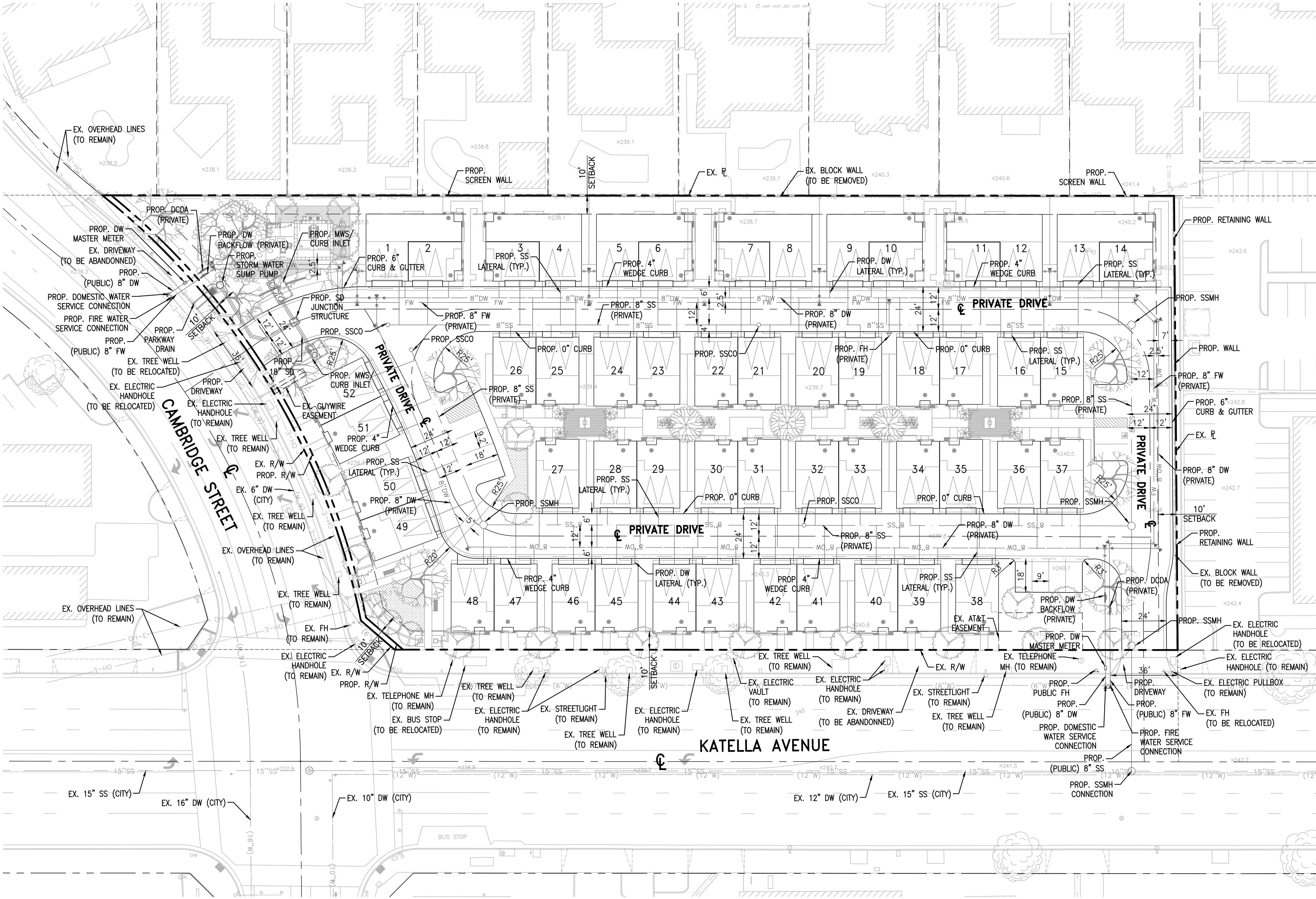
TOTAL HOMES: 52 UNITS
PARKING REQUIRED: 104 STALLS
PARKING PROVIDED: 117 STALLS
OVERALL PARKING RATIO: 2.25:1

LEGEND:

- CENTERLINE
- - - EXISTING BOUNDARY
- - - PROPOSED BOUNDARY
- - - SETBACK
- - - EXISTING LOT LINE
- - - EXISTING WALL
- - - PROPOSED WALL
- - - PROPOSED TURF
- - - PROPOSED PCC PAVEMENT
- - - PROPOSED DECORATIVE PAVEMENT

ABBREVIATIONS:

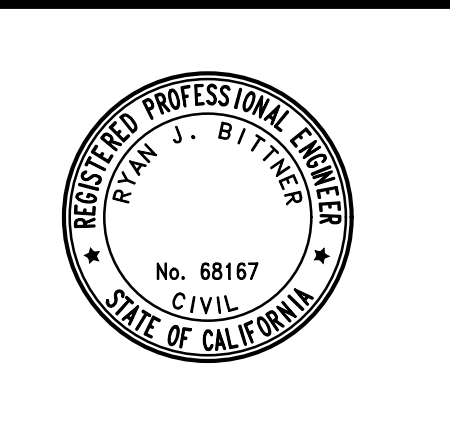
- BNDY BOUNDARY
- CB CATCH BASIN
- CF CURB FACE
- CLF CHAIN LINK FENCE
- CO CLEANOUT
- DCDA DOUBLE CHECK DETECTOR ASSEMBLY
- DI DROP INLET
- DW DOMESTIC WATER
- DWY DRIVEWAY
- ELEC ELECTRIC
- ESMT EASEMENT
- EVCS ELECTRIC VEHICLE CHARGING STATION
- EX. EXISTING
- FG FINISHED GRADE
- FL FLOW LINE
- FF FINISHED FLOOR
- FH FIRE HYDRANT
- FS FINISHED SURFACE
- FW FIRE WATER
- GM GAS METER
- INV INVERT
- LP LOW POINT
- MH MANHOLE
- MWS MODULAR WETLANDS SYSTEM
- NTS NOT TO SCALE
- OH OVERHEAD WIRES
- PB PULL BOX
- PED PEDESTAL
- PKWY PARKWAY
- PL PROPERTY LINE
- POC POINT OF CONNECTION
- PP POWER POLE
- PROP. PROPOSED
- RADIUS RADIUS
- RFM RESIDENTIAL FIRE METER
- R/W RIGHT OF WAY
- SD STORM DRAIN
- SF SQUARE FEET
- SS SANITARY SEWER
- STD STANDARD
- STLT STREETLIGHT
- WM WAREHOUSE
- WV WAREHOUSE
- TG TOP OF GRATED INLET
- TYP. TYPICAL



REVISIONS					
NO	DATE	INITIAL	DESCRIPTION	APP	DATE

DEVELOPER:	INTRACORP HOMES 895 DOVE STREET, SUITE 400 NEWPORT BEACH, CA 92660 PHONE (949) 955-2370
SOILS ENGINEER:	GEOTEK, INC. 1548 N. MAPLE STREET CORONA, CA 92880 PHONE (951) 710-1160

PREPARED BY:	C&V CONSULTING, INC. 9830 IRVINE CENTER DRIVE IRVINE, CALIFORNIA 92618 (949) 916-3800 INFO@CVC-INC.NET WWW.CVC-INC.NET
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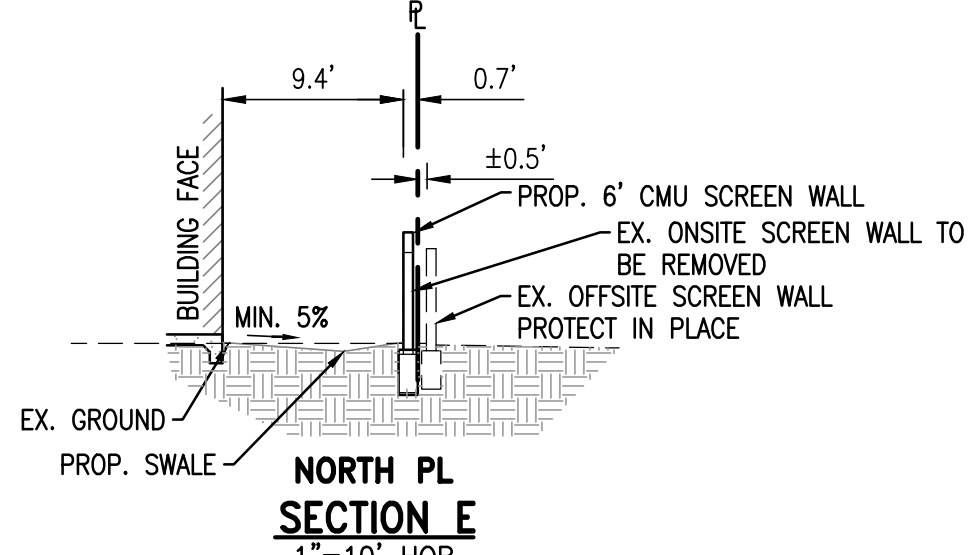
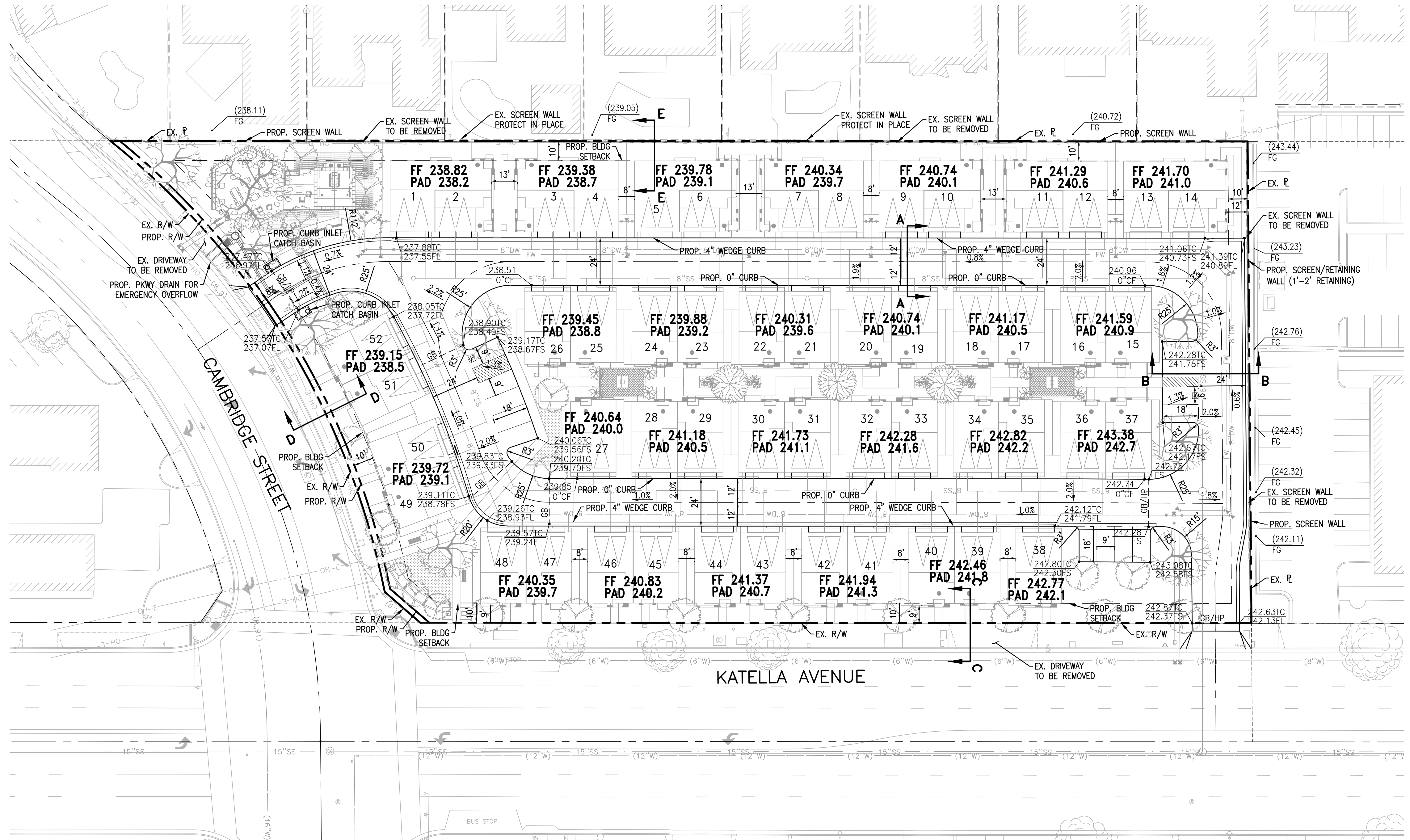
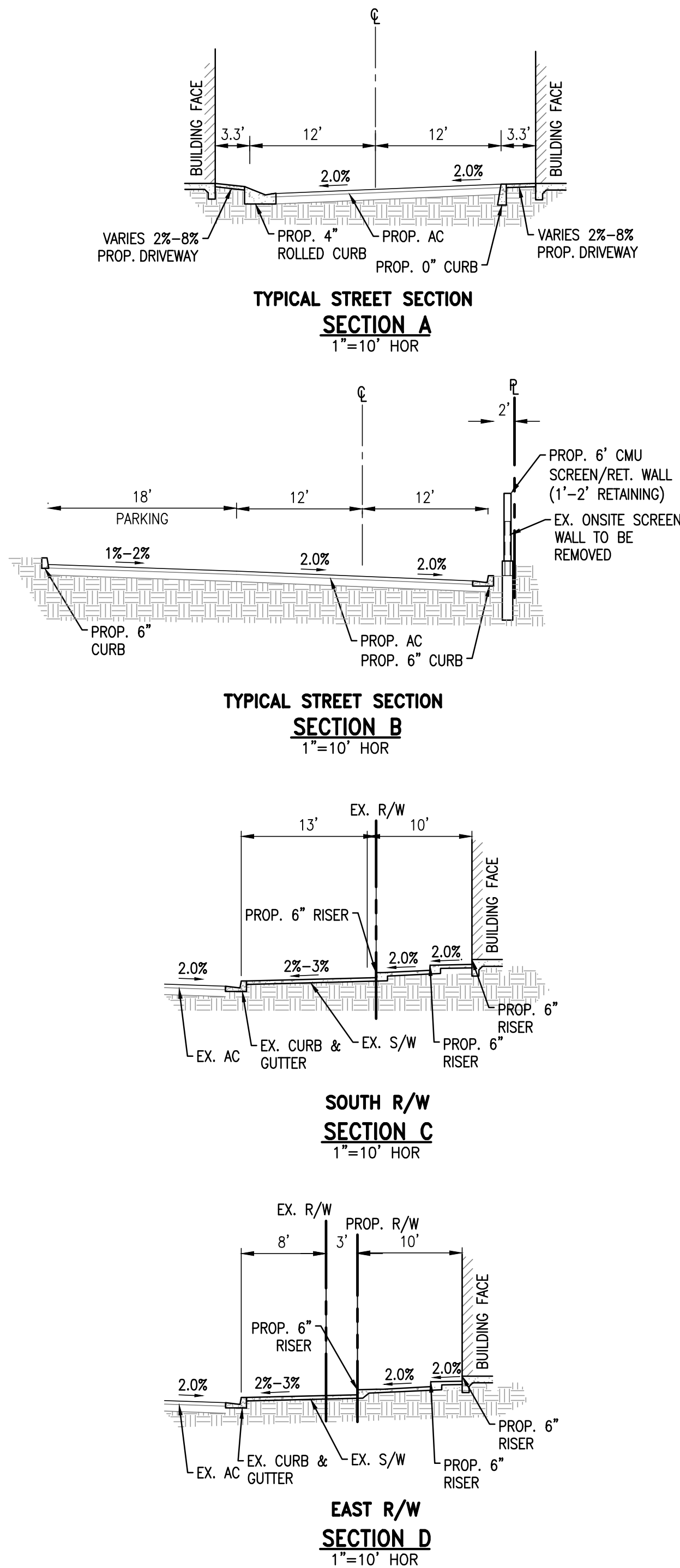
TENTATIVE TRACT MAP 19253		
PRELIMINARY SITE PLAN		
SCALE: AS SHOWN	DRAWN BY: LR	CHECKED BY: JH
CITY OF ORANGE		

TENTATIVE TRACT NO. 19253

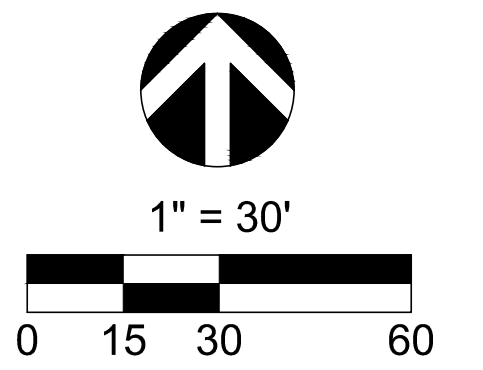
FOR CONDOMINIUM PURPOSES
901 EAST KATELLA AVENUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA

EARTHWORK:
RAW CUT: 588 CU. YDS.
RAW FILL: 2,942 CU. YDS.
OVER-EX: 21,708 CU. YDS.

PROJECT AREA:
GROSS: 2.711 AC



- LEGEND:**
- CENTERLINE
 - EXISTING BOUNDARY
 - PROPOSED BOUNDARY
 - SETBACK
 - EXISTING LOT LINE
 - EXISTING WALL
 - PROPOSED WALL
- ABBREVIATIONS:**
- BNDY: BOUNDARY
 - CB: CATCH BASIN
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 - PB: PULL BOX
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 - POC: POINT OF CONNECTION
 - PP: POWER POLE
 - PROP: PROPOSED
 - R: RADIUS
 - RFM: RESIDENTIAL FIRE METER
 - R/W: RIGHT OF WAY
 - SD: STORM DRAIN
 - SS: SQUARE FEET
 - SS: SANITARY SEWER
 - STD: STANDARD
 - STLT: STREETLIGHT
 - TC: TOP OF CURB
 - TE: TRASH ENCLOSURE
 - TG: TOP OF GRATED INLET
 - TYP: TYPICAL
 - WM: WATER METER
 - WV: WATER VALVE



REVISIONS						DEVELOPER:		INTRACORP HOMES		PREPARED BY :				TENTATIVE TRACT MAP		SHEET 3 OF 4					
NO		DATE		INITIAL		DESCRIPTION		APP		DATE				895 DOVE STREET, SUITE 400 NEWPORT BEACH, CA 92660 PHONE (949) 955-2370			6830 IRVINE CENTER DRIVE IRVINE, CALIFORNIA 92618		19253		
														(949) 916-3800 INFO@CVC-INC.NET			PRELIMINARY GRADING PLAN & SECTIONS				
						SOILS ENGINEER:		GEOTEK, INC.						www.CVC-INC.NET		SCALE: AS SHOWN		DRAWN BY: LR		CHECKED BY: JH	
								1548 N. MAPLE STREET CORONA, CA 92880 PHONE (951) 710-1160								CITY OF ORANGE					

TENTATIVE TRACT NO. 19253

FOR CONDOMINIUM PURPOSES
901 EAST KATELLA AVENUE
CITY OF ORANGE, COUNTY OF ORANGE
STATE OF CALIFORNIA

PROJECT AREA:
GROSS: 2.711 AC

RESIDENTIAL PROJECT SUMMARY:

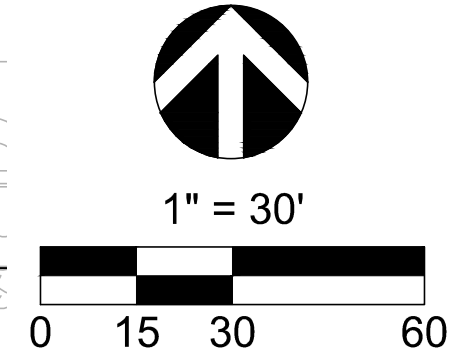
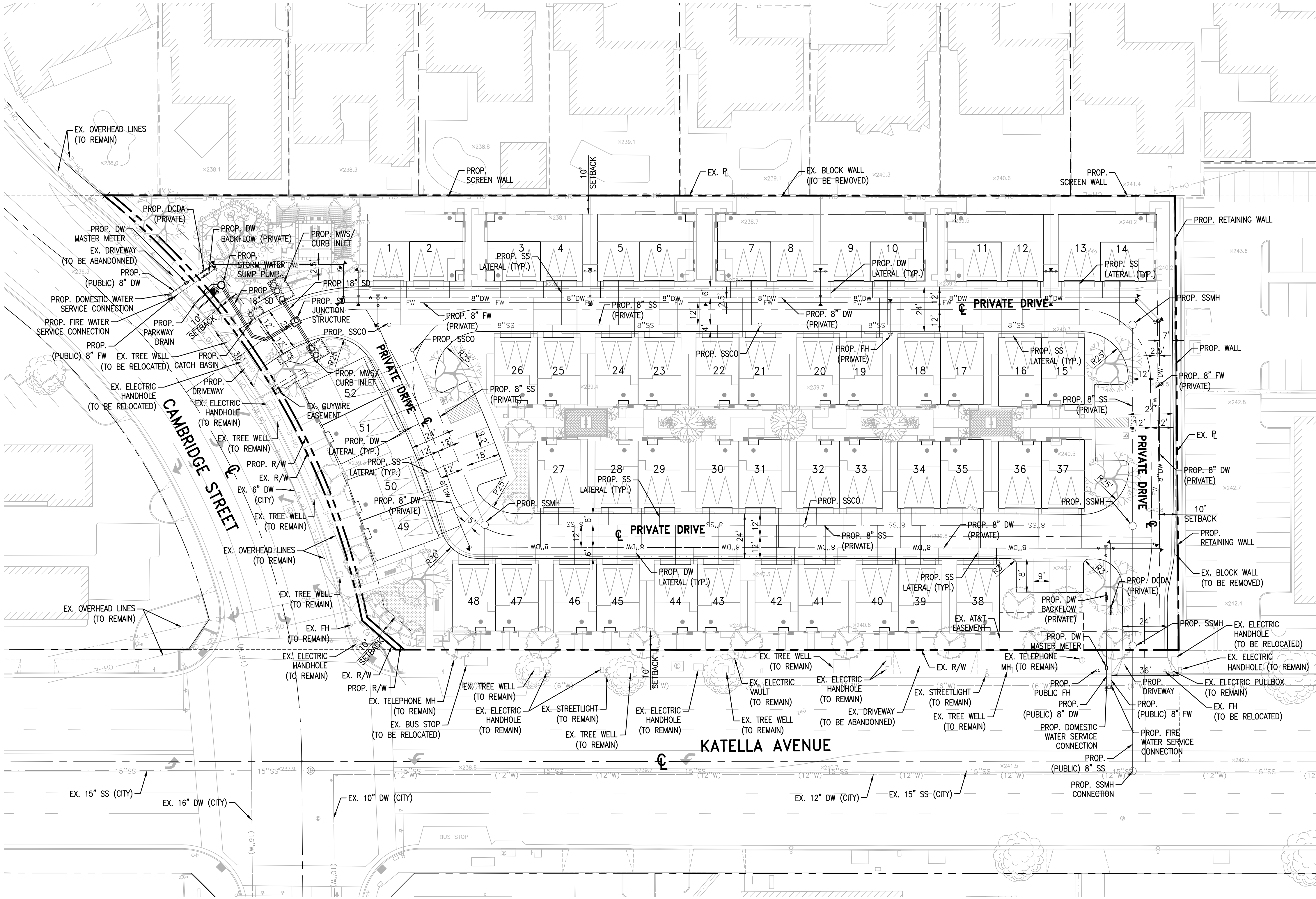
TOTAL HOMES: 52 UNITS
PARKING REQUIRED: 104 STALLS
PARKING PROVIDED: 117 STALLS
OVERALL PARKING RATIO: 2.25:1

LEGEND:

- CENTERLINE
- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- SETBACK
- EXISTING LOT LINE
- EXISTING WALL
- PROPOSED WALL
- PROPOSED TURF
- PROPOSED PCC PAVEMENT
- PROPOSED DECORATIVE PAVEMENT

ABBREVIATIONS:

- BNDY BOUNDARY
- CB CATCH BASIN
- CF CURB FACE
- CLF CHAIN LINK FENCE
- CO CLEANOUT
- DCDA DOUBLE CHECK DETECTOR ASSEMBLY
- DI DROP INLET
- DW DOMESTIC WATER
- DWY DRIVEWAY
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- TG TOP OF GRADED INLET
- TYP. TYPICAL



REVISIONS				
NO	DATE	INITIAL	DESCRIPTION	APP DATE

DEVELOPER:
INTRACORP HOMES
895 DOVE STREET, SUITE 400
NEWPORT BEACH, CA 92660
PHONE (949) 955-2370

SOILS ENGINEER:
GEOTEK, INC.
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PREPARED BY:
C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
9830 IRVINE CENTER DRIVE
IRVINE, CALIFORNIA 92618
(949) 916-3800
INFO@CVC-INC.NET
WWW.CVC-INC.NET



**TENTATIVE TRACT MAP
19253**
PRELIMINARY UTILITY PLAN

SCALE: AS SHOWN DRAWN BY: LR CHECKED BY: JH

CITY OF ORANGE

SHEET 4 OF 4