# Preliminary Hydrology/Stormwater Drainage Report

# Brookdale Apartments

**November 10, 2021**

Owner: Brookdale LLC
Mike Folk
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Corte Madera, CA 94925

Prepared by: LTD Engineering, Inc.
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BROOKDALE APARTMENTS
SAN RAFAEL

G DEARCH
11-1-21
1/12

STORMWATER ANALYSIS — EXISTING & PROPOSED RUNOFF

LOCATION: 37.983° N 122.524° W

PRECIPITATION: see sht 4

GROUND COVER: see sht. SW-2

$A_{E1}$ = 309 sf IMPERVIOUS - EXISTING

$A_{E2}$ = 11394 - 309 = 11,085 PERVIOUS - EXISTING

RUNOFF COEFFICIENT

C = 0.65 — PERVIOUS

C = 0.95 IMPERVIOUS

TIME OF CONCENTRATION - See sht 5

$$\text{AVG SLOPE} = \frac{114-100}{128} = 0.11$$

WATERSHED LENGTH 128'

$T_C$ = 10 min

PRECIPITATION

$i_{10}$ = 2.48 — 10 YR STORM see sht 4

RUNOFF

$Q = CiA$

$$= \left(0.65 \times 2.48 \times \frac{11085}{43560}\right) + \left(0.95 \times 2.48 \times \frac{309}{43560}\right)$$

$$= 0.41 + 0.02$$

$\underline{Q_{10} = 0.43 \text{ cfs}}$

PROPOSED RUNOFF

GROUND COVER - IMPERVIOUS AREA ROUTED THROUGH A BIO-RETENTION BASIN IS THE SAME AS THROUGH PERVIOUS AREA. SEE shts 6-9
SEE SHT SW-1 & G-2

| DMA | Impervious Surface Area through Bioretention Basin (sf) |
|---|---|
| 1A | 1301 |
| 1B | 100 |
| 2A | 1931 |
| 2B | 225 |
| 2C | 109 |
| 4A | 1552 |
| 4B | 154 |
| 4C | 54 |
| 7A | 90 |
| 7B | 525 |
| **Subtotal** | **6041** |

| DMA | Impervious Surface Area Direct Runoff (sf) |
|---|---|
| 5 | 469 |
| 8 | 373 |
| | **842** |

| DMA | Paver Surface Area Direct Runoff (sf) |
|---|---|
| 3 | 703 |
| 6 | 897 |
| | **1600** |

| | |
|---|---|
| Total impervious through bio-retention | 6041 |
| Total impervious direct runoff | 842 |
| Total paver direct runoff | 1600 |
| Total pervious runoff | 2911 |
| **Total Watershed** | **11394** |

RUNOFF COEFFICIENT

C = 0.60 FROM BIORETENTION

C = 0.65 NATURAL

C = 0.80 PAVERS

C = 0.95 IMPERVIOUS

RUNOFF

$$Q = CIA$$

$$Q = \left(0.60 \times 2.48 \times \frac{6041}{43560}\right) + \left(0.65 \times 2.48 \times \frac{2911}{43560}\right)$$

$$+ \left(0.90 \times 2.48 \times \frac{1600}{43560}\right) + \left(0.95 \times 2.48 \; \frac{842}{43560}\right)$$

$$Q = 0.21 + 0.11 + 0.07 + 0.05$$

$$Q = 0.44 \text{ cfs}$$

CONCLUSION

EXISTING RUNOFF $Q_{10} = 0.43$ cfs
PROPOSED RUNOFF $Q_{10} = 0.44$ cfs

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**NOAA Atlas 14, Volume 6, Version 2**
**Location name: San Rafael, California, USA***
**Latitude: 37.983°, Longitude: -122.524°**
**Elevation: 92.32 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

## PF tabular

**PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]**

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 1.87 (1.67-2.12) | 2.32 (2.05-2.63) | 2.93 (2.60-3.34) | 3.47 (3.05-4.00) | 4.25 (3.59-5.10) | 4.90 (4.03-6.01) | 5.59 (4.46-7.07) | 6.35 (4.91-8.30) | 7.44 (5.47-10.2) | 8.34 (5.89-11.9) |
| 10-min | 1.34 (1.19-1.52) | 1.66 (1.48-1.88) | 2.10 (1.87-2.39) | 2.48 (2.18-2.86) | 3.05 (2.57-3.65) | 3.51 (2.89-4.31) | 4.01 (3.20-5.07) | 4.55 (3.52-5.95) | 5.33 (3.92-7.32) | 5.98 (4.22-8.55) |
| 15-min | 1.08 (0.964-1.22) | 1.34 (1.19-1.52) | 1.70 (1.50-1.93) | 2.00 (1.76-2.31) | 2.46 (2.07-2.94) | 2.83 (2.33-3.48) | 3.23 (2.58-4.09) | 3.67 (2.83-4.80) | 4.30 (3.16-5.90) | 4.82 (3.40-6.89) |
| 30-min | 0.804 (0.716-0.912) | 0.994 (0.884-1.13) | 1.26 (1.12-1.44) | 1.49 (1.31-1.72) | 1.83 (1.54-2.19) | 2.11 (1.73-2.59) | 2.40 (1.92-3.04) | 2.73 (2.11-3.57) | 3.20 (2.35-4.39) | 3.59 (2.53-5.13) |
| 60-min | 0.575 (0.512-0.652) | 0.711 (0.632-0.807) | 0.901 (0.799-1.03) | 1.07 (0.936-1.23) | 1.31 (1.10-1.57) | 1.51 (1.24-1.85) | 1.72 (1.37-2.17) | 1.95 (1.51-2.55) | 2.29 (1.68-3.14) | 2.56 (1.81-3.67) |
| 2-hr | 0.434 (0.386-0.492) | 0.538 (0.478-0.610) | 0.683 (0.606-0.778) | 0.809 (0.710-0.931) | 0.991 (0.836-1.19) | 1.14 (0.938-1.40) | 1.30 (1.04-1.65) | 1.47 (1.14-1.93) | 1.72 (1.27-2.37) | 1.93 (1.36-2.76) |
| 3-hr | 0.367 (0.327-0.416) | 0.455 (0.405-0.516) | 0.578 (0.512-0.658) | 0.683 (0.600-0.786) | 0.836 (0.705-1.00) | 0.960 (0.790-1.18) | 1.09 (0.873-1.38) | 1.24 (0.955-1.62) | 1.44 (1.06-1.98) | 1.61 (1.14-2.31) |
| 6-hr | 0.272 (0.242-0.308) | 0.337 (0.300-0.383) | 0.427 (0.379-0.487) | 0.504 (0.443-0.580) | 0.615 (0.518-0.736) | 0.704 (0.578-0.864) | 0.798 (0.637-1.01) | 0.899 (0.695-1.18) | 1.04 (0.768-1.43) | 1.16 (0.820-1.66) |
| 12-hr | 0.195 (0.173-0.221) | 0.243 (0.216-0.276) | 0.308 (0.273-0.351) | 0.364 (0.319-0.418) | 0.442 (0.373-0.529) | 0.505 (0.415-0.620) | 0.570 (0.456-0.722) | 0.641 (0.495-0.838) | 0.739 (0.544-1.01) | 0.819 (0.578-1.17) |
| 24-hr | 0.133 (0.120-0.151) | 0.167 (0.150-0.190) | 0.213 (0.191-0.242) | 0.251 (0.223-0.287) | 0.304 (0.263-0.359) | 0.346 (0.294-0.417) | 0.390 (0.324-0.480) | 0.436 (0.353-0.550) | 0.501 (0.390-0.655) | 0.552 (0.417-0.745) |
| 2-day | 0.090 (0.081-0.102) | 0.113 (0.102-0.128) | 0.144 (0.129-0.163) | 0.169 (0.151-0.194) | 0.204 (0.176-0.241) | 0.231 (0.196-0.278) | 0.259 (0.215-0.318) | 0.288 (0.233-0.363) | 0.328 (0.256-0.429) | 0.359 (0.271-0.486) |
| 3-day | 0.069 (0.062-0.078) | 0.086 (0.078-0.098) | 0.109 (0.098-0.125) | 0.129 (0.114-0.147) | 0.155 (0.134-0.182) | 0.175 (0.148-0.210) | 0.195 (0.162-0.240) | 0.216 (0.175-0.273) | 0.245 (0.191-0.321) | 0.267 (0.202-0.361) |
| 4-day | 0.057 (0.051-0.064) | 0.071 (0.064-0.081) | 0.090 (0.081-0.103) | 0.106 (0.095-0.122) | 0.127 (0.110-0.150) | 0.144 (0.122-0.173) | 0.160 (0.133-0.197) | 0.177 (0.143-0.223) | 0.200 (0.156-0.262) | 0.217 (0.164-0.294) |
| 7-day | 0.039 (0.035-0.045) | 0.050 (0.045-0.056) | 0.063 (0.056-0.071) | 0.074 (0.065-0.084) | 0.088 (0.076-0.104) | 0.099 (0.084-0.119) | 0.110 (0.091-0.135) | 0.121 (0.098-0.152) | 0.136 (0.106-0.178) | 0.147 (0.111-0.199) |
| 10-day | 0.032 (0.029-0.036) | 0.040 (0.036-0.046) | 0.051 (0.046-0.058) | 0.060 (0.053-0.069) | 0.071 (0.062-0.084) | 0.080 (0.068-0.096) | 0.088 (0.073-0.109) | 0.097 (0.078-0.122) | 0.108 (0.084-0.141) | 0.116 (0.088-0.157) |
| 20-day | 0.021 (0.019-0.024) | 0.027 (0.024-0.030) | 0.034 (0.030-0.039) | 0.039 (0.035-0.045) | 0.046 (0.040-0.055) | 0.051 (0.044-0.062) | 0.056 (0.047-0.069) | 0.061 (0.049-0.077) | 0.067 (0.052-0.088) | 0.071 (0.054-0.096) |
| 30-day | 0.017 (0.015-0.019) | 0.022 (0.020-0.025) | 0.027 (0.025-0.031) | 0.032 (0.028-0.036) | 0.037 (0.032-0.044) | 0.041 (0.035-0.049) | 0.045 (0.037-0.055) | 0.048 (0.039-0.060) | 0.052 (0.040-0.068) | 0.055 (0.041-0.074) |
| 45-day | 0.014 (0.013-0.016) | 0.018 (0.016-0.020) | 0.023 (0.020-0.026) | 0.026 (0.023-0.030) | 0.030 (0.026-0.036) | 0.033 (0.028-0.040) | 0.036 (0.030-0.044) | 0.038 (0.031-0.048) | 0.041 (0.032-0.054) | 0.043 (0.032-0.058) |
| 60-day | 0.012 (0.011-0.014) | 0.016 (0.014-0.018) | 0.020 (0.018-0.023) | 0.023 (0.020-0.026) | 0.027 (0.023-0.031) | 0.029 (0.025-0.035) | 0.031 (0.026-0.038) | 0.033 (0.027-0.042) | 0.035 (0.028-0.046) | 0.037 (0.028-0.050) |

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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## PF graphical

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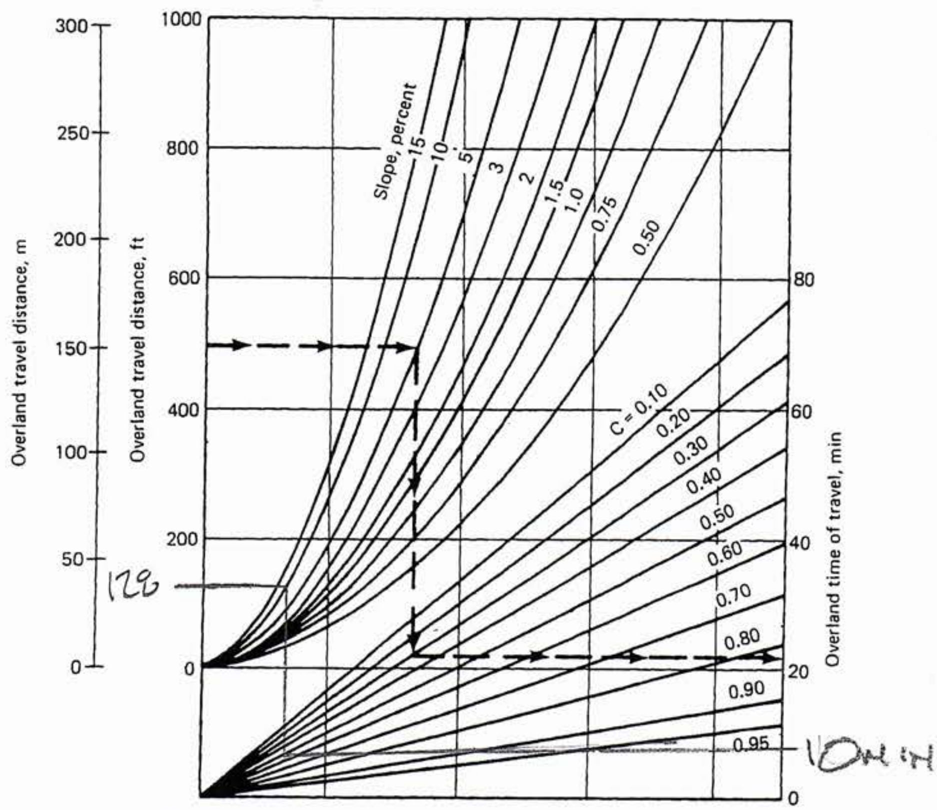


**Fig. 4.5** A nomograph of overland flow time. (10) Enter left margin with slope length; move right to slope curve and down to *C* value; and find overland travel time on right margin.

- Calculate the average slope by computing the difference in altitude between the highest and lowest points of the flow path and dividing by the distance between those points.
- Find or compute the *C* value.
- Enter the graph on the left margin with the overland travel distance; move to the right to the correct slope curve; move down to the *C* value; and then move over to the right margin.
- Read the overland flow time from the right-hand scale.

**EXAMPLE 4.5**

**Given:** A site 500 ft (152 m) long with 5 percent average slope and a *C* value of 0.30.

**Find:** Overland flow time.

***Solution:*** From Fig. 4.5, the estimated flow time is 22 min.

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DUBIN Environmental

# Technical Memorandum

Dubin Environmental Consulting
4218 Meridian Avenue N
Seattle, WA 98103
206-898-0057

Project Title: Region 2 NPDES Phase II Permit Support

Project No.: 10005.001

**Bioretention Performance Modeling**

Subject: Evaluating Hydromodification Performance of Bioretention

Date: June 25, 2014

To: Dan Cloak

From: Tony Dubin

This technical memorandum describes the modeling analysis that was performed to determine whether bioretention facilities sized using the criteria included in Region 2 NPDES Phase II permit would achieve the permit's hydromodification requirement[1]. This memo describes the modeling method, results and implications.

## Model Setup and Approach

Stormwater runoff and bioretention performance were simulated using HSPF, which is a physically-based, continuous hydrology model distributed by the USEPA. HSPF was used to simulate (1) pre-project runoff from a representative 1-acre of scrub/range vegetation land, (2) post-project runoff from a 1-acre impervious surface and (3) outflows from a bioretention facility that receives its input from the 1-acre impervious area. The HSPF model parameters and bioretention modeling approach were adapted from the Contra Costa HMP.

Time series input data for the model include hourly rainfall from the Kentfield gauge (from January 1995 to March 2014) and evapotranspiration data from the California Irrigation Management Information System (CIMIS) gauges at Novato (January 1995 to January 2002) and Point San Pedro (December 2002 to March 2014). Evapotranspiration values for the 11 month period between the two gauge records were estimated for each calendar day by computing the average of the evapotranspiration values measured on that same day in other years. Table 1 summarizes the model setup and bioretention facility configuration.

[1] The hydromodification requirement is described in Section E.12.e(f) of the State Water Resources Control Board Water Quality Order No. 2013-0001-DWQ NPDES General Permit No. CAS000004 – Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Water Systems (MS4s).

| Table 1. HSPF Model Setup and Bioretention Configuration | |
|---|---|
| **Model Setup Item** | **Model Value** |
| Scenarios simulated | • Pre-project condition (scrub/range vegetation)<br>• Post-project condition (100% paved area)<br>• Post-project, mitigated (flow routed through bioretention) |
| Rainfall data | • Kentfield gauge, hourly accumulations (Jan. 1995 to Mar. 2014) |
| Evapotranspiration data | • CIMIS daily data from Novato (1995-2002) and Point San Pedro (2002-2014) |
| Soil type | • NRCS Hydrologic Soil Group D (clay). HSPF parameters based on Contra Costa HMP analysis. |
| Bioretention dimensions | • Plan area = 4 percent of impervious tributary area<br>• Surface reservoir depth = 6 inches (elevation of catch basin inlet)<br>• Freeboard = 2 inches (from catch basin inlet to top of bioretention)<br>• Bioretention soil depth = 18 inches<br>• Gravel depth = 12 inches |
| Bioretention underdrain | • 4-inch diameter pipe with its crown elevation set equal to top of gravel layer |
| Bioretention infiltration | • Infiltration rate from gravel layer to native soils = 0.25 in/hr |

## Model Simulations and Results

Long term simulations were run for the three scenarios listed above. Hourly flows for each scenario were exported from the model and then separated into distinct storm events[2]. Each storm event was evaluated to determine a) the peak flow rate and b) the recurrence interval for each significant storm event (the top 100 events over the 19 year simulation period).

The simulated bioretention performance was examined in detail for two large storm events to better understand the function of each part of a bioretention facility. Figure 1 and Figure 2 show the simulated inflows, outflows and water depths within a bioretention facility for a large storm event in early December 2004 that produced 6.5 inches of rain over a three day period.

The bioretention was dry at the start of the event and the soils accommodated the first wave of stormwater runoff, providing treatment and percolating water into the gravel layer. Later in the event, as both the gravel layer and the bioretention soil/surface storage layers became saturated, stormwater was discharged from both the underdrain and the catch basin inlet located at the top of the surface storage layer. The downward sloping portion of the blue line in Figure 2 illustrates infiltration from the gravel layer to the surrounding soils. For smaller events, all incoming stormwater would infiltrate to surrounding soils or be discharged via the underdrain.

[2] The time series of modeled flow rates were divided into distinct events using the partial duration series method, which is preferable for frequency analyses of relatively common storm/hydrologic events (<5 to 10 years).

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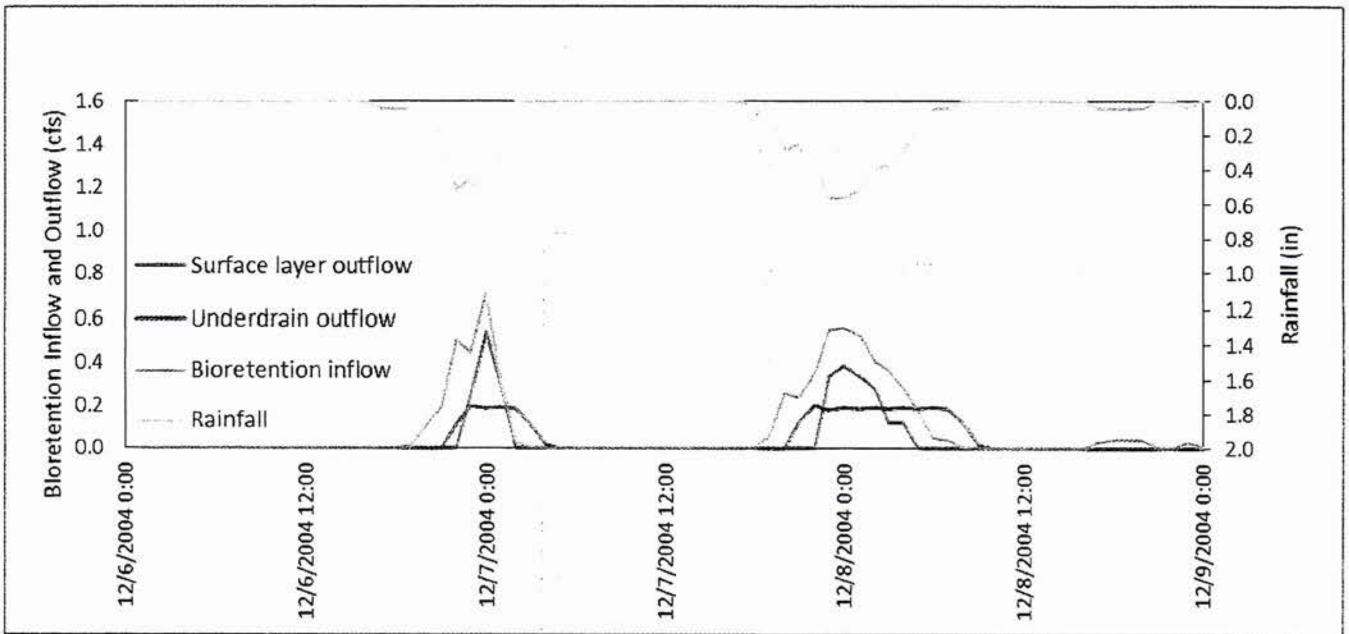


**Figure 1. Bioretention inflows and outflows for large December 2004 event**

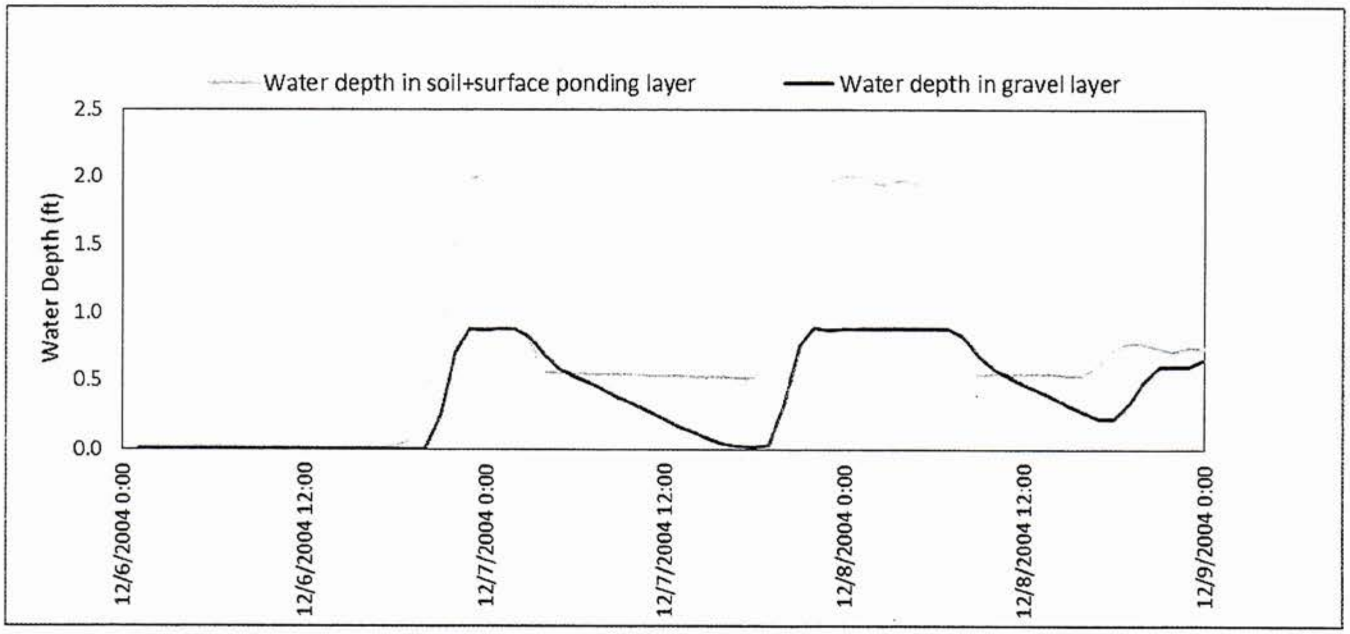


**Figure 2. Water depths within the gravel and soil/surface storage layers for large December 2004 event**

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The NPDES Phase II permit covering parts of Marin, Napa, Sonoma and Solano Counties specifies that the peak 2-year outflow from the bioretention facility cannot exceed the pre-project peak 2-year flow for the project site. The bioretention outflows and pre-project flows were compared for the 2-year recurrence and for other storms up to the 10-year recurrence level (Figure 3). The results demonstrate that the bioretention facility dimensions included in the permit will limit peak outflows to levels that are below the pre-project peak flows. *Note: The comparison of storms > 2-years was performed only because I had the automated tools already in place.*

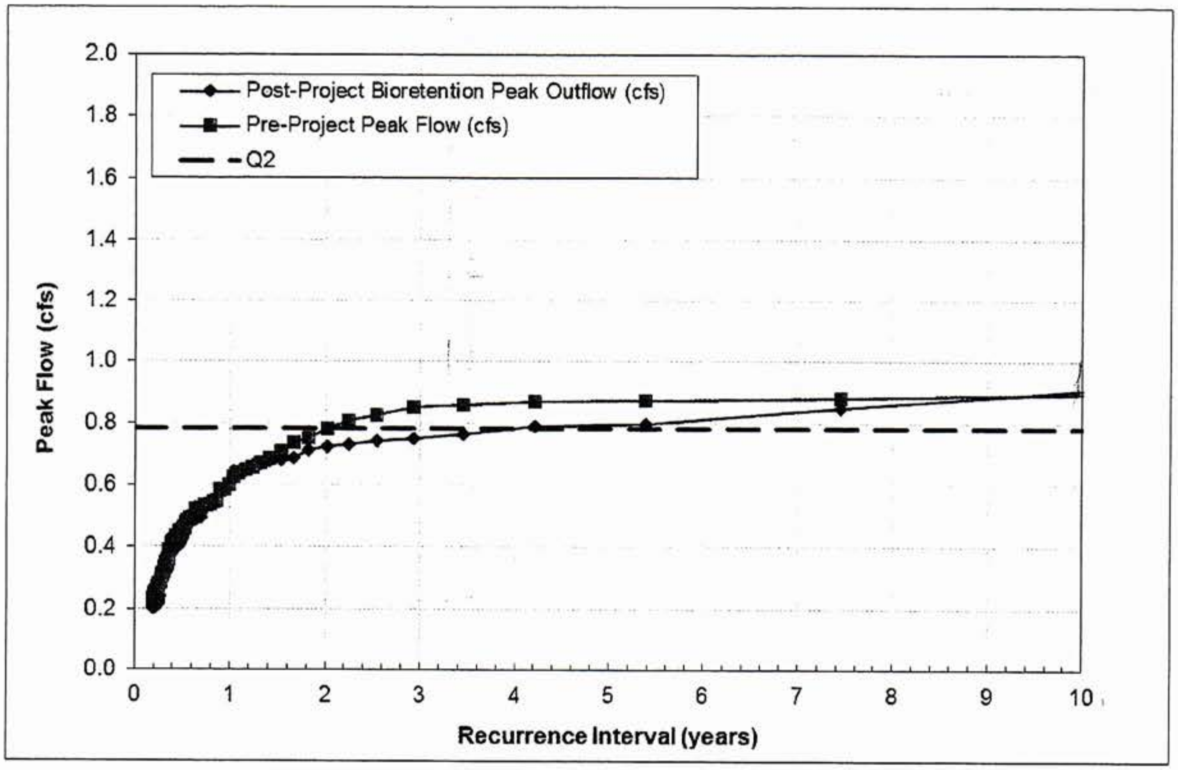
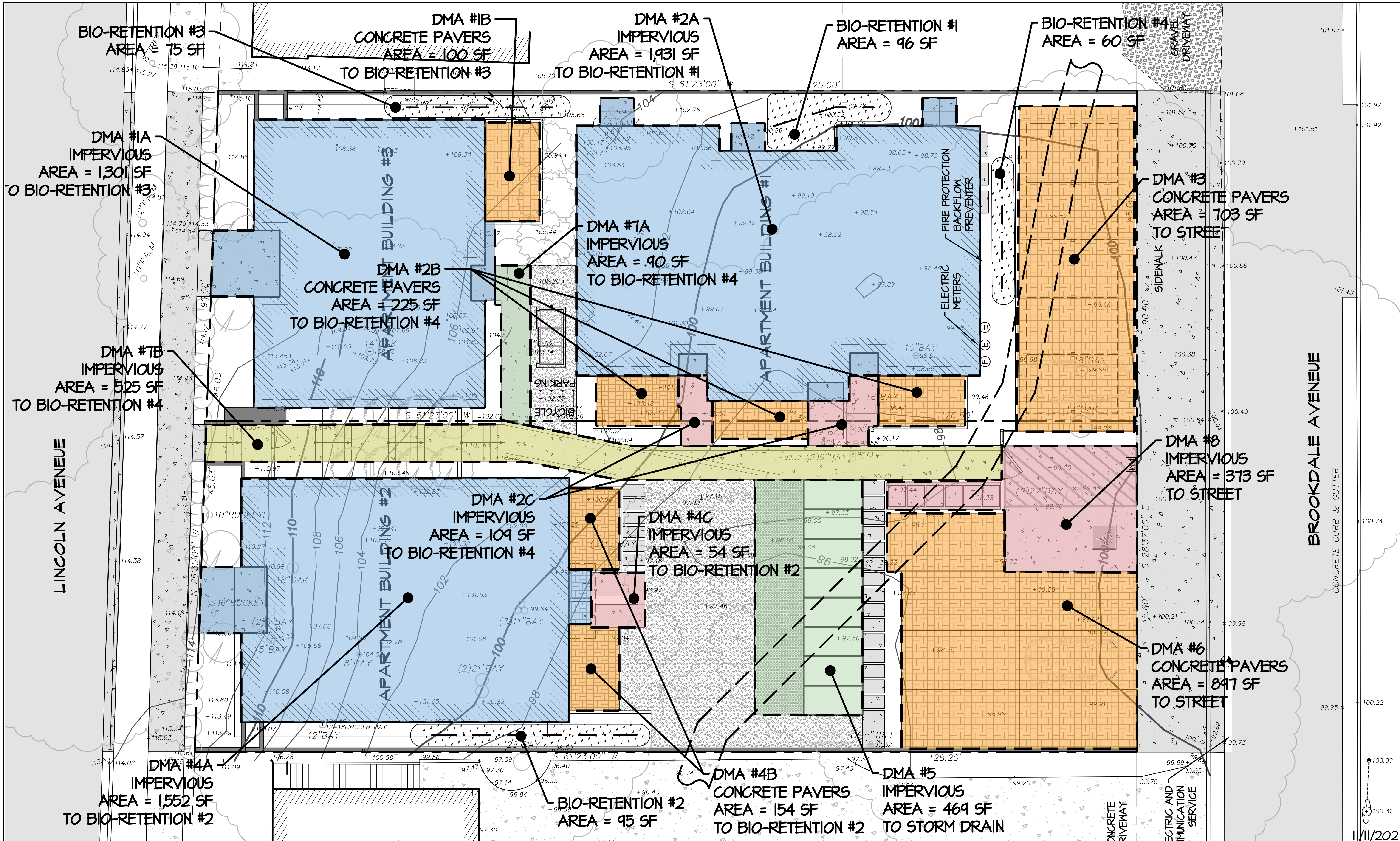



**Figure 3. The NPDES permit's bioretention sizing criteria will reduce peak flows below pre-project levels for the 2-year recurrence event required by the permit and for larger storms.**

## Conclusions

HSPF modeling was used to evaluate whether a bioretention facility sized with the criteria included in the Region 2 NPDES Phase II permit would control 2-year peak flows to pre-project levels. This analysis was performed using rainfall data collected at Kentfield, which is among the wettest areas covered by the permit, and for NRCS Group D (clay) soils, which is the most commonly found soil type within the permit area.

The modeling results show the bioretention's peak 2-year outflow rate would be 7 percent lower than 2-year peak flows for pre-project conditions. The bioretention facility would also control peak flows for storms up to the 10-year recurrence interval.

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**PROPOSED IMPERVIOUS AREA = 6,404 SF**
**PROPOSED CONCRETE PAVER AREA = 2,079 SF**

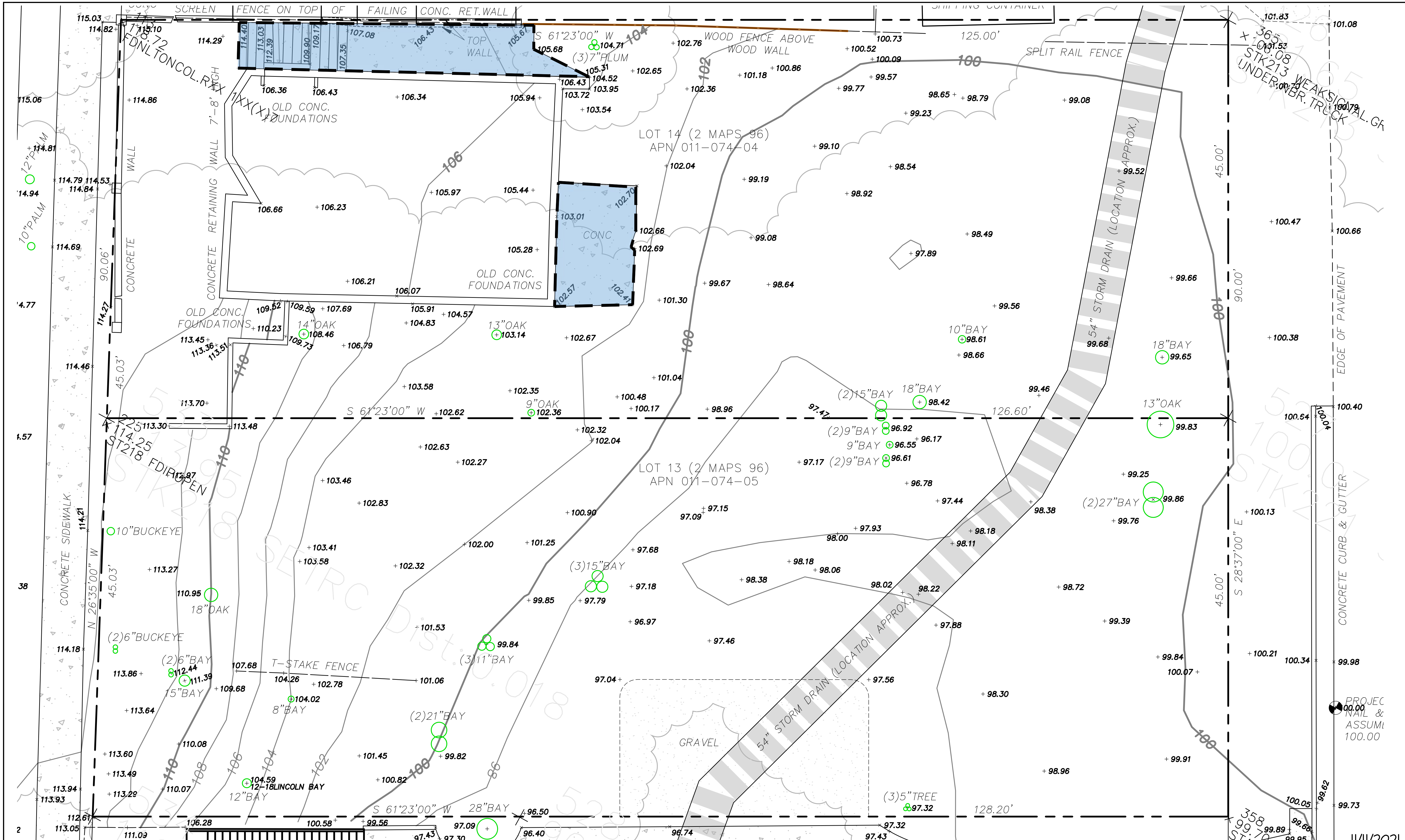
1/11/2021

BROOKDALE APARTMENTS
55 BROOKDALE AVENUE
SAN RAFAEL, CALIFORNIA

STORMWATER CONTROL PLAN

PROJECT NO.
662.001

FIGURE
SW-1




11/11/2021

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0 10 20
SCALE IN FEET

**EXISTING IMPERVIOUS AREA = 309 SF**
**TOTAL LOT AREA = 11,394 SF**

| | |
|---|---|
| BROOKDALE APARTMENTS<br>55 BROOKDALE AVENUE<br>SAN RAFAEL, CALIFORNIA | PROJECT NO.<br>662.001 |
| STORMWATER CONTROL PLAN | FIGURE<br>**SW-2** |

# DESIGN REVIEW NOTES

## STORMWATER DRAINAGE PLAN

1. THE CONCEPTUAL STORMWATER DRAINAGE PLAN IS DESIGNED TO COMPLY WITH THE CITY REQUIREMENTS FOR ON-SITE STORMWATER MANAGEMENT AND CONTROL OF STORMWATER RUNOFF TO MINIMIZE OFF-SITE IMPACTS AND IMPROVE STORMWATER QUALITY.

2. THE EXISING IMPERVIOUS AREA ON THE SITE TOTALS 309 SQ FT..

3. THE PROPOSED DEVELOPMENT PLAN INCLUDES 6,404 SQ FT OF IMPERVIOUS AREA. THE TOTAL LOT AREA IS 11,344 SQ FT. THE PROPOSED TOTAL IMPERVIOUS AREA AMOUNTS TO 56 PERCENT OF THE LOT AREA.

4. THE PROPOSED DEVELOPMENT PLAN MINIMIZES THE USE OF IMPERVIOUS HARDSCAPE. CONCRETE PAVERS WILL BE USED FOR PARKING AREAS AND PATIOS.

5. RUNOFF FROM 5,562 SQ FT OF THE PROPOSED NEW IMPERVIOUS AREA WILL BE COLLECTED IN A PIPED DRAINAGE SYSTEM AND DIRECTED TO FOUR BIO-RETENTION BASINS. THE IMPERVIOUS AREA DIRECTED TO THE BIO-RETENTION BASINS INCLUDES THE ENTIRE ROOF AREA OF THE THREE APARTMENT BUILDINGS, WALKWAYS AND PATIOS. RUNOFF FROM REMAINING IMPERVIOUS AREA WILL SHEET FLOW TO LANDSCAPE AREAS OR TO THE STREET.

6. AREA DRAINS IN LANDSCAPE AND HARDSCAPE AREAS ARE LIMITED TO LOCATIONS WHERE THEY ARE NECESSARY TO PREVENT WATER PONDING THAT COULD DAMAGE THE BUILDINGS.

7. THE BIO RETENTION BASINS ARE DESIGNED TO CAPTURE THE 10-YEAR STORM AND INFILTRATE IT INTO THE GROUND IN ACCORDANCE WITH MCSTOPPP GUIDELINES. THE SURFACE AREA OF THE BASINS AND DETAILS OF CONSTRUCTION COMPLY WITH MCSTOPPP GUIDELINES.

8. A FOUNDATION DRAINAGE AND RETAINING WALL BACK DRAINAGE SYSTEM WILL BE CONSTRUCTED USING PERFORATED PVC PIPE. THE SYSTEM WILL OUTLET TO THE GROUND SURFACE AT A SUITABLE LOCATION. PERMANENT EROSION CONTROL WILL BE INSTALLED AT THE OUTLET LOCATION.

## EXCAVATION & GRADING PLAN

1. SITE GRADING WILL BE COMPLETED IN CONFORMANCE WITH THE PROJECT GEOTECHNICAL REPORT AND THE APPROVED SITE GRADING PLAN.

2. EXCESS EXCAVATED MATERIAL WILL BE LEGALLY DISPOSED OF AT AN OFF-SITE LOCATION TO BE DETERMINED BY THE CONSTRUCTION CONTRACTOR.

## EROSION CONTROL

1. EROSION CONTROL MEASURES WILL BE INCORPORATED INTO THE PROJECT DURING CONSTRUCTION AND IMPLEMENTED BY THE CONSTRUCTION CONTRACTOR. STRAW WATTLES WILL BE PLACED AROUND THE DOWN-SLOPE PERIMETER OF THE DISTURBED AREA. EXCAVATED AREAS AND SOIL STOCKPILES WILL BE COVERED WITH PLASTIC TARPS TO MINIMIZE EROSION. AREAS DISTURBED DURING CONSTRUCTION WILL BE RESTORED BY SEEDING AND INSTALLATION OF EROSION CONTROL BLANKET AND STRAW WATTLES.

2. PERMANENT EROSION CONTROL WILL BE PROVIDED BY LANDSCAPING THE ENTIRE DISTURBED AREA AT THE COMPLEITON OF THE WORK IN ACCORDANCE WITH THE LANDSCAPING PLANS.

## STORMWATER POLLUTION PREVENTION

1. SPECIFICATIONS WILL BE INCLUDED ON THE PROJECT DRAWINGS OUTLINING CONSTRUCTION PRACTICES THAT MUST BE FOLLOWED TO PREVENT STORMWATER POLLUTION. CONSTRUCTION WORKERS WILL BE ADVISED OF REQUIRED CONSTRUCTION MEASURES FOR AVOIDING STORMWATER POLLUTION. THESE MEASURES WILL INCLUDE PROCEDURES FOR MATERIAL STORAGE, USE AND DISPOSAL OF HAZARDOUS MATERIALS (PAINT, SOLVENTS, ADHESIVES, ETC.), WASTE DISPOSAL PROCEDURES, CONCRETE WASHOUT REQUIREMENTS AND OTHER CONSTRUCTION PRACTICES.

## UTILITY PLAN

1. WATER: WATER SERVICE WILL BE PROVIDED BY A NEW SERVICE CONNECTION TO THE EXISTING WATER MAIN IN BROOKDALE AVENUE AND AN APPROPRIATELY SIZED METER AS SHOWN ON DRAWING C-2. ALL WATER SYSTEM IMPROVEMENTS WILL BE COMPLETED IN CONFORMANCE WITH MARIN MUNICIPAL WATER DISTRICT STANDARDS.

2. ELECTRIC POWER: ELECTRIC SERVICE WILL BE LOCATED UNDERGROUND FROM THE NEAREST JOINT POLE AS SHOWN ON DRAWING C-2. ALL ELECTRIC POWER SYSTEM IMPROVEMENTS WILL BE COORDINATED WITH PACIFIC GAS AND ELECTRIC (PG&E) AND COMPLETED IN CONFORMANCE WITH PG&E STANDARDS.

3. COMMUNICATION: PHONE AND CABLE TV SERVICE WILL BE LOCATED UNDERGROUND FROM THE NEAREST JOINT POLE AS SHOWN ON DRAWING C-2. ALL COMMUNICATION SYSTEM IMPROVEMENTS WILL BE COORDINATED WITH AT&T AND COMCAST. THE WORK WILL BE COMPLETED IN CONFORMANCE WITH THEIR STANDARDS.

4. NATURAL GAS: GAS SERVICE WILL BE PROVIDED WITH A NEW SERVICE LINE AND METER AS SHOWN ON DRAWING C-2INED. ALL GAS SYSTEM IMPROVEMENTS WILL BE COORDINATED WITH PACIFIC GAS AND ELECTRIC (PG&E) AND COMPLETED IN CONFORMANCE WITH PG&E STANDARDS.

5. NATURAL GAS: ALL GAS SYSTEM IMPROVEMENTS WILL BE COORDINATED WITH PACIFIC GAS AND ELECTRIC (PG&E) AND COMPLETED IN CONFORMANCE WITH PG&E STANDARDS.

6. SANITARY SEWER: A NEW SEWER LATERAL AND BACK FLOW PREVENTION DEVICES AT EACH BUILDING WILL BE CONSTRUCTED AS SHOWN ON DRAWING C-2. THE LATERAL WILL CONROM TO SAN RAFAEL SANITATION DISTRICT STANDARDS.

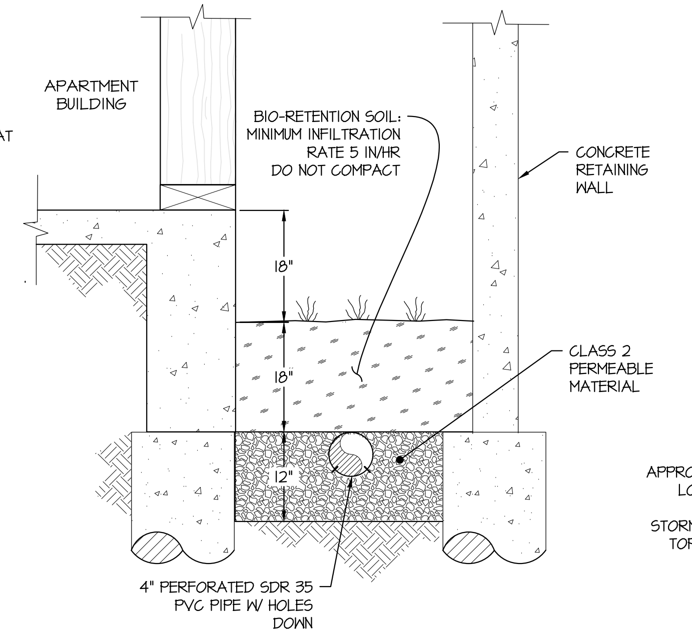
## RETAINING WALL CONSTRUCTION NOTES

1. ALL RETAINING WALLS WILL BE REINFORCED CONCRETE CONSTRUCTION SUPPORTED BY SPREAD FOOTINGS OR DRILLED PIERS AS DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER AND STRUCTURAL ENGINEER.

## EXISTING UTILITY LOCATION

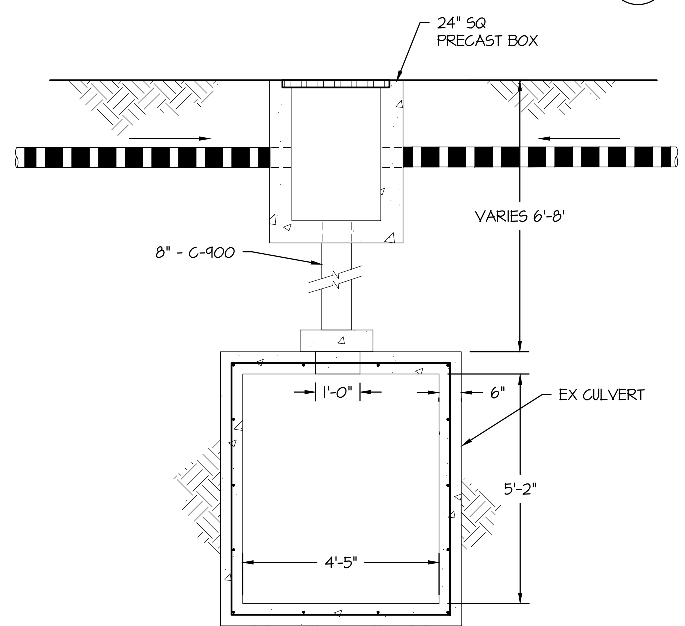
CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES PRIOR TO STARTING WORK. CONTACT THE ENGINEER TO REVIEW UTILITY LOCATION AND ANY CONFLICTS WITH THE PROPOSED WORK PRIOR TO STARTING WORK. UTILITY LOCATIONS SHOWN ON THIS DRAWING ARE ASSUMED LOCATIONS BASED ON VISIBLE FEATURES AND MAY NOT INCLUDE ALL EXISTING UTILITIES.

0 8 16 24
SCALE IN FEET



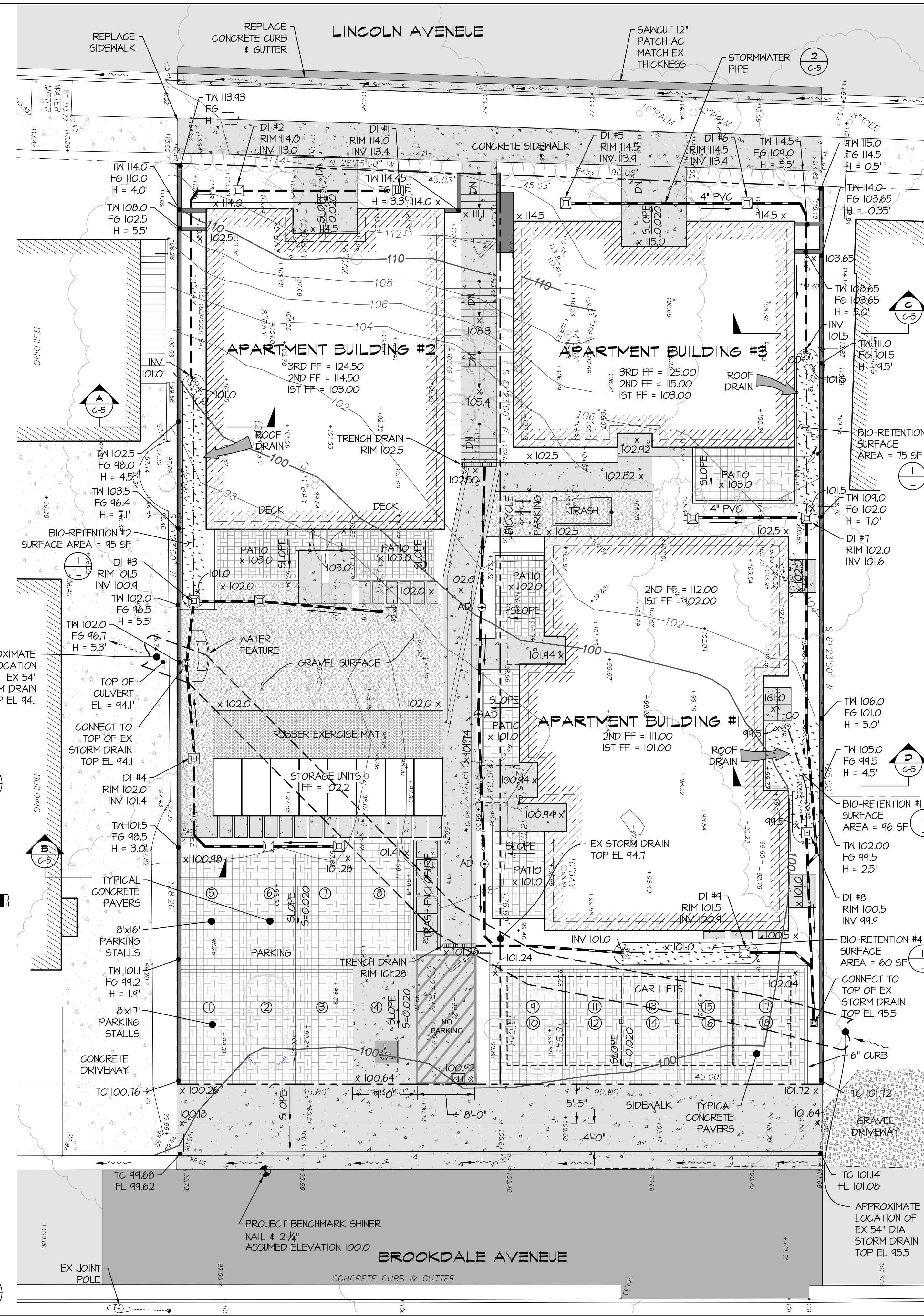

BIO-RETENTION BASIN SECTION (1)

NO SCALE




STORMWATER CONNECTION TO EX CULVERT (2)

SCALE : 1" = 2'-0"

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BROOKDALE APARTMENTS
APN 011-074-04 & 011-074-05
55 BROOKDALE AVENUE
SAN RAFAEL, CALIFORNIA

REVISIONS

| NO. | DATE | DESCRIPTION |
|---|---|---|
| 1 | 7/22/21 | ISSUED FOR REVIEW |
| 2 | 11/8/21 | REVISED PER CITY COMMENTS 9/9/21 |
| 3 | | |
| 4 | | |
| 5 | | |

| | |
|---|---|
| DESIGNED BY: | G. DEARTH |
| DRAWN BY: | E. HAYDEN |
| APPROVED BY: | |
| SCALE: | 1" = 8'-0" |
| DATE: 7/28/2021 | PROJECT NO. 662.001 |

**CONCEPTUAL DRAINAGE PLAN**

REVISION 1
SHEET NO. 2 OF 6
DRAWING **C-2**