

Drainage Calculations

FOR THE PROPOSED

Shapiro Residence

AT

**3229 Park Hills Drive
Rollingwood, Texas 78746**

December, 2019

Prepared By:



BLEYL ENGINEERING

PLANNING • DESIGN • MANAGEMENT



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December 4, 2019

City of Rollingwood
403 Nixon Drive
Rollingwood, TX 78746

**RE: Stormwater Detention in Association with Building Permit Application
3229 Park Hills Drive, Rollingwood, Texas 78746
Engineer's Summary Letter and Drainage Analysis**

To Whom It May Concern:

Project Summary –

The subject tract is Lot 1, Block A, Hatley Park Estates, a subdivision of record in Travis County, Texas recorded in Volume 75, Page 257. The lot is proposed to be developed as a two (2) story residence. The proposed project involves the construction of a 4,514 square feet residence, 1,853 square feet of pool coping and stairs, and several paving and drainage improvements. A rainwater collection system to substantiate proposed site impervious cover below 20% for the purposes of complying with City of Rollingwood requirements relative to TCEQ compliance is provided in the "Rainwater Harvesting Plan" sheet. Additionally a detention pond is being proposed and additional support information is provided in the "Ex & Pro Drainage Area Plan" sheet.

The proposed house has been designed by Cornerstone Architects, and will include a rainwater collection system. Installation of the rainwater collection tanks, piping connections and discharge pipe network will be by the Owner as a component of the project. The purpose of the collection system is to achieve compliance with the requirements of the TCEQ relative to regulated activities within the Recharge Zone of the Edwards Aquifer.

The site was previously developed with a single family home, with associated concrete drives and sidewalks. The existing condition is shown on Sheet 1 of the construction drawings. The proposed improvements will yield an increase in impervious cover on the site. For the purposes of hydraulic analysis, only the increase in proposed impervious cover was accounted for in the design of an onsite stormwater detention facility. No benefit from the rainwater collection system was assumed with respect to storm water management. We believe that based on the size and scope of the proposed residence and improvements, a construction schedule of 9 - 12 months is likely.

Drainage Summary –

The summary of all drainage calculations, including hydraulic analysis for the existing and proposed conditions, and the functionality of the onsite stormwater detention pond is included on Sheet 1 of 1 titled "Ex and Pro Drainage Area Plan". The existing and proposed conditions were modeled using HEC-HMS software using the City of Austin 24 hour storm (HEC-HMS file attached). The area of roof necessary to capture runoff to achieve a net impervious cover on the site is shown on the

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“Rainwater Harvesting Plan”. Runoff from this area is conveyed in a gutter and downspout system to two rainwater collection tanks totaling 4,103 gallons, which exceeds the required capture volume of 4,009 gallons. The tanks will be cast in place concrete as shown on the plans. Discharge from the rainwater tanks will be to the onsite detention pond.

Runoff from the proposed home that is not conveyed to the rainwater tanks is conveyed directly to the onsite detention system in additional gutters and downspouts. A portion of the site improvements consisting of the driveway and front sidewalk are not routed to the detention pond due to grading limitations. The increase in peak rates of runoff is mitigated by the proposed stormwater detention pond located near the front of the home. The exterior pond walls are set to tie into natural ground at the southern side of the site and to the raised planters designed by the architect on the northern end of the pond.

A proposed cast in place concrete wall will form the pond wall, with one outlet structure consisting of a 4.5” orifice plate bolted to the interior of the pond wall at existing grade. A secondary outlet consisting of a 90° v-notch weir at a higher elevation is shown on the plan. Both pond discharges are facing Park Hills Drive. The outlet locations are protected from erosion through the placement of rip rap. Grading within the detention pond is being proposed to achieve positive slope to the outlet structure.

The contributing off-site flows were not routed in HEC-HMS; however, they were accounted for in the design of the detention pond overflow rectangular weir. The rectangular weir was placed at the 100 yr water surface elevation of 629.10 feet. Summaries of hydraulic data are included on the subject sheet and demonstrate compliance with City of Rollingwood design criteria with respect to stormwater discharge from a developed lot. The 2, 10, 25 and 100 yr discharge rates for the site in the post development condition are less than the predeveloped condition. Input data for the analysis is shown in the Drainage Report included in the submittal.

The plan shows contours on a one foot interval based on an on the ground survey provided by the Owner. Due to the size of the proposed detention facility, we feel it was best represented in plan view, with important elevations annotated. We have also included a representative pond cross section. The plan is sufficient for both engineering review and construction by a qualified contractor.

We have provided an erosion and sedimentation control plan system in the form of silt fence downgradient of the proposed detention pond area to provide protection during the construction process.

If you have any questions during your review, please contact our office at 512-328-7878.

Sincerely,



Kenny Watkins, P.E.
Bleyl Engineering
Project Manager



**3229 Park Hills Drive
 Rollingwood, TX
 Peak Flow and Pond Summary Table**

OUTFLOW SUMMARY						
STORM EVENT	OUTFALL DISCHARGES (cfs)					
	OUTFALL 1		OUTFALL 2		TOTAL SITE DISCHARGE	
	EX	PRO	EX	PRO	EX	PRO
2-YR	0.31	0.44	0.55	0.36	0.86	0.80
10-YR	0.68	0.65	1.15	0.73	1.83	1.38
25-YR	0.89	1.24	1.51	0.94	2.40	2.18
100-YR	1.25	1.87	2.11	1.30	3.36	3.17

POND DETENTION RESULTS				
STORM EVENT	WSE (ft)	STORAGE (ac-ft)	POND (IN) (cfs)	POND (OUT) (cfs)
2-YR	627.82	0.003	0.55	0.44
10-YR	628.64	0.012	1.14	0.65
25-YR	628.96	0.016	1.50	1.24
100-YR	629.10	0.018	2.09	1.87

**3229 Park Hills Drive
Rollingwood, TX
Impervious Cover Summary Table**

EXISTING IMPERVIOUS COVER BREAKDOWN			
AREA	EXISTING (SF)	NEW (SF)	TOTAL (SF)
SITE AREA	-	-	18,990
WOOD DECK	170	0.00	170
DRIVEWAY	1,761	0.00	1,761
SIDEWALK	611.79	0.00	612
RESIDENCE	4,261	0.00	4,261
Total			6,759
Impervious Cover %			36%

PROPOSED IMPERVIOUS COVER BREAKDOWN			
AREA	EXISTING (SF)	NEW (SF)	TOTAL (SF)
SITE AREA	-	-	18,990
RESIDENCE	0	4,513	4,513
DRIVEWAY	0	1,257	1,257
GARAGE	0	990	990
LANSC. WALLS	0	183	183
PORCHES	0	762	762
WALKWAYS	211	344	555
Total			8,260
Impervious Cover %			42%

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Basin: Basin 1

Last Modified Date: 22 November 2019

Last Modified Time: 18:14:05

Version: 4.3

Filepath Separator: \

Unit System: English

Missing Flow To Zero: No

Enable Flow Ratio: No

Compute Local Flow At Junctions: No

Enable Sediment Routing: No

Enable Quality Routing: No

End:

Subbasin: Pro 1

Last Modified Date: 4 December 2019

Last Modified Time: 19:21:50

Canvas X: -8760.681438118967

Canvas Y: 3767.9357915055875

Label X: -23.0

Label Y: 19.0

Area: .00042188

Downstream: Det-Pond

Canopy: None

Allow Simultaneous Precip Et: No

Plant Uptake Method: None

Surface: None

LossRate: SCS

Percent Impervious Area: 56.30

Curve Number: 80

Transform: SCS

Lag: 3.53

Unitgraph Type: STANDARD

Baseflow: None

End:

Reservoir: Det-Pond

Last Modified Date: 4 December 2019

Last Modified Time: 16:41:53

Canvas X: -8760.663776650916

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Canvas Y: 3767.5214464775895
From Canvas X: -8760.682280567684
From Canvas Y: 3767.3479722578863
Downstream: Pro DA 1

Route: Controlled Outflow
Routing Curve: Elevation-Area
Initial Elevation: 626.95
Elevation-Area Table: Detention Pond
Adaptive Control: On
Main Tailwater Condition: None
Auxiliary Tailwater Condition: None

Conduit: Orifice
Conduit Outlet: Main
Orifice Coefficient: 0.6
Orifice Area: 0.1104466
Centerline Elevation: 627.1375
Number Barrels: 1
End Conduit:

Spillway: Rating Curve Spillway
Spillway Outlet: Main
Spillway Rating Curve Name: V-Notch Weir
End Spillway:

Evaporation Method: Zero Evaporation
End Evaporation:

End:

Sink: Pro DA 1

Last Modified Date: 22 November 2019
Last Modified Time: 22:45:03
Canvas X: -8760.654860252924
Canvas Y: 3767.1877861191865
Label X: -35.0
Label Y: -28.0

End:

Subbasin: Ex 1

Last Modified Date: 3 December 2019
Last Modified Time: 03:32:55
Canvas X: -8761.195764258006
Canvas Y: 3767.9262196568966
From Canvas X: -8761.669927125195
From Canvas Y: 3767.9493495528573

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Area: 0.00025
Downstream: EX DA 1

Canopy: None
Allow Simultaneous Precip Et: No
Plant Uptake Method: None

Surface: None

LossRate: SCS
Percent Impervious Area: 31.88
Curve Number: 80

Transform: SCS
Lag: 3.312
Unitgraph Type: STANDARD

Baseflow: None

End:

Sink: EX DA 1

Last Modified Date: 22 November 2019
Last Modified Time: 18:14:30
Canvas X: -8761.207329205985
Canvas Y: 3767.1351772150506
From Canvas X: -8761.65373619802
From Canvas Y: 3767.10048237111

End:

Subbasin: Ex 2

Last Modified Date: 3 December 2019
Last Modified Time: 03:33:03
Canvas X: -8760.987492279217
Canvas Y: 3767.949437232478
From Canvas X: -8761.436315175994
From Canvas Y: 3767.947036563261
Area: 0.0004375
Downstream: EX DA 2

Canopy: None
Allow Simultaneous Precip Et: No
Plant Uptake Method: None

Surface: None

LossRate: SCS

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Percent Impervious Area: 37.14

Curve Number: 80

Transform: SCS

Lag: 4.608

Unitgraph Type: STANDARD

Baseflow: None

End:

Sink: EX DA 2

Last Modified Date: 22 November 2019

Last Modified Time: 18:14:26

Canvas X: -8760.976030246382

Canvas Y: 3767.1374902046464

From Canvas X: -8761.364612498517

From Canvas Y: 3767.107421339898

End:

Subbasin: Pro 2

Last Modified Date: 3 December 2019

Last Modified Time: 03:33:16

Canvas X: -8760.399220726418

Canvas Y: 3767.9508018051674

From Canvas X: -8760.393156868178

From Canvas Y: 3767.942410584069

Label X: 1.0

Label Y: 0.0

Area: .00026563

Downstream: Pro DA 2

Canopy: None

Allow Simultaneous Precip Et: No

Plant Uptake Method: None

Surface: None

LossRate: SCS

Percent Impervious Area: 24.41

Curve Number: 80

Transform: SCS

Lag: 4.608

Unitgraph Type: STANDARD

Baseflow: None

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End:

Sink: Pro DA 2

Last Modified Date: 22 November 2019

Last Modified Time: 18:14:14

Canvas X: -8760.409347795352

Canvas Y: 3767.1398031942426

From Canvas X: -8760.409347795352

From Canvas Y: 3767.1398031942426

End:

Basin Layer Properties:

Element Layer:

Name: Icons

Layer shown: Yes

End Layer:

End:

Basin Spatial Properties:

End:

Basin Schematic Properties:

Last View N: 3792.481810766129

Last View S: 3467.313985394992

Last View W: -8853.738521207448

Last View E: -8367.834327613076

Maximum View N: 3792.481810766129

Maximum View S: 3467.313985394992

Maximum View W: -8853.738521207448

Maximum View E: -8367.834327613076

Extent Method: Elements

Buffer: 25

Draw Icons: Yes

Draw Icon Labels: Name

Draw Map Objects: No

Draw Gridlines: No

Draw Flow Direction: No

Draw HillShade Layer: Yes

Draw Elevation Layer: Yes

Elevation Layer Color Palette: Default

Ignore Elevation Color Ramp Scale: No

Use Interpolated Color Ramp for Elevation Layer: Yes

Color Ramp Opacity Level for Elevation Layer: 33.0

Fix Element Locations: No

Fix Hydrologic Order: No

End:

Global Summary Results for Run "2-year"

Project: Shapiro Residence Simulation Run: 2-year

Start of Run: 01Jan3000, 01:00 Basin Model: Basin 1
 End of Run: 02Jan3000, 02:00 Meteorologic Model: SCS 002-yr
 Compute Time: 04Dec2019, 13:21:57 Control Specifications: Standard Control

Show Elements: Volume Units: IN AC-FT Sorting:

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Pro 1	.00042188	0.624	01Jan3000, 13:05	2.63
Det-Pond	.00042188	0.491	01Jan3000, 13:10	2.60
Pro DA 1	.00042188	0.491	01Jan3000, 13:05	2.60
Ex 1	.00025	0.322	01Jan3000, 13:05	2.18
EX DA 1	.00025	0.322	01Jan3000, 13:00	2.18
Ex 2	.0004375	0.550	01Jan3000, 13:05	2.28
EX DA 2	.0004375	0.550	01Jan3000, 13:00	2.28
Pro 2	.00026563	0.306	01Jan3000, 13:05	2.04
Pro DA 2	.00026563	0.306	01Jan3000, 13:00	2.04

Global Summary Results for Run "10-year"

Project: Shapiro Residence Simulation Run: 10-year

Start of Run: 01Jan3000, 01:00 Basin Model: Basin 1
 End of Run: 02Jan3000, 02:00 Meteorologic Model: SCS 010-yr
 Compute Time: 04Dec2019, 13:22:02 Control Specifications: Standard Control

Show Elements: Volume Units: IN AC-FT Sorting:

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Pro 1	.00042188	1.231	01Jan3000, 13:05	5.13
Det-Pond	.00042188	0.759	01Jan3000, 13:15	5.10
Pro DA 1	.00042188	0.759	01Jan3000, 13:10	5.10
Ex 1	.00025	0.686	01Jan3000, 13:05	4.58
EX DA 1	.00025	0.686	01Jan3000, 13:00	4.58
Ex 2	.0004375	1.155	01Jan3000, 13:05	4.70
EX DA 2	.0004375	1.155	01Jan3000, 13:00	4.70
Pro 2	.00026563	0.674	01Jan3000, 13:05	4.42
Pro DA 2	.00026563	0.674	01Jan3000, 13:00	4.42

