SPACECO INC.

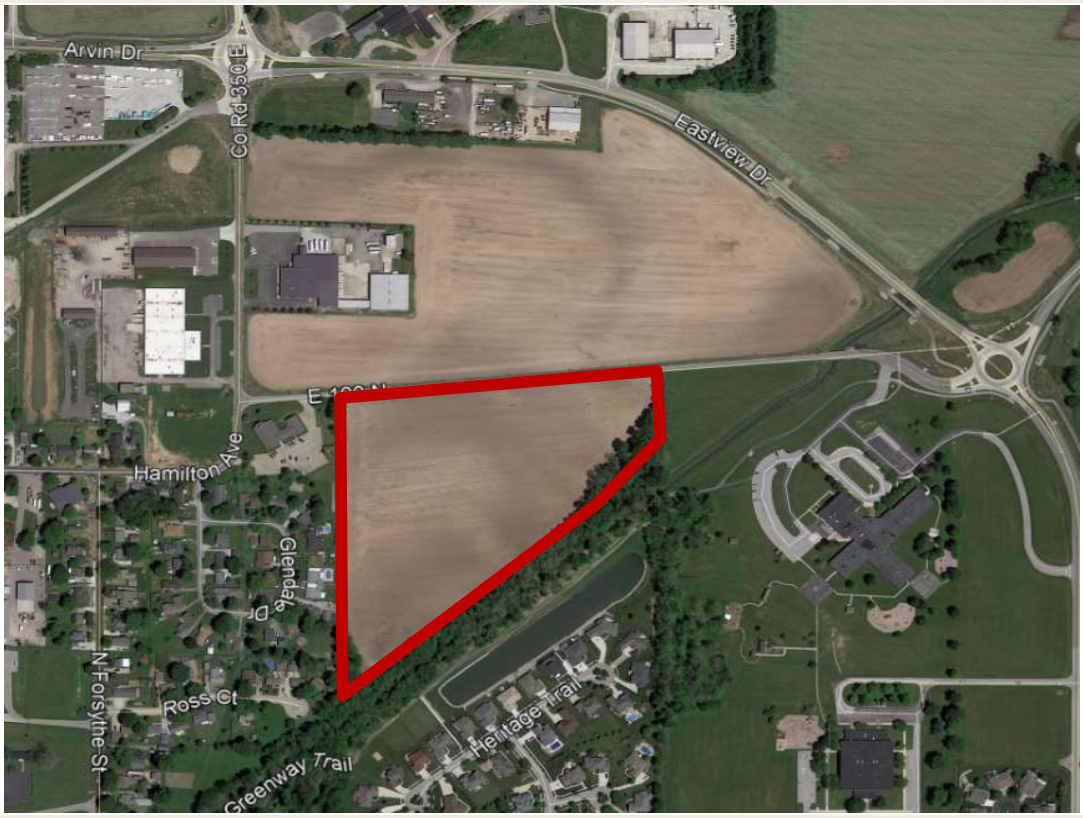
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

FINAL STORMWATER MANAGEMENT REPORT

FOR

Franklin Flats

Franklin, Indiana



Lauth Group, INC.
Carmel, IN

Prepared By:
SPACECO, Inc.
Indianapolis, IN

PH: 317-779-2194
Contact: Dillon Reynolds, P.E.

SPACECO PROJ #:	11582
ORIGINAL DATE:	8/4/2021
LAST REVISED:	

TABLE OF CONTENTS

TAB 1
STORMWATER NARRATIVE

STORMWATER MANAGEMENT PERMIT APPLICATION
FOR
FRANKLIN FLATS
FRANKLIN, JOHNSON COUNTY, INDIANA

PREPARED FOR
LAUTH GROUP, INC.

PREPARED BY
SPACECO, INC.
INDIANPOLIS, IN

SPACECO PROJECT # 11582

AUGUST 4, 2021

PROJECT NARRATIVE

INTRODUCTION

This report summarizes the stormwater management calculations for the proposed Franklin Flats multi-family development located in Franklin, Johnson County, Indiana. The project site is located approximately 400 feet east of the intersection of Upper Shelbyville Road (CR 100) and Hamilton Avenue on the south side of the road. The total site area is 18.95 acres. The stormwater analysis was performed based on the land plan and survey prepared by SPACECO, Inc. and site engineering in accordance with the requirements of the City of Franklin and Johnson County Subdivision Control Ordinances.

SOILS

Per the USDA NRCS Web Soil Survey, the primary soil types inside the project limits are Ockley Loam (ObaA), Rensselaer Silty Clay Loam (Re), Sleeth Loam (Sk), Ockley Loam Urban Land Complex (YobA), and Rensselaer Silty Clay Loam (YreA). All soils are in hydrologic soils group B (HSG B). A soils map is included as Exhibit 2 under Tab 2.

FLOODPLAIN

Per the Flood Insurance Rate Map (FIRM) 18081C0231E, the site is located within flood hazard Zone AE, with partial floodway encroachment into the property. These constraints are discussed in more detail later in this report. A partial copy of the FIRM panel is included as Exhibit 3 under Tab 2.

EXISTING CONDITIONS

The existing site is currently undeveloped agricultural land.

The site generally drains northwest to southeast toward Hurricane Creek, the legal drain that borders the southern property boundary. There are two subbasins that create the overall drainage pattern. One drains overland directly to the legal drain and the other first drains off site to the east before eventually turning south towards the legal drain.

Table 1, along with the Existing Drainage Plan located in Tab 3, summarizes the drainage and peak flows of each subbasin.

Table 1: Existing Drainage Basin Summary

Basin Name	Area	Discharge Location	2-yr Peak Discharge	10-yr Peak Discharge	100-yr Peak Discharge
EX-1	16.85 ac	Hurricane Creek	16.48 cfs	30.99 cfs	55.75 cfs
EX-2	2.10 ac	Offsite, then Hurricane Creek	2.73 cfs	4.99 cfs	8.81 cfs
Total to Hurricane Creek	18.95 ac		18.72 cfs	35.12 cfs	63.10 cfs

PROPOSED CONDITIONS

The proposed development consists of six (6) multi-family apartment buildings, an asphalt parking lot, and the necessary utility infrastructure to support the development.

The entire developed area will drain via sheet flow to proposed sag inlets and a storm sewer system that discharges into a proposed wet-detention pond before being outlet to Hurricane Creek. Drainage patterns and discharge locations are perpetuated from the existing condition.

Floodplain and Floodway Effects on the Development

Approximately 41% of the proposed site is located within Zone AE of the regulated floodplain, with a Base Flood Elevation (BFE) of 727, and approximately 31% is located within the regulated floodway.

No land disturbance will take place within the regulated floodway, other than grading necessary to form the pond outlet to the legal drain.

The portion of the site located within the floodplain will be filled so that the buildings are located a minimum of 2 feet above the BFE and pavement/parking lot a minimum of 1 foot above the BFE.

COMPENSATORY STORAGE

Since the proposed development will create fill areas within the floodplain, it is necessary to provide compensatory storage so as not to raise the BFE.

Approximately 3,936 cubic yards of fill will be placed within the floodplain limits. Since local ordinances require 1:1 compensatory storage, this same amount will be cut out of the floodplain. It's proposed that 4,932 cubic yards be cut as compensatory storage near the southwest corner of the site, corresponding to the location of the pond outlet.

This fulfills the compensatory storage requirement.

Calculations for compensatory storage can be seen in Tab 5.

STORMWATER DETENTION

A wet detention pond is proposed to account for the increase in runoff due to the added impervious area of the development.

Allowable Release Rates

The pond must limit the proposed 10-year peak discharge to that of the 2-year pre-development peak discharge. It also must limit the proposed 100-year peak discharge to that of the 10-year pre-development peak discharge.

The allowable release rates for a 10-year and 100-year event are 18.7 cfs and 35.2 cfs, respectively.

Pond Design

The pond was designed per the City of Franklin and Johnson County standards. The pond was designed with the starting tailwater elevation at the crown of the outlet pipe. A single 12" RCP outlet was able to limit both storm events to an amount that, when

combined with the area draining around the pond, the allowable release rates were met. An emergency spillway is set at 728.50, which is higher than the 100-year elevation of 724.01, to provide additional flood protection and to ensure the overflow operates during a 100-year event, when the BFE is at 727. It's capable of handling 125% of the incoming 100-year flow.

Table 2 summarizes the proposed basins and their runoff. Runoff calculations are included in Tab 4.

Table 2: Proposed Runoff and Pond Performance

Basin Name	Area	Discharge Location	2-yr Peak Discharge	10-yr Peak Discharge	100-yr Peak Discharge
PROP-1	8.95 ac	Detention Pond	16.14 cfs	27.11 cfs	44.80 cfs
PROP-2	10.0 ac	Hurricane Creek	7.13 cfs	15.39 cfs	30.34 cfs

Table 3 summarizes the pond's performance. Pond routing calculations are included in Tab 4.

Table 3: Pond Performance Summary

10-yr Pond Inflow	100-yr Pond Inflow	10-yr Pond Outflow	100-yr Pond Outflow	10-yr HWL	100-yr HWL
27.11 cfs	44.80 cfs	3.25 cfs	4.60 cfs	723.00	724.01

The pond outflow will then combine with the areas outside of the pond's drainage area and will ultimately outlet to Hurricane Creek. The final discharge to Hurricane Creek is summarized in Table 4.

Table 4: Final Proposed Discharge Summary to Hurricane Creek

10-yr Allowable Release Rate	100-yr Allowable Release Rate	10-yr Peak Discharge	100-yr Peak Discharge
18.72 cfs	35.12 cfs	18.08 cfs	34.26 cfs

An additional check was performed to monitor the pond's performance in a high tailwater event of the corresponding BFE of 727. In this scenario, the pond high water elevation was 725.68, containing 3.3 feet of freeboard. The calculation for this additional check is included in Tab 5.

STORM SEWER SUMMARY

Proposed storm sewers for the project were calculated using the rational method for a 10-year peak storm event and input values as described in the City of Franklin and Johnson County standards, along with precipitation data from NOAA. Calculations are included in Tab 4 of this report.

SUMMARY

Design and calculations were performed according to the City of Franklin and Johnson County stormwater standards; therefore, no adverse impacts are anticipated from this design.

If you have any questions, feel free to contact me.

Dillon Reynolds, P.E.
Senior Project Manager
dreynolds@spacecoinc.com
812-249-7276

TAB 2
EXHIBITS

STORMWATER MANAGEMENT PERMIT APPLICATION
FOR
FRANKLIN FLATS
FRANKLIN, JOHNSON COUNTY, INDIANA

PREPARED FOR
LAUTH GROUP, INC.

PREPARED BY
SPACECO, INC.
INDIANPOLIS, IN

SPACECO PROJECT # 11582

AUGUST 4, 2021

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

EXHIBIT TITLE: **USGS MAP**
DESCRIPTION: 7.5' QUADRANGLE

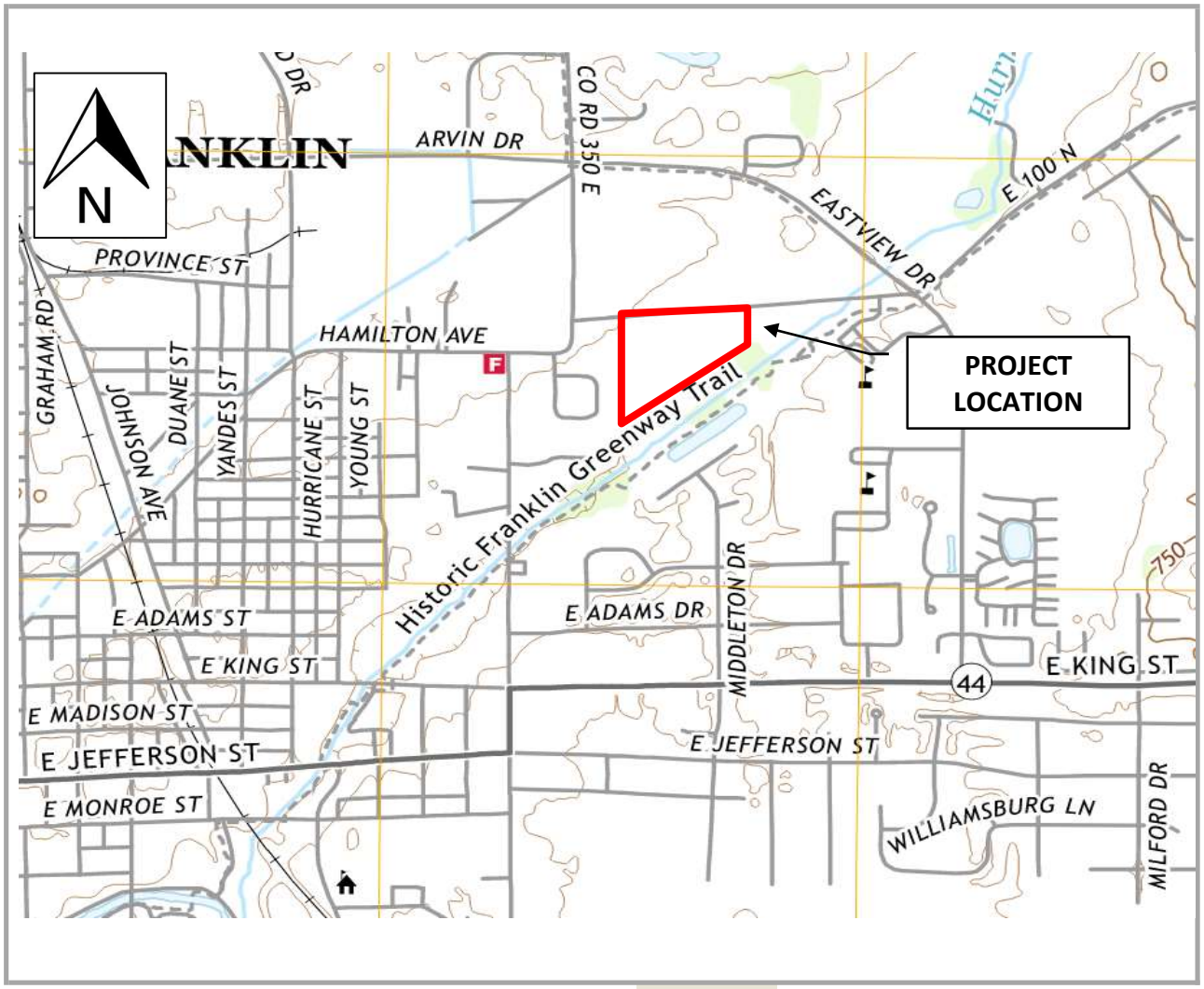

EXHIBIT # 1

SPACECO INC.
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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

EXHIBIT TITLE: **NRCS SOILS MAP**
DESCRIPTION: HYDROLOGIC SOIL DATA

MAJOR SOIL TYPES: OCKLEY LOAM (ObaA, HSG B), Rensselaer Silty Clay Loam (Re, HSG B), Sleeth Loam (Sk, HSG B), Ockley Loam - Urban Land Complex (YobA, HSG B), Rensselaer Silty Clay Loam - Urban Land

EXHIBIT # 2

SPACECO INC.
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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

EXHIBIT TITLE: **FEMA MAP**
DESCRIPTION: MAP NUMBER 18081C0231E

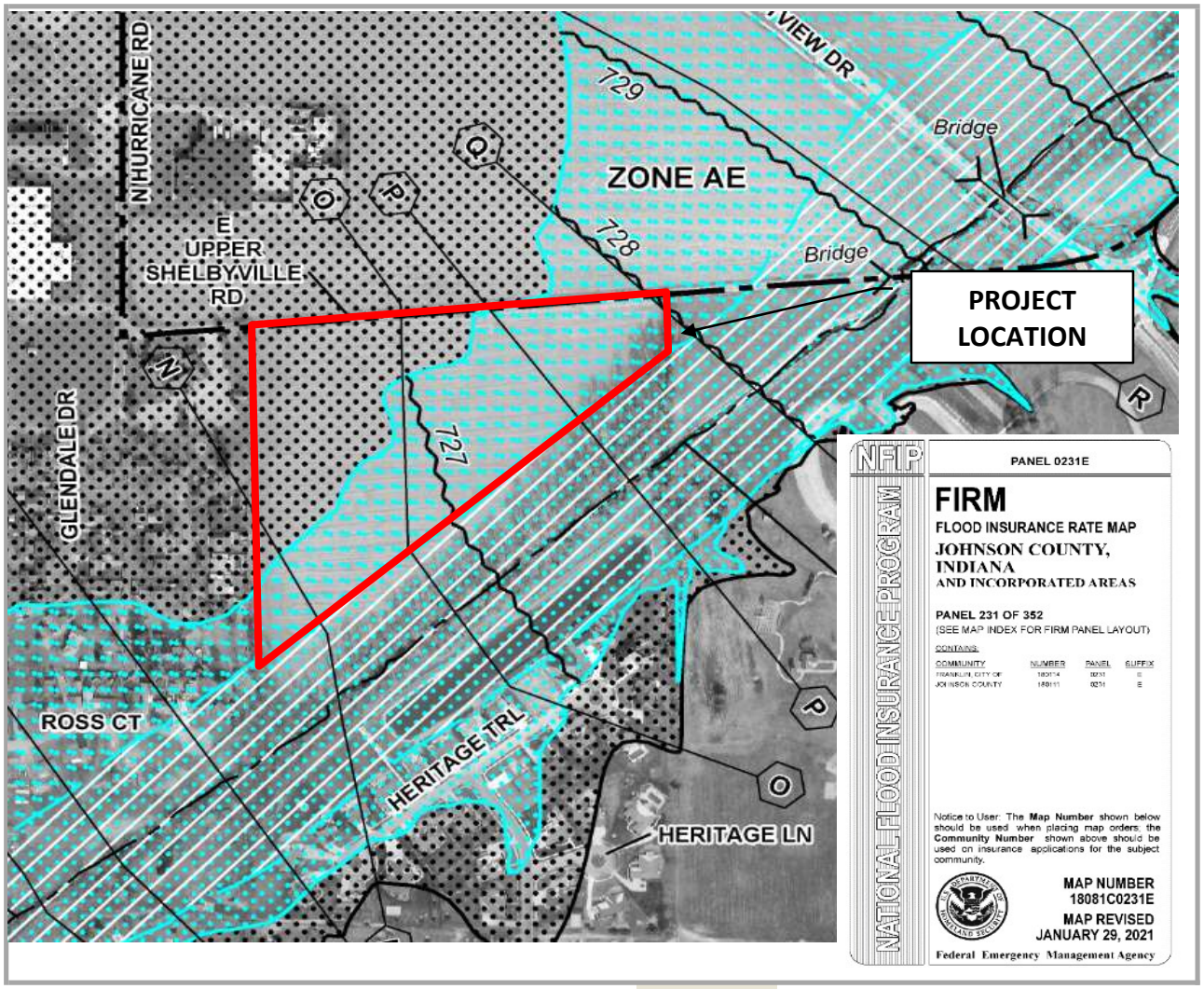

EXHIBIT # 3

SPACECO INC.
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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

EXHIBIT TITLE: NATIONAL WETLAND INVENTORY MAP
DESCRIPTION: FARMLAND ONLY

EXHIBIT # 4

SPACECO INC.
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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

EXHIBIT TITLE: AERIAL MAP
DESCRIPTION: GOOGLE EARTH

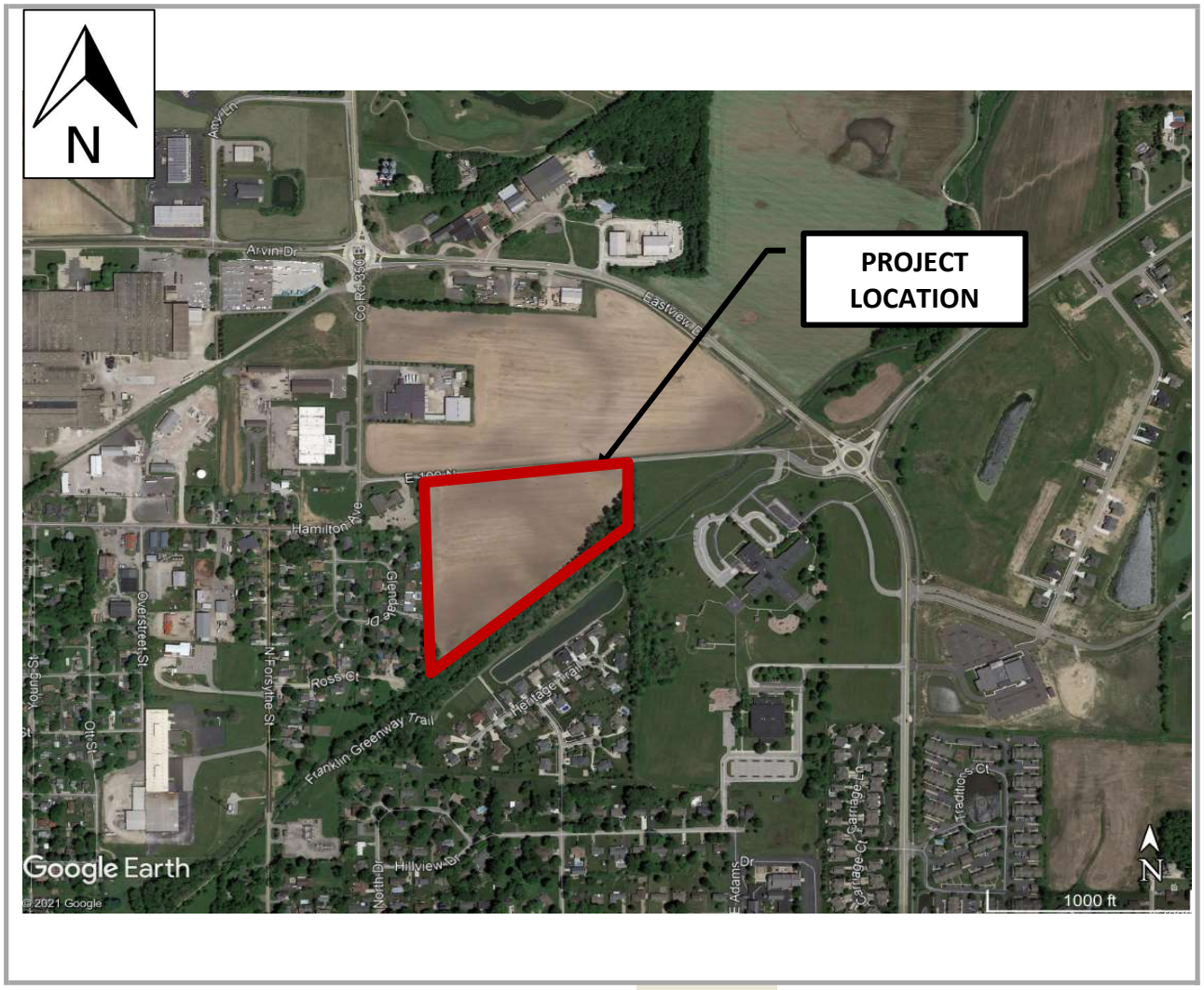

EXHIBIT # 5

TAB 3
EXISTING CONDITIONS

STORMWATER MANAGEMENT PERMIT APPLICATION
FOR
FRANKLIN FLATS
FRANKLIN, JOHNSON COUNTY, INDIANA

PREPARED FOR
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PREPARED BY
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INDIANAPOLIS, IN

SPACECO PROJECT # 11582

AUGUST 4, 2021

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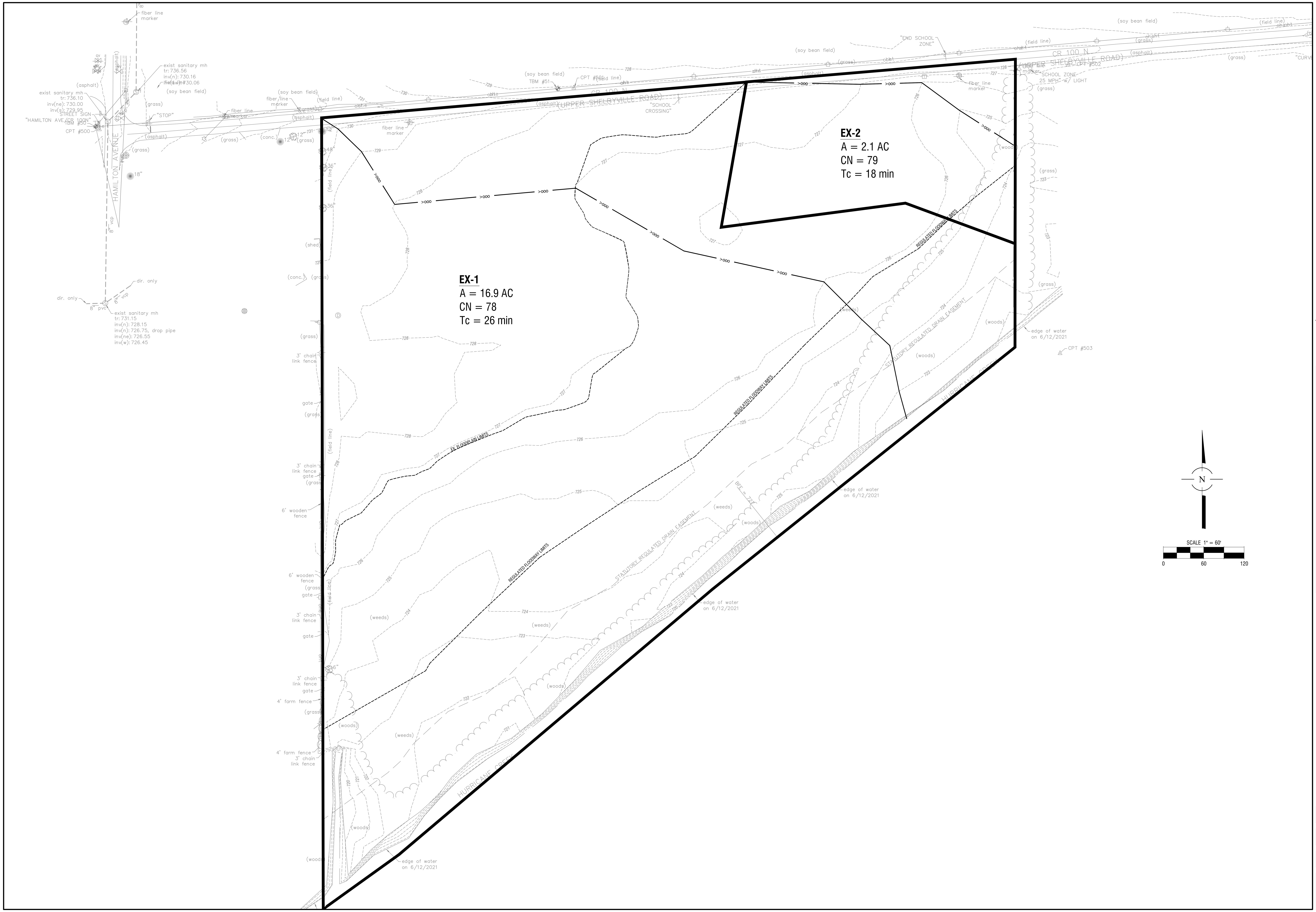

NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

EXISTING DRAINAGE PLAN
FRANKLIN FLATS APARTMENTS
UPPER SHELBYVILLE ROAD
FRANKLIN, IN 46131

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Indianapolis
Indiana
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SPACECO INC.

FILENAME: 1158EDP
DATE: 07/21/2021
JOB NO. 11582
SHEET EDP OF

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Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT: Franklin Flats
LOCATION: Franklin, Indiana

PROJECT #: 11582
DATE: 8/4/2021
LAST REVISED:

CALCULATION TITLE: CURVE NUMBER CALCULATION
DESCRIPTION: BASIN EX-1
SITE CONDITION: EXISTING

Hydrologic Group	Cover Description (Cover Type, Treatment, and hydrologic conditions; percent Impervious; unconnected/connected impervious area ratio	Curve Number	Area X Acres / Sq. M. / %	Product of Curve Number and Area
	DISTURBED AREA			
-	IMPERVIOUS	98	0.16	15.7
-	WATER SURFACE	98	0.00	0.0
B	GRASS (OPEN SPACE)	61	0.00	0.0
B	ROW CROPS	78	16.74	1305.7
		TOTALS =	16.90	1,321.40
			0.0264 sq. mi	

CN (weighted) = Total Product / Total Area = 1321.40 / 16.90 = 78.19

Total Pervious	16.74
Total Impervious	0.16
% Impervious	0.9%

USE CN = 78

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PROJECT: Franklin Flats
LOCATION: Franklin, Indiana

PROJECT #: 11582
DATE: 8/4/2021
LAST REVISED:

CALCULATION TITLE: CURVE NUMBER CALCULATION
DESCRIPTION: BASIN EX-2
SITE CONDITION: EXISTING

Hydrologic Group	Cover Description (Cover Type, Treatment, and hydrologic conditions; percent Impervious; unconnected/connected impervious area ratio	Curve Number	Area X Acres / Sq. M. / %	Product of Curve Number and Area
	DISTURBED AREA			
-	IMPERVIOUS	98	0.10	9.8
-	WATER SURFACE	98	0.00	0.0
B	GRASS (OPEN SPACE)	61	0.00	0.0
B	ROW CROPS	78	2.00	156.0
		TOTALS =	2.10	165.80
			0.0033 sq. mi	

CN (weighted) = Total Product / Total Area = 165.80 / 2.10 = 78.95

Total Pervious	2.00
Total Impervious	0.10
% Impervious	4.8%

USE CN = 79

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

CALCULATION TITLE: **TIME OF CONCENTRATION EXHIBIT**
DESCRIPTION: BASIN EX-1
SITE CONDITION: EXISTING

SHEET FLOW — SEGMENT ID **1**

1.	SUFACE DESCRIPTION (TABLE 3-1)	CULTIVATED	
2.	MANNING'S ROUGHNESS COEFF., n (TABLE 3-1)	0.17	
3.	**FLOW LENGTH, L (TOTAL <= 100 FT)**	100	
4.	TWO-YR 24-HR RAINFALL, P2	2.92	
5.	LAND SLOPE, S	0.015	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,S^{0.4}}$	0.21	HR
		12.72	MIN

SHALLOW CONCENTRATED FLOW — SEGMENT ID **2**

7.	SUFACE DESCRIPTION (TABLE 3-1)	UNPAVED	(TYPE PAVED IF PAVED)
8.	FLOW LENGTH, L	953	FT
9.	LAND SLOPE, S	0.0060	'/'
10.	AVERAGE VELOCITY (FIGURE 3-1)	1.25	FT/S
11.	$T_t = \frac{L}{3600\,V}$	0.21	HR
		12.7	**MIN**

CHANNEL FLOW

		SEGMENT ID	**3**	**4**	**5**
			12" PIPE	***36" PIPE***	***48" PIPE***
12.	CROSS SECTIONAL FLOW AREA				
13.	WETTED PERIMETER, P_W				
14.	HYDRAULIC RADIUS, $r = a/P_W$				
15.	CHANNEL SLOPE, s				
16.	MANNINGS ROUGHNESS COEFF., n				
17.	$V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$				
18.	FLOW LENGTH, L				
19.	$T_t = \frac{L}{3600\,V}$	HR			
		MIN			

20.	**WATERSHED OR SUBAREA TC OR Tt TOTAL**	**0.42**	**HR**
		25.4	**MIN**

USE 26 MIN.

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

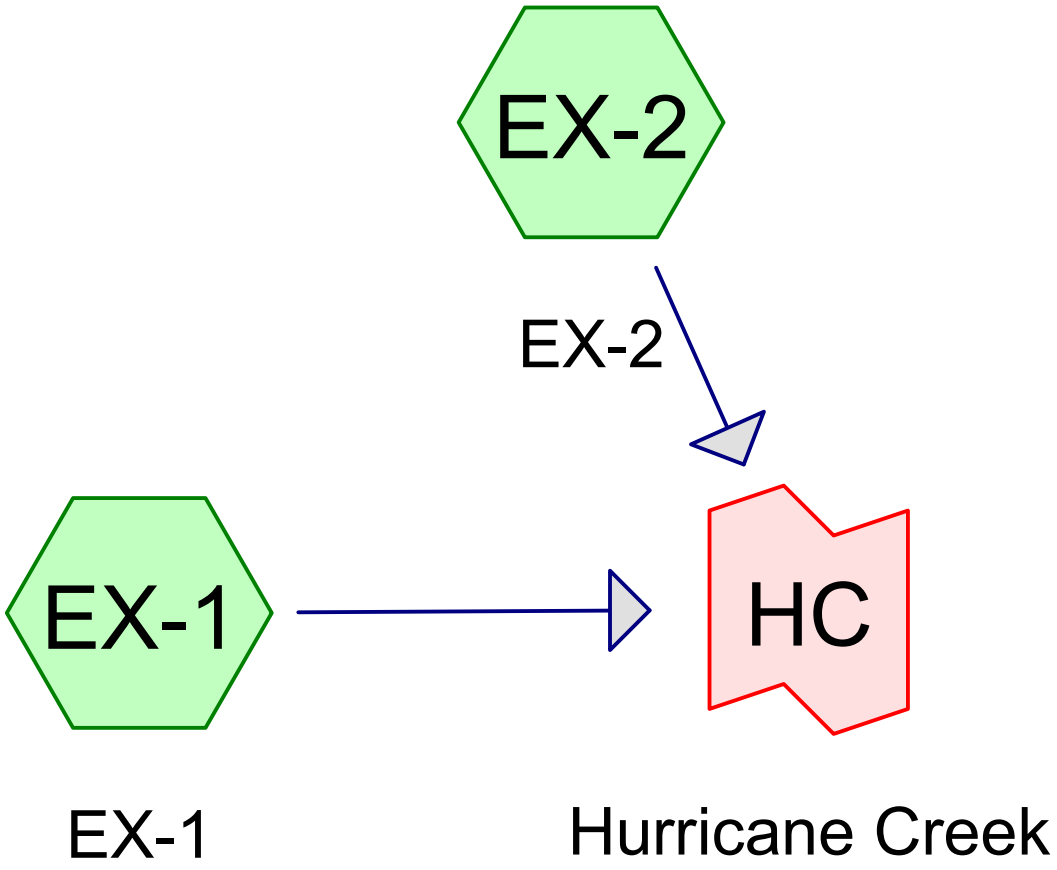
CALCULATION TITLE: **TIME OF CONCENTRATION EXHIBIT**
DESCRIPTION: BASIN EX-2
SITE CONDITION: EXISTING

SHEET FLOW		SEGMENT ID	**1**	
1.	SUFACE DESCRIPTION (TABLE 3-1)		CULTIVATED	
2.	MANNING'S ROUGHNESS COEFF., n (TABLE 3-1)		0.17	
3.	**FLOW LENGTH, L (TOTAL <= 100 FT)**		100	
4.	TWO-YR 24-HR RAINFALL, P2		2.92	
5.	LAND SLOPE, S		0.011	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,S^{0.4}}$		0.24	HR
			14.40	MIN
SHALLOW CONCENTRATED FLOW		SEGMENT ID	**2**	
7.	SUFACE DESCRIPTION (TABLE 3-1)		UNPAVED	(TYPE PAVED IF PAVED)
8.	FLOW LENGTH, L		325	FT
9.	LAND SLOPE, S		0.0090	'/'
10.	AVERAGE VELOCITY (FIGURE 3-1)		1.53	FT/S
11.	$T_t = \frac{L}{3600\,V}$		0.06	HR
			3.5	**MIN**

		SEGMENT ID	**3**	**4**	**5**
CHANNEL FLOW			***12" PIPE***	***36" PIPE***	***48" PIPE***
12.	CROSS SECTIONAL FLOW AREA				
13.	WETTED PERIMETER, P_W				
14.	HYDRAULIC RADIUS, $r = a/P_W$				
15.	CHANNEL SLOPE, s				
16.	MANNINGS ROUGHNESS COEFF., n				
17.	$V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$				
18.	FLOW LENGTH, L				
19.	$T_t = \frac{L}{3600\,V}$	HR			
		MIN			

20.	**WATERSHED OR SUBAREA TC OR Tt TOTAL**	**0.30**	**HR**
		17.9	**MIN**

USE 18 MIN.



Subcat Reach Pond Link

Routing Diagram for Franklin Flats ExistingConditions
Prepared by SPACECO, Printed 8/2/2021

Summary for Subcatchment EX-1: EX-1

Runoff = 0.24 cfs @ 12.41 hrs, Volume= 0.082 af, Depth= 0.06"
Routed to Link HC : Hurricane Creek

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=1.00"

	Area (ac)	CN	Description
*	16.900	78	See Composite CN Worksheet
	16.900	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.0					**Direct Entry, See Tc Worksheet**

Events for Subcatchment EX-1: EX-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1yr	2.43	10.99	1.046	0.74
2yr	2.92	16.48	1.510	1.07
5yr	3.57	24.41	2.184	1.55
10yr	4.08	30.99	2.747	1.95
25yr	4.78	40.37	3.557	2.53
50yr	5.33	47.93	4.217	2.99
100yr	**5.89**	**55.75**	**4.904**	**3.48**
WQv	1.00	0.24	0.082	0.06

Summary for Subcatchment EX-2: EX-2

Runoff = 0.06 cfs @ 12.21 hrs, Volume= 0.012 af, Depth= 0.07"
Routed to Link HC : Hurricane Creek

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=1.00"

	Area (ac)	CN	Description
*	2.100	79	See Composite CN Worksheet
	2.100	79	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0					**Direct Entry, See Tc Worksheet**

Events for Subcatchment EX-2: EX-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1yr	2.43	1.86	0.138	0.79
2yr	2.92	2.73	0.198	1.13
5yr	3.57	3.97	0.284	1.62
10yr	4.08	4.99	0.355	2.03
25yr	4.78	6.44	0.457	2.61
50yr	5.33	7.61	0.540	3.09
100yr	**5.89**	**8.81**	**0.627**	**3.58**
WQv	1.00	0.06	0.012	0.07

Summary for Link HC: Hurricane Creek

Inflow Area = 19.000 ac, 0.00% Impervious, Inflow Depth = 0.06" for WQv event
Inflow = 0.28 cfs @ 12.39 hrs, Volume= 0.094 af
Primary = 0.28 cfs @ 12.39 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Events for Link HC: Hurricane Creek

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1yr	12.50	12.50	**0.00**
2yr	18.72	18.72	0.00
5yr	27.68	27.68	0.00
10yr	35.12	35.12	0.00
25yr	45.72	45.72	0.00
50yr	54.26	54.26	0.00
100yr	**63.10**	**63.10**	0.00
WQv	0.28	0.28	0.00

TAB 4
PROPOSED CONDITIONS

STORMWATER MANAGEMENT PERMIT APPLICATION
FOR
FRANKLIN FLATS
FRANKLIN, JOHNSON COUNTY, INDIANA

PREPARED FOR
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PREPARED BY
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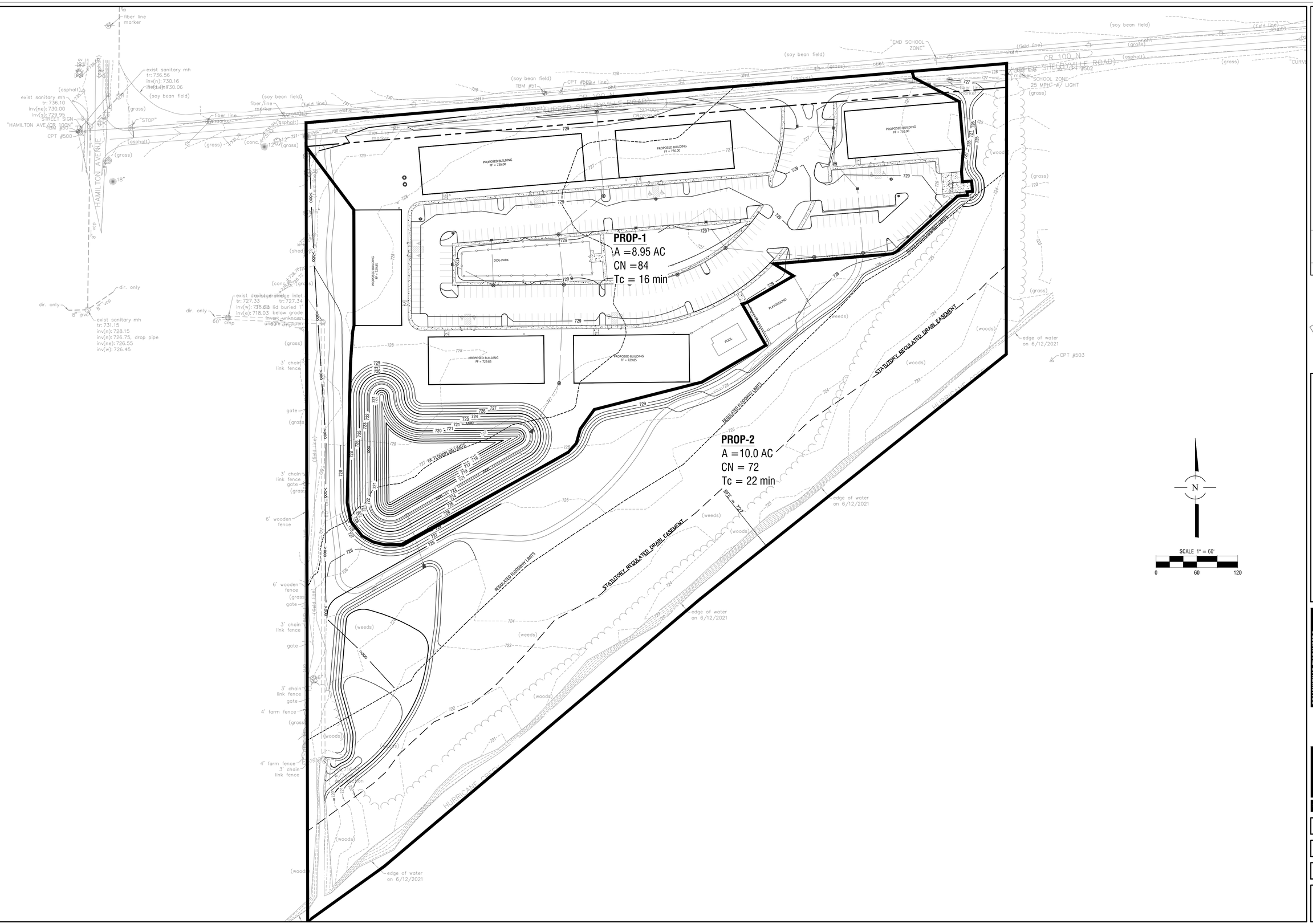
INDIANAPOLIS, IN

SPACECO PROJECT # 11582

AUGUST 4, 2021



NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

PROPOSED DRAINAGE PLAN

FRANKLIN FLATS APARTMENTS

UPPER SHELBYVILLE ROAD
FRANKLIN, IN 46131

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

Indianapolis
Indiana
Phone: (317) 779-2194

SPACECO INC.

FILENAME: 11582PDP

DATE: 08/04/2021

JOB NO. 11582

SHEET **PDP**

SPACECO INC.
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LAND SURVEYORS

9575 W. Higgins Road, Suite 700, Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT: Franklin Flats
LOCATION: Franklin, Indiana

PROJECT #: 11582
DATE: 8/4/2021
LAST REVISED:

CALCULATION TITLE: CURVE NUMBER CALCULATION
DESCRIPTION: BASIN PROP-1
SITE CONDITION: PROPOSED

Hydrologic Group	Cover Description (Cover Type, Treatment, and hydrologic conditions; percent Impervious; unconnected/connected impervious area ratio	Curve Number	Area X Acres / Sq. M. / %	Product of Curve Number and Area
	DISTURBED AREA			
-	IMPERVIOUS	98	5.09	498.82
-	WATER SURFACE	98	0.58	56.8
B	GRASS (OPEN SPACE)	61	3.28	200.1
		TOTALS =	8.95	755.74
			0.0140 sq. mi	

CN (weighted) = Total Product / Total Area = 755.74 / 8.95 = 84.44

Total Pervious	3.28
Total Impervious	5.67
% Impervious	63.4%

USE CN = 84

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SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

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PROJECT: Franklin Flats
LOCATION: Franklin, Indiana

PROJECT #: 11582
DATE: 8/4/2021
LAST REVISED:

CALCULATION TITLE: CURVE NUMBER CALCULATION
DESCRIPTION: BASIN PROP-2
SITE CONDITION: PROPOSED

Hydrologic Group	Cover Description (Cover Type, Treatment, and hydrologic conditions; percent Impervious; unconnected/connected impervious area ratio)	Curve Number	Area X Acres / Sq. M. / %	Product of Curve Number and Area
	DISTURBED AREA			
-	IMPERVIOUS	98	0.29	28.42
-	WATER SURFACE	98	0.00	0.0
B	GRASS (OPEN SPACE)	61	3.83	233.6
B	ROW CROPS	78	5.88	458.6
		TOTALS =	10.00	720.69
			0.0156 sq. mi	

CN (weighted) = Total Product / Total Area = 720.69 / 10.00 = 72.07

Total Pervious	9.71
Total Impervious	0.29
% Impervious	2.9%

USE CN = 72

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

CALCULATION TITLE:	**TIME OF CONCENTRATION EXHIBIT**
DESCRIPTION:	BASIN PROP-1
SITE CONDITION:	PROPOSED

See Storm Sewer Calculations for System Tc

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

CALCULATION TITLE: **TIME OF CONCENTRATION EXHIBIT**
DESCRIPTION: BASIN PROP-2
SITE CONDITION: PROPOSED

SHEET FLOW — SEGMENT ID **1**

1.	SUFACE DESCRIPTION (TABLE 3-1)	GRASS	
2.	MANNING'S ROUGHNESS COEFF., n (TABLE 3-1)	0.15	
3.	**FLOW LENGTH, L (TOTAL <= 100 FT)**	100	
4.	TWO-YR 24-HR RAINFALL, P2	2.92	
5.	LAND SLOPE, S	0.01	
6.	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,S^{0.4}}$	0.23	HR
		13.53	MIN

SHALLOW CONCENTRATED FLOW — SEGMENT ID **2**

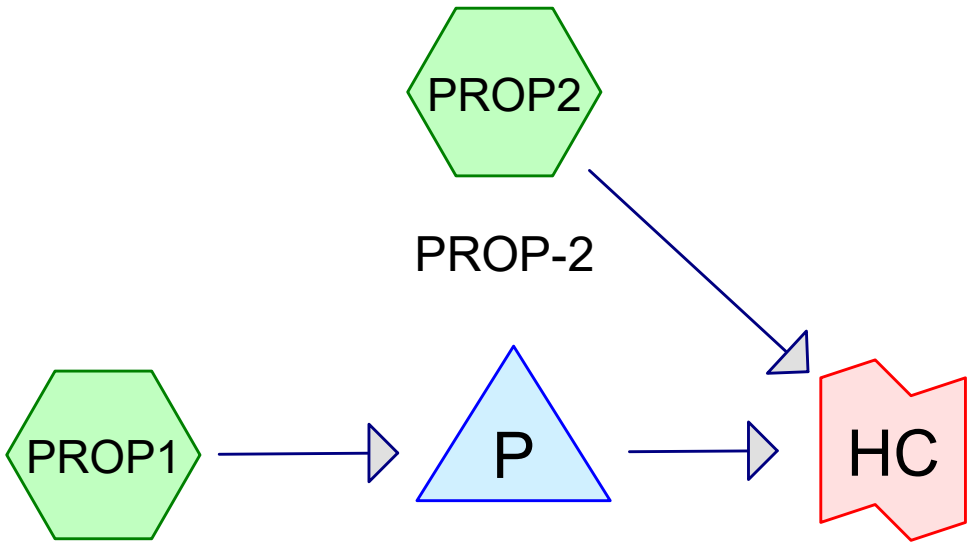
7.	SUFACE DESCRIPTION (TABLE 3-1)	UNPAVED	(TYPE PAVED IF PAVED)
8.	FLOW LENGTH, L	728	FT
9.	LAND SLOPE, S	0.0080	'/'
10.	AVERAGE VELOCITY (FIGURE 3-1)	1.44	FT/S
11.	$T_t = \frac{L}{3600\,V}$	0.14	HR
		8.4	**MIN**

CHANNEL FLOW

		SEGMENT ID	**3**	**4**	**5**
			12" PIPE	***36" PIPE***	***48" PIPE***
12.	CROSS SECTIONAL FLOW AREA				
13.	WETTED PERIMETER, P_W				
14.	HYDRAULIC RADIUS, $r = a/P_W$				
15.	CHANNEL SLOPE, s				
16.	MANNINGS ROUGHNESS COEFF., n				
17.	$V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$				
18.	FLOW LENGTH, L				
19.	$T_t = \frac{L}{3600\,V}$	HR			
		MIN			

20.	**WATERSHED OR SUBAREA TC OR Tt TOTAL**	**0.37**	**HR**
		21.9	**MIN**

USE 22 MIN.



10yr Allow.=18.7cfs

100yr Allow.=35.1cfs

Subcat Reach Pond Link

Routing Diagram for Franklin Flats Proposed Conditions
Prepared by SPACECO, Printed 8/2/2021

Summary for Subcatchment PROP1: PROP-1

Runoff = 1.23 cfs @ 12.12 hrs, Volume= 0.113 af, Depth= 0.15"
Routed to Pond P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=1.00"

	Area (ac)	CN	Description
*	8.950	84	See Composite CN Worksheet
	8.950	84	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.0					**Direct Entry, See Tc Worksheet**

Events for Subcatchment PROP1: PROP-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1yr	2.43	11.75	0.792	1.06
2yr	2.92	16.14	1.082	1.45
5yr	3.57	22.22	1.489	2.00
10yr	4.08	27.11	1.821	2.44
25yr	4.78	33.91	2.290	3.07
50yr	5.33	39.30	2.665	3.57
100yr	**5.89**	**44.80**	**3.053**	**4.09**
WQv	1.00	1.23	0.113	0.15

Summary for Subcatchment PROP2: PROP-2

Runoff = 0.01 cfs @ 17.96 hrs, Volume= 0.010 af, Depth= 0.01"
Routed to Link HC : Hurricane Creek

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr WQv Rainfall=1.00"

	Area (ac)	CN	Description
*	10.000	72	See Composite CN Worksheet
	10.000	72	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0					**Direct Entry, See Tc Worksheet**

Events for Subcatchment PROP2: PROP-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1yr	2.43	4.18	0.411	0.49
2yr	2.92	7.13	0.634	0.76
5yr	3.57	11.58	0.972	1.17
10yr	4.08	15.39	1.264	1.52
25yr	4.78	20.96	1.692	2.03
50yr	5.33	25.54	2.046	2.45
100yr	**5.89**	**30.34**	**2.420**	**2.90**
WQv	1.00	0.01	0.010	0.01

Summary for Pond P: Pond

Inflow Area = 8.950 ac, 0.00% Impervious, Inflow Depth = 0.15" for WQv event
Inflow = 1.23 cfs @ 12.12 hrs, Volume= 0.113 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link HC : Hurricane Creek

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 721.69' @ 24.95 hrs Surf.Area= 0.594 ac Storage= 0.113 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	721.50'	6.446 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
721.50	0.581	0.000	0.000
722.00	0.616	0.299	0.299
723.00	0.686	0.651	0.950
724.00	0.759	0.723	1.673
725.00	0.835	0.797	2.470
726.00	0.912	0.874	3.343
727.00	0.992	0.952	4.295
728.00	1.075	1.034	5.329
729.00	1.159	1.117	6.446

Device	Routing	Invert	Outlet Devices
#1	Primary	721.50'	**12.0" Round Culvert** L= 82.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 721.50' / 721.00' S= 0.0061 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=721.50' TW=722.00' (Fixed TW Elev= 722.00')
1=Culvert (Controls 0.00 cfs)

Events for Pond P: Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1yr	11.75	0.84	722.21	0.433
2yr	16.14	1.65	722.42	0.563
5yr	22.22	2.84	722.72	0.763
10yr	27.11	3.25	723.00	0.951
25yr	33.91	3.83	723.39	1.225
50yr	39.30	4.23	723.70	1.449
100yr	**44.80**	**4.60**	**724.01**	**1.680**
WQv	1.23	0.00	721.69	0.113

Summary for Link HC: Hurricane Creek

Inflow Area = 18.950 ac, 0.00% Impervious, Inflow Depth = 0.01" for WQv event
Inflow = 0.01 cfs @ 17.96 hrs, Volume= 0.010 af
Primary = 0.01 cfs @ 17.96 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Events for Link HC: Hurricane Creek

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1yr	4.17	4.17	**0.00**
2yr	7.85	7.85	0.00
5yr	13.37	13.37	0.00
10yr	18.08	18.08	0.00
25yr	24.15	24.15	0.00
50yr	29.12	29.12	0.00
100yr	**34.26**	**34.26**	0.00
WQv	0.01	0.01	0.00

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LAND SURVEYORS

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PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

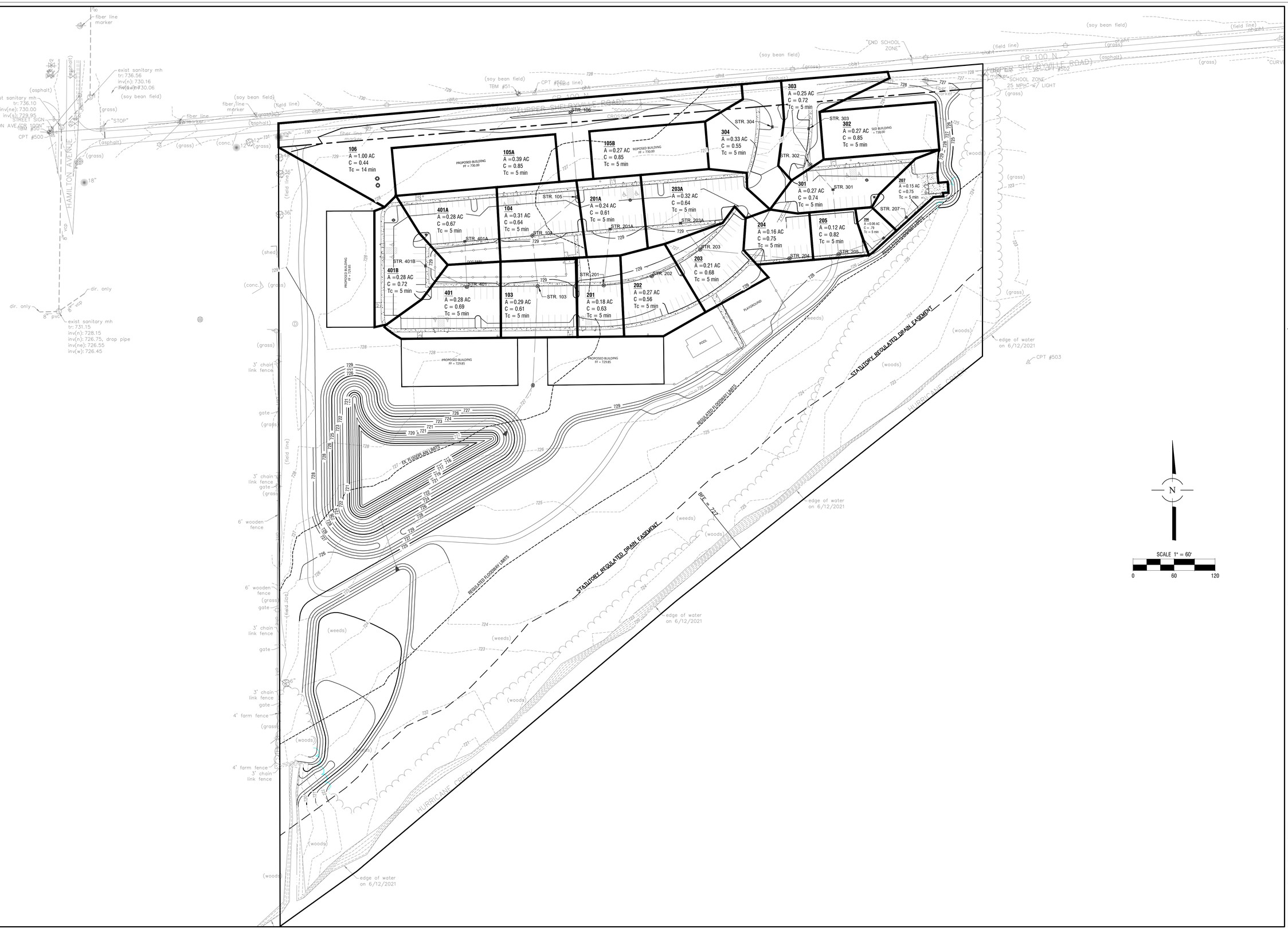
CALCULATION TITLE: **EMERGENCY OVERFLOW**
DESCRIPTION: POND WEIR CALCULATION
SITE CONDITION: PROPOSED

Required Q = 1.25xQ100 = 56

$$Q = C * \sqrt{2 * g} * L * h^{3/2}$$

Given: h = 0.50
L = 35
C = 0.60

Then: Q = 59.6 cfs



NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

PROPOSED INLET BASINS MAP

FRANKLIN FLATS APARTMENTS

UPPER SHELBYVILLE ROAD
FRANKLIN, IN 46131

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

Indianapolis
Indiana
Phone: (317) 779-2194

SPACECO INC.

FILENAME:

DATE:
08/04/2021

JOB NO.
11582

SHEET
BASINS

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

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Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT: Franklin Flats **PROJECT #:** 11582
LOCATION: Franklin, Indiana **DATE:** 8/4/2021

CALCULATION TITLE: COMPOSITE C CALCULATIONS
DESCRIPTION: INLET BASINS
SITE CONDITION: PROPOSED

Rational Method Runoff Coefficients	
Roof	0.85
Asphalt	0.82
Concrete	0.85
Lawn	0.21

103

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	7,032	1,200	4,400	12,632	0.29	0.61

104

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	8,254	1,250	4,000	13,504	0.31	0.64

105A

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
16,988	0	0	0	16,988	0.39	0.85

105B

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
11,900	0	0	0	11,900	0.27	0.85

106

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	16,550	0	27,010	43,560	1.00	0.44

201

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	4,541	800	2,500	7,841	0.18	0.63

201A

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	5,754	1,000	3,700	10,454	0.24	0.61

202

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	5,861	900	5,000	11,761	0.27	0.56

203

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	5,148	1,300	2,700	9,148	0.21	0.64

203A

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	10,739	1,000	2,200	13,939	0.32	0.73

204

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	5,220	900	850	6,970	0.16	0.75

205

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	4,237	940	50	5,227	0.12	0.82

206

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	2,150	314	150	2,614	0.06	0.79

207

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	3,894	1,800	840	6,534	0.15	0.75

301

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	9,461	800	1,500	11,761	0.27	0.74

302

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
11,900	0	0	0	11,900	0.27	0.85

303

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	8,560	480	1,850	10,890	0.25	0.72

304

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	7,470	605	6,300	14,375	0.33	0.55

401

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	8,497	1,100	2,600	12,197	0.28	0.69

401A

Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	897	8,000	3,300	12,197	0.28	0.67

401B

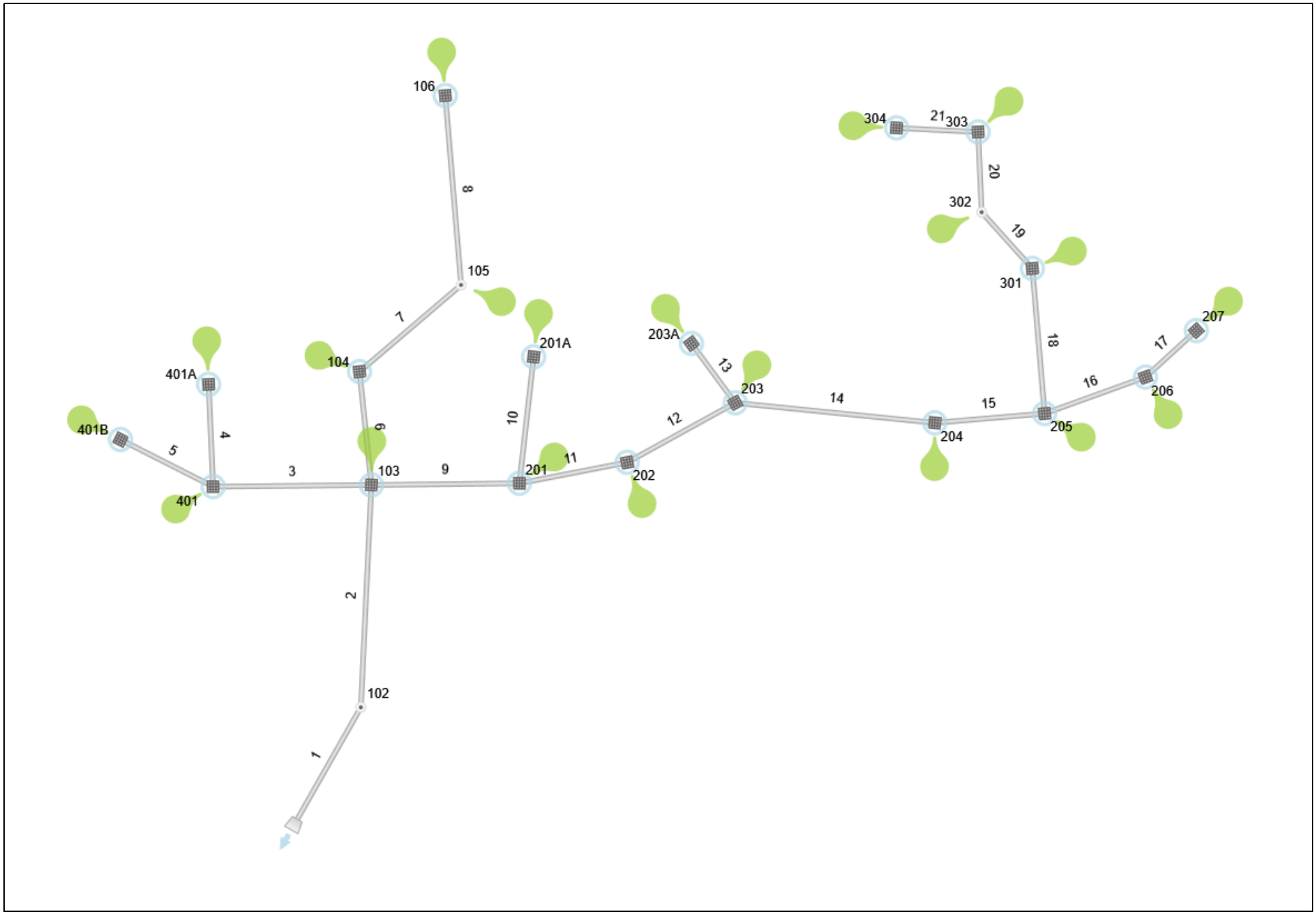
Roof (ft^2)	Asphalt (ft^2)	Cocnrete (ft^2)	Lawn (ft^2)	Total (ft^2)	Total (acres)	Composite C
0	9,097	1,100	2,000	12,197	0.28	0.72

Plan View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021



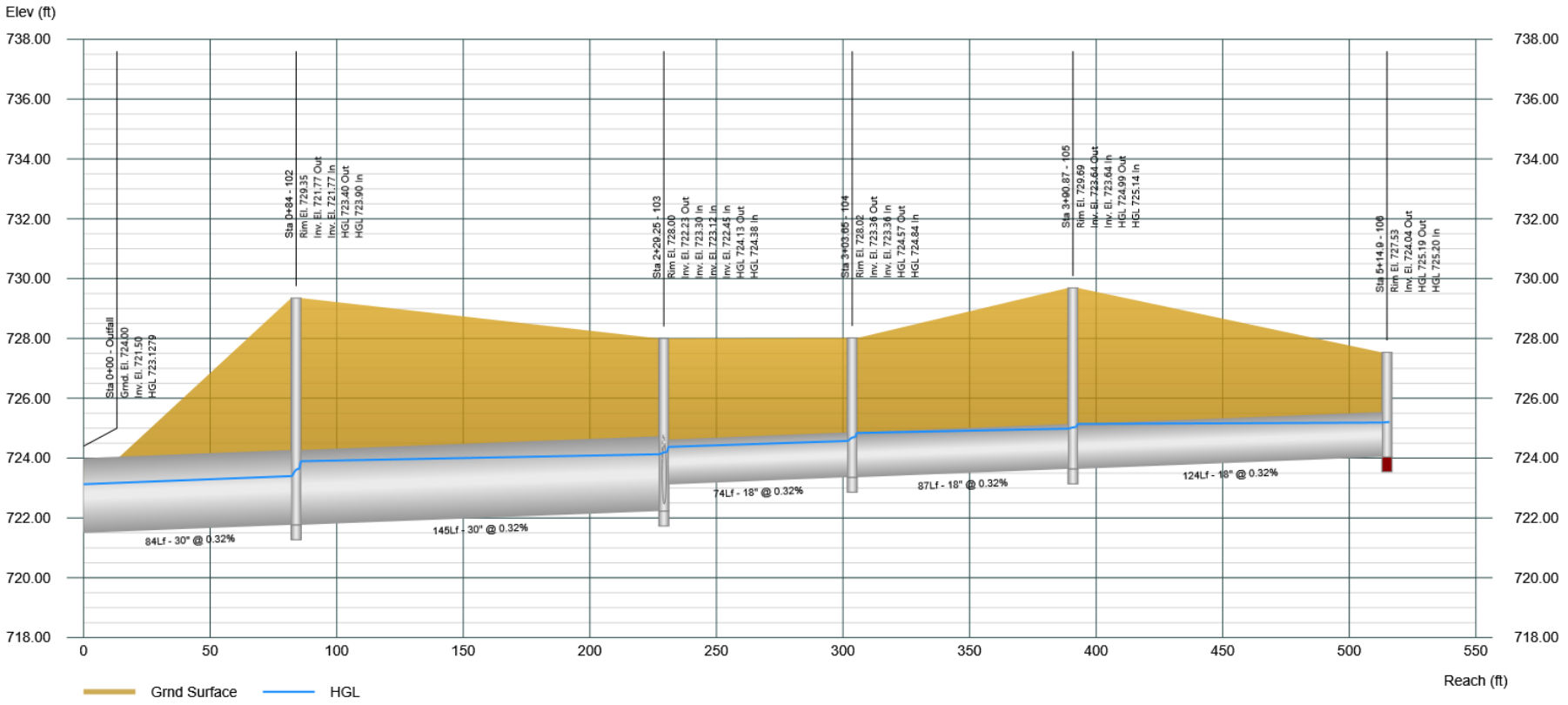
Project File: 11582 Storm Sewer.sws

Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021

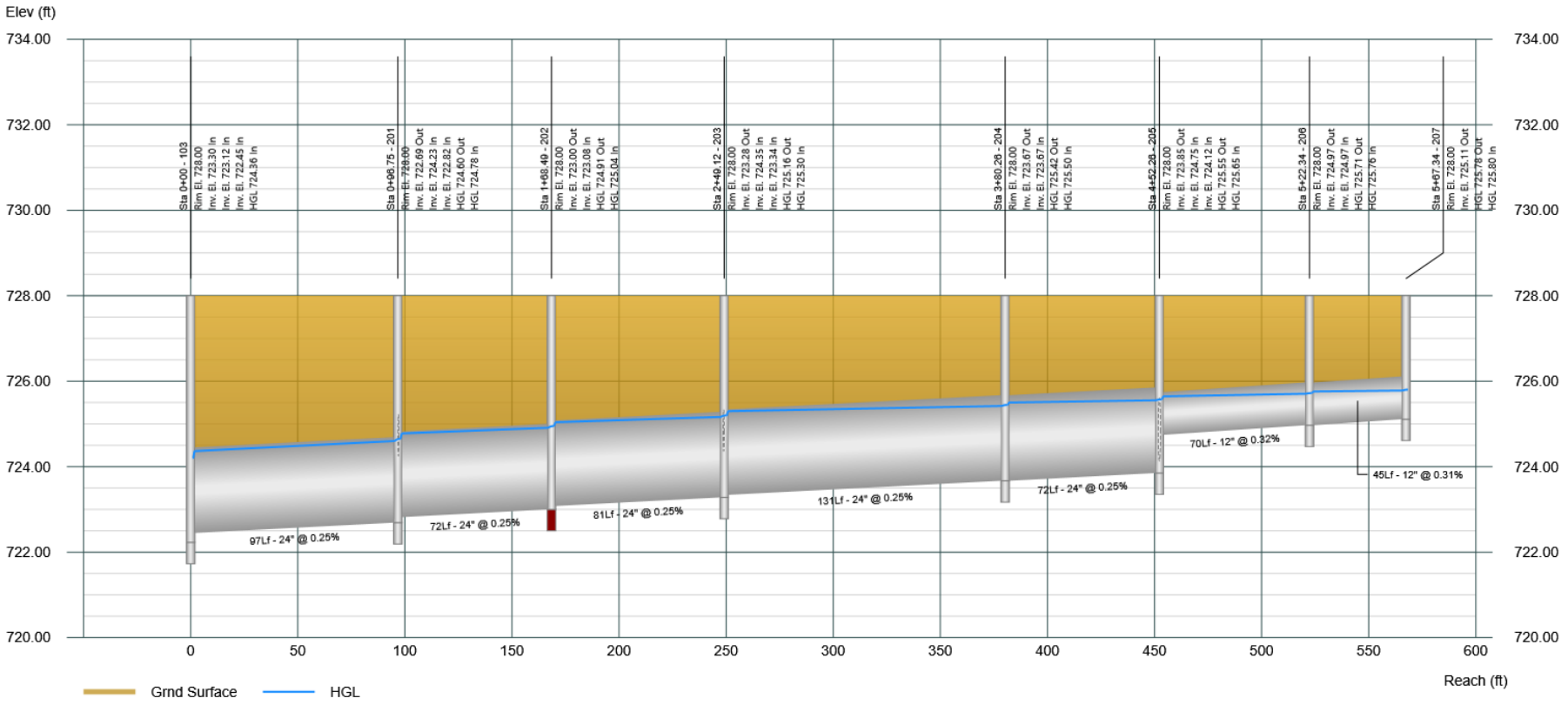


Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021



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Profile View

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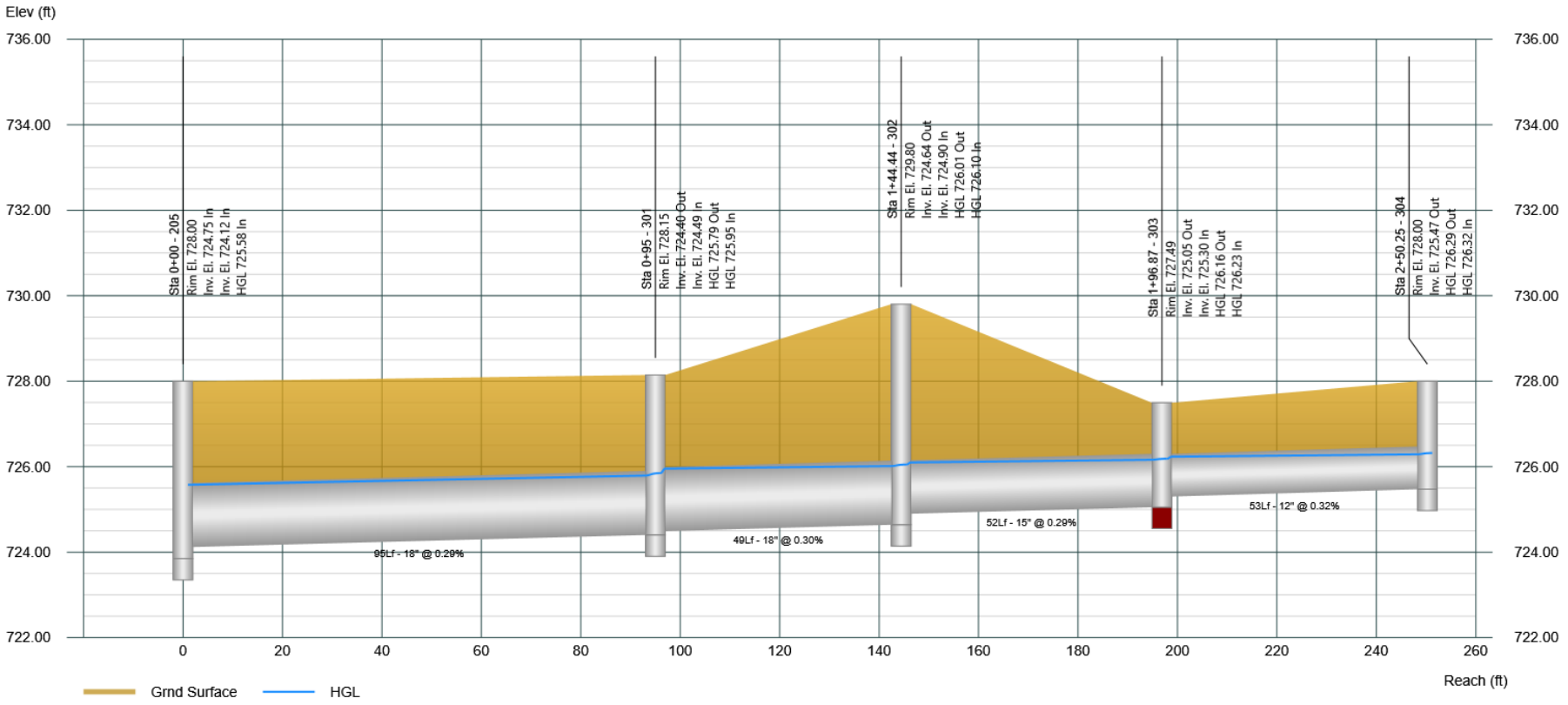
Project Name: Franklin Flats

08-03-2021

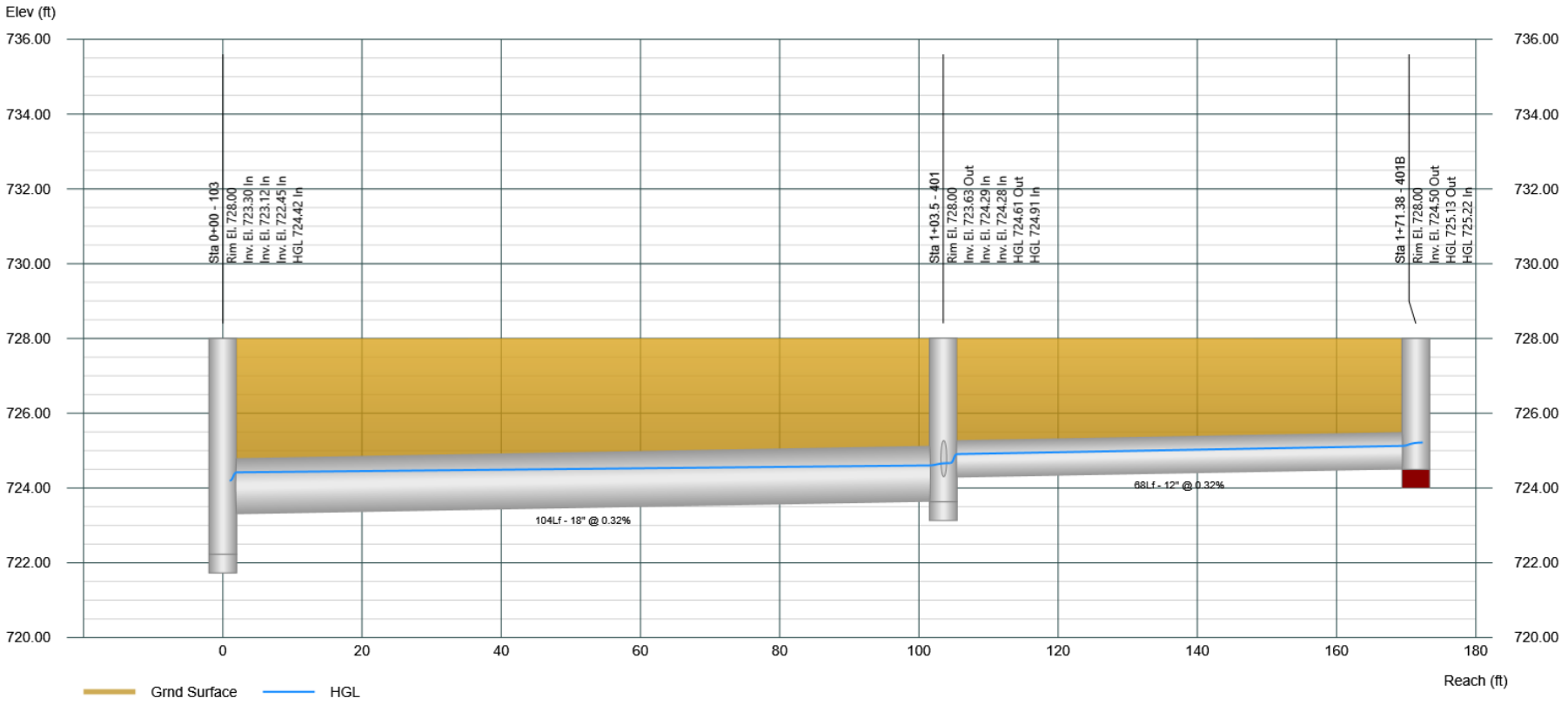


Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021

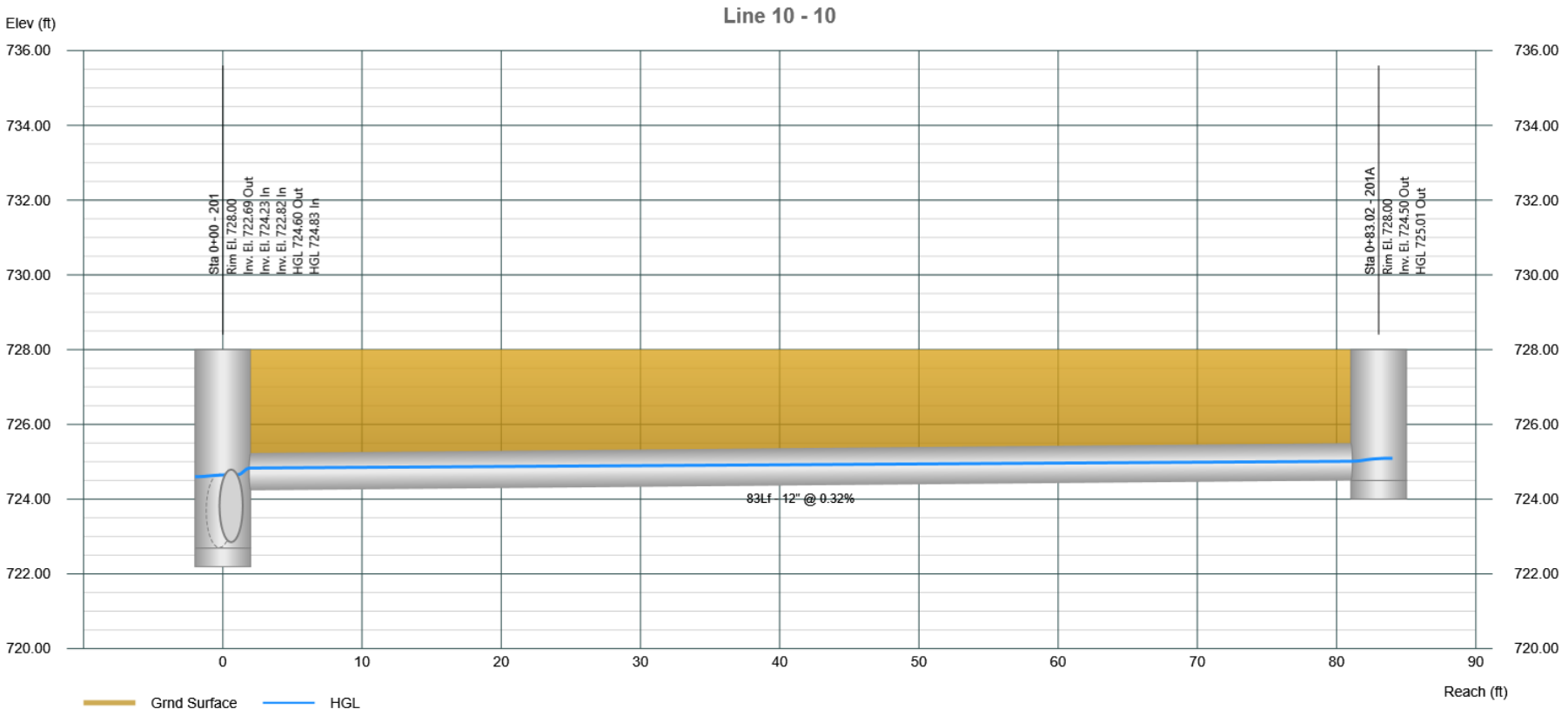


Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021

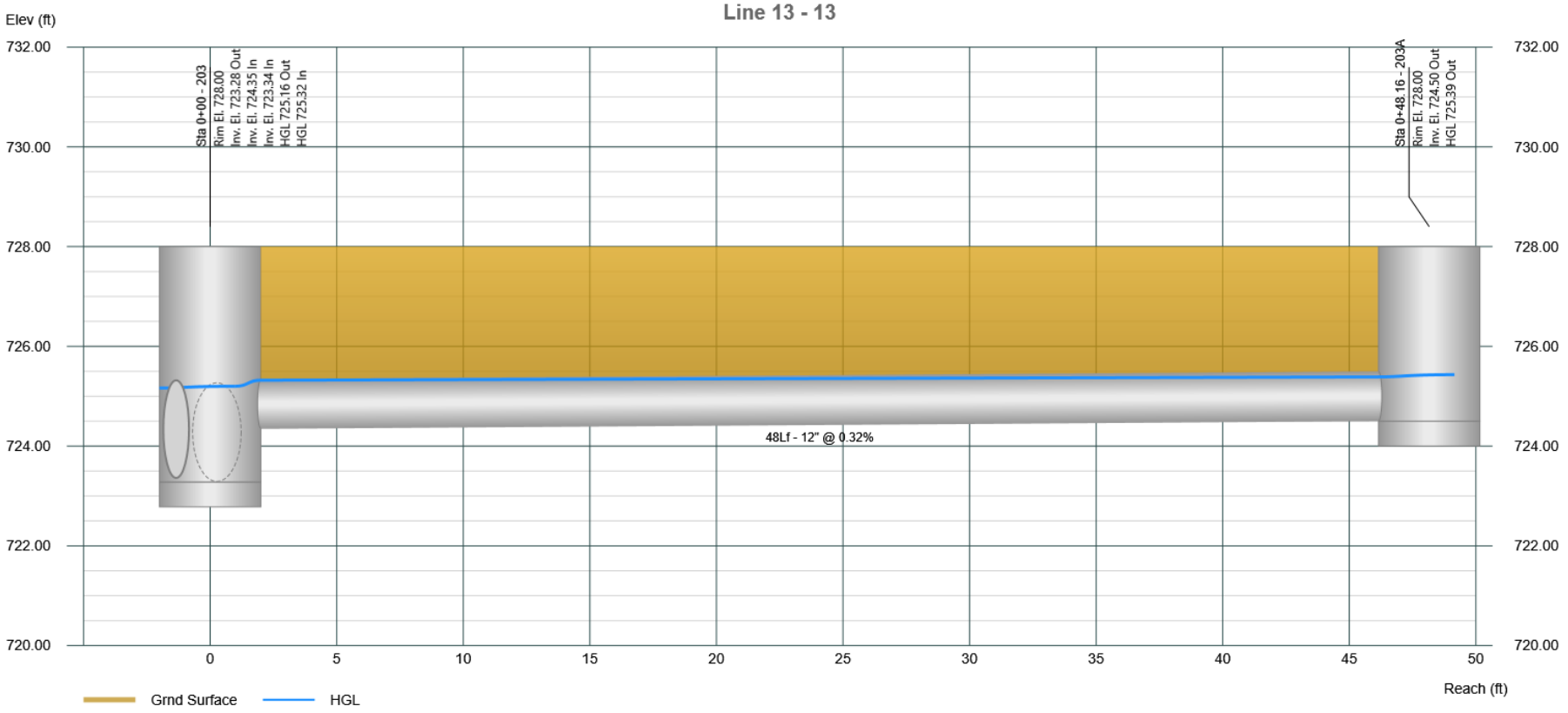


Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021

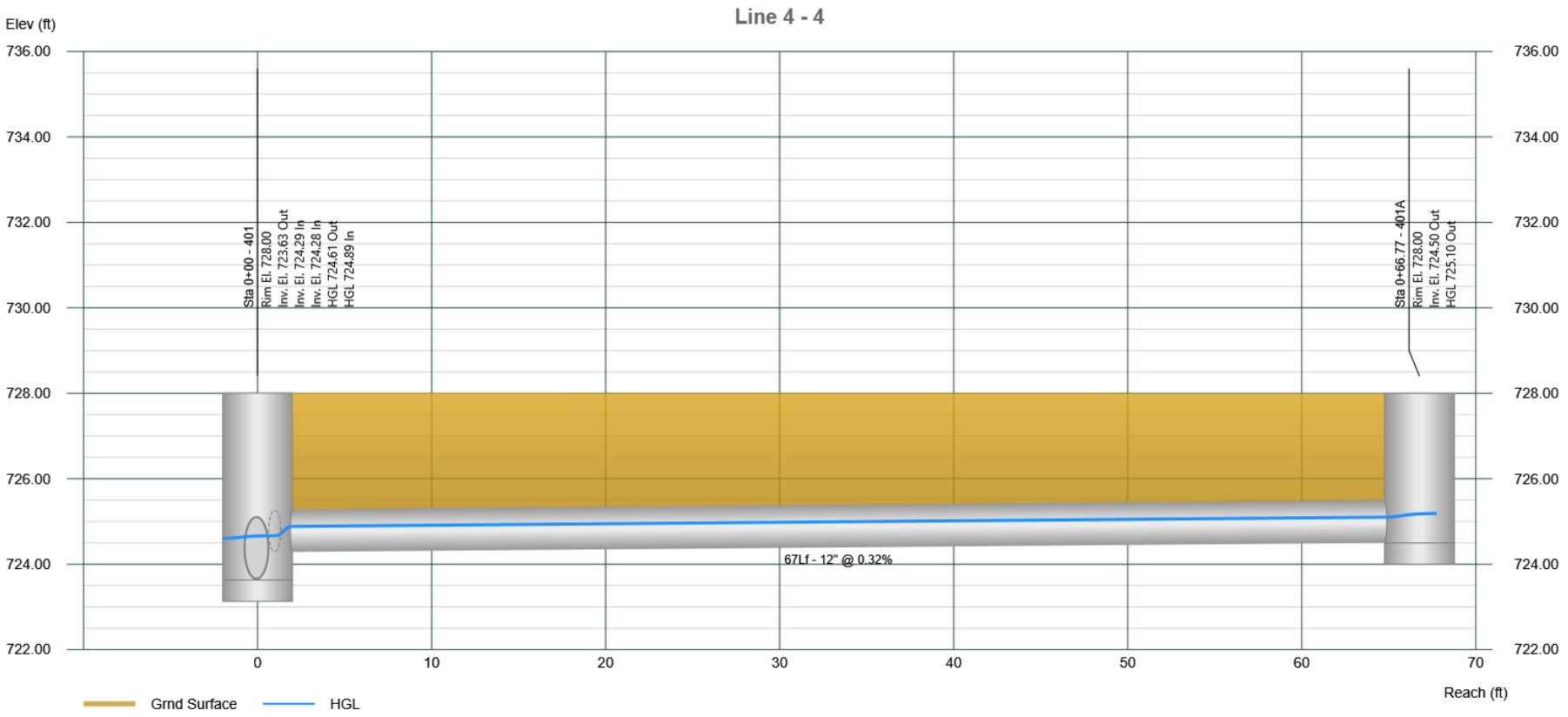


Profile View

Stormwater Studio 2021 v 3.0.0.25

Project Name: Franklin Flats

08-03-2021



Storm Sewer Tabulation

Project Name: Franklin Flats

Stormwater Studio 2021 v 3.0.0.25

08-03-2021

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	84.00	0.000	5.930	0.00	0.00	3.89	0.0	15.85	4.54	17.63	23.25	5.21	30	0.32	721.77	721.50	723.40	723.13	729.35	722.93	1
2	145.24	0.290	5.930	0.61	0.18	3.89	5.0	15.38	4.61	17.90	23.08	4.25	30	0.32	722.23	721.77	724.13	723.90	728.00	729.35	2
3	103.50	0.280	0.840	0.69	0.19	0.58	5.0	5.41	7.03	4.09	5.94	3.13	18	0.32	723.63	723.30	724.61	724.42	728.00	728.00	3
4	66.77	0.280	0.280	0.67	0.19	0.19	5.0	5.00	7.19	1.35	2.01	2.75	12	0.32	724.50	724.29	725.10	724.89	728.00	728.00	4
5	67.88	0.280	0.280	0.72	0.20	0.20	5.0	5.00	7.19	1.45	2.01	2.79	12	0.32	724.50	724.28	725.13	724.91	728.00	728.00	5
6	74.40	0.310	1.970	0.64	0.20	1.20	5.0	15.06	4.65	5.58	5.97	3.59	18	0.32	723.36	723.12	724.57	724.38	728.02	728.00	6
7	87.23	0.660	1.660	0.85	0.56	1.00	5.0	14.67	4.72	4.72	5.95	2.75	18	0.32	723.64	723.36	724.99	724.84	729.69	728.02	7
8	124.03	1.000	1.000	0.44	0.44	0.44	14.0	14.00	4.83	2.12	5.97	1.33	18	0.32	724.04	723.64	725.19	725.14	727.53	729.69	8
9	96.75	0.180	2.830	0.63	0.11	1.93	5.0	7.79	6.21	11.98	11.26	3.87	24	0.25	722.69	722.45	724.60	724.36	728.00	728.00	9
10	83.02	0.240	0.240	0.61	0.15	0.15	5.0	5.00	7.19	1.05	2.01	2.37	12	0.32	724.50	724.23	725.01	724.83	728.00	728.00	10
11	71.74	0.270	2.410	0.56	0.15	1.67	5.0	7.49	6.30	10.51	11.33	3.38	24	0.25	723.00	722.82	724.91	724.78	728.00	728.00	11
12	80.63	0.210	2.140	0.68	0.14	1.52	5.0	7.16	6.41	9.72	11.29	3.14	24	0.25	723.28	723.08	725.16	725.04	728.00	728.00	12
13	48.16	0.320	0.320	0.64	0.20	0.20	5.0	5.00	7.19	1.47	2.01	1.94	12	0.32	724.50	724.35	725.39	725.32	728.00	728.00	13
14	131.14	0.160	1.610	0.75	0.12	1.17	5.0	6.59	6.59	7.71	11.34	2.56	24	0.25	723.67	723.34	725.42	725.30	728.00	728.00	14
15	72.00	0.120	1.450	0.82	0.10	1.05	5.0	6.27	6.71	7.03	11.32	2.40	24	0.25	723.85	723.67	725.55	725.50	728.00	728.00	15
16	70.08	0.060	0.210	0.79	0.05	0.16	5.0	5.31	7.07	1.13	2.01	1.67	12	0.32	724.97	724.75	725.71	725.65	728.00	728.00	16
17	45.00	0.150	0.150	0.75	0.11	0.11	5.0	5.00	7.19	0.81	1.99	1.33	12	0.31	725.11	724.97	725.78	725.76	728.00	728.00	17
18	95.00	0.270	1.120	0.74	0.20	0.79	5.0	5.84	6.86	5.43	5.70	3.13	18	0.29	724.40	724.12	725.79	725.58	728.15	728.00	18
19	49.44	0.270	0.850	0.85	0.23	0.59	5.0	5.61	6.95	4.11	5.79	2.38	18	0.30	724.64	724.49	726.01	725.95	729.80	728.15	19
20	52.43	0.250	0.580	0.72	0.18	0.36	5.0	5.33	7.06	2.55	3.45	2.16	15	0.29	725.05	724.90	726.16	726.10	727.49	729.80	20
21	53.38	0.330	0.330	0.55	0.18	0.18	5.0	5.00	7.19	1.31	2.02	1.81	12	0.32	725.47	725.30	726.29	726.23	728.00	727.49	21

Notes: IDF File = Franklin IDF.idf, Return Period = 10-yrs.

Project File: 11582 Storm Sewer.sws

Energy Grade Line Calculations

Project Name: Franklin Flats

Stormwater Studio 2021 v 3.0.0.25

08-03-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
			Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev		Invert Elev	Depth	Area	HGL Elev	Vel	Vel Head	EGL Elev	n Value	Enrgy Loss	HGLa Elev	EGLa Elev	Enrgy Loss
	(in)	(cfs)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft)	(ft/s)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
1	30	17.63	721.50	1.63[3]	3.38	723.13	5.21	0.42	723.55	84.00	721.77	1.63	3.39	723.40	5.21	0.42	723.82	0.013	0.270	723.64	724.06	0.24
2	30	17.90	721.77	2.13	4.45	723.90	4.02	0.25	724.15	145.24	722.23	1.90	4.00	724.13	4.47	0.31	724.44	0.013	0.293	724.20	724.51	0.07
3	18	4.09	723.30	1.12	1.42	724.42	2.89	0.13	724.55	103.50	723.63	0.98	1.22	724.61	3.37	0.18	724.78	0.013	0.232	724.67	724.84	0.06
4	12	1.35	724.29	0.60[3]	0.49	724.89	2.75	0.12	725.00	66.77	724.50	0.60	0.49	725.10	2.75	0.12	725.22	0.013	0.214	725.19	725.30	0.09
5	12	1.45	724.28	0.63[3]	0.52	724.91	2.79	0.12	725.03	67.88	724.50	0.63	0.52	725.13	2.79	0.12	725.25	0.013	0.218	725.22	725.34	0.09
6	18	5.58	723.12	1.26	1.58	724.38	3.53	0.19	724.57	74.40	723.36	1.21	1.53	724.57	3.65	0.21	724.78	0.013	0.209	724.70	724.91	0.13
7	18	4.72	723.36	1.48	1.76	724.84	2.68	0.11	724.95	87.23	723.64	1.34	1.67	724.99	2.83	0.12	725.11	0.013	0.159	725.03	725.16	0.05
8	18	2.12	723.64	1.50	1.77	725.14	1.20	0.02	725.17	124.03	724.04	1.15	1.45	725.19	1.46	0.03	725.22	0.013	0.055	725.20	725.24	0.02
9	24	11.98	722.45	1.91	3.10	724.36	3.87	0.23	724.60	96.75	722.69	1.91	3.09	724.60	3.87	0.23	724.83	0.013	0.235	724.65	724.88	0.05
10	12	1.05	724.23	0.60	0.49	724.83	2.15	0.07	724.90	83.02	724.50	0.51	0.41	725.01	2.60	0.11	725.12	0.013	0.214	725.09	725.20	0.08
11	24	10.51	722.82	1.96	3.13	724.78	3.36	0.18	724.95	71.74	723.00	1.91	3.09	724.91	3.40	0.18	725.09	0.013	0.136	724.95	725.13	0.04
12	24	9.72	723.08	1.96	3.13	725.04	3.11	0.15	725.19	80.63	723.28	1.88	3.07	725.16	3.17	0.16	725.32	0.013	0.131	725.20	725.36	0.04
13	12	1.47	724.35	0.98	0.78	725.32	1.89	0.06	725.38	48.16	724.50	0.89	0.74	725.39	2.00	0.06	725.45	0.013	0.073	725.43	725.49	0.04
14	24	7.71	723.34	1.96	3.13	725.30	2.47	0.09	725.39	131.14	723.67	1.75	2.92	725.42	2.64	0.11	725.53	0.013	0.137	725.45	725.55	0.02
15	24	7.03	723.67	1.83	3.01	725.50	2.33	0.08	725.59	72.00	723.85	1.70	2.85	725.55	2.47	0.09	725.65	0.013	0.063	725.57	725.67	0.02
16	12	1.13	724.75	0.90	0.74	725.65	1.52	0.04	725.68	70.08	724.97	0.74	0.62	725.71	1.82	0.05	725.76	0.013	0.076	725.72	725.78	0.02
17	12	0.81	724.97	0.79	0.67	725.76	1.22	0.02	725.78	45.00	725.11	0.67	0.56	725.78	1.44	0.03	725.81	0.013	0.031	725.80	725.83	0.02
18	18	5.43	724.12	1.46	1.75	725.58	3.10	0.15	725.73	95.00	724.40	1.39	1.71	725.79	3.17	0.16	725.95	0.013	0.222	725.85	726.01	0.06
19	18	4.11	724.49	1.46	1.76	725.95	2.34	0.09	726.04	49.44	724.64	1.37	1.70	726.01	2.42	0.09	726.11	0.013	0.067	726.05	726.14	0.04
20	15	2.55	724.90	1.20	1.21	726.10	2.11	0.07	726.17	52.43	725.05	1.11	1.15	726.16	2.21	0.08	726.24	0.013	0.072	726.19	726.26	0.02
21	12	1.31	725.30	0.93	0.76	726.23	1.71	0.05	726.28	53.38	725.47	0.82	0.69	726.29	1.90	0.06	726.35	0.013	0.068	726.32	726.38	0.03

Notes: Return Period = 10-yrs. [3] Normal depth.

Project File: 11582 Storm Sewer.sws

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700, Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT:	**Franklin Flats**	**PROJECT #:**	**11582**
LOCATION:	**Franklin, Indiana**	**DATE:**	**8/4/2021**

CALCULATION TITLE: **INLET CAPACITY CALCULATIONS**
DESCRIPTION: INLET BASINS
SITE CONDITION: PROPOSED

Curb Inlet (EJIW 7030M2)
A = Square Foot Open = 1.81 ft^2 = 0.91 ft^2 (50% clogged)
P = Weir Perimeter = 5.92 ft = 2.96 ft (50% clogged)

Flat Inlet Grate (EJIW V5660)
A = Square Foot Open = 2.70 ft^2 = 1.35 ft^2 (50% clogged)
P = Weir Perimeter = 9.92 ft = 4.96 ft (50% clogged)

Beehive Inlet Grate (EJIW 1045Z2O2)
A = Square Foot Open = 1.28 ft^2 = 0.64 ft^2 (50% clogged)
P = Weir Perimeter = 6.80 ft = 3.40 ft (50% clogged)

Flat Inlet Grate (EJIW V5630)
A = Square Foot Open = 3.29 ft^2 = 1.65 ft^2 (50% clogged)
P = Weir Perimeter = 10.60 ft = 5.30 ft (50% clogged)

Reference: EJIW

$Q = 3.0P(d)^{3/2}$ Weir Condition (d<0.3')
$Q = 4.89A(d)^{1/2}$ Orifice Condition (d>0.4')
Reference: HERPICC Stormwater Drainage Manual-Revised July 1994 (Equations 5.3.2 & 5.3.3)
(control depth is based on d(weir) if d(weir)<0.4, if d(weir)>0.4 then d(orifice))

STR. #	Type	Area	Weighted "C" Value	Intensity	Q	Depth (d weir)	Depth (d orifice)	Max Depth	Allowable Depth
		(ac)		(in/hr)	(cfs)	(ft)	(ft)	(ft)	6 inches
103	Curb Inlet (EJIW 7030M2)	0.29	0.61	7.21	1.28	0.27	0.08	0.27	OK
104	Curb Inlet (EJIW 7030M2)	0.31	0.64	7.21	1.43	0.30	0.10	0.30	OK
106	Beehive Inlet (EJIW 1045Z2O2)	1.00	0.44	4.57	2.01	0.34	0.41	0.41	OK
201	Curb Inlet (EJIW 7030M2)	0.18	0.63	7.21	0.82	0.20	0.03	0.20	OK
201A	Curb Inlet (EJIW 7030M2)	0.24	0.61	7.21	1.06	0.24	0.06	0.24	OK
202	Curb Inlet (EJIW 7030M2)	0.27	0.56	7.21	1.09	0.25	0.06	0.25	OK
203	Curb Inlet (EJIW 7030M2)	0.21	0.68	7.21	1.03	0.24	0.05	0.24	OK
203A	Curb Inlet (EJIW 7030M2)	0.32	0.64	7.21	1.48	0.30	0.11	0.30	OK
204	Curb Inlet (EJIW 7030M2)	0.16	0.75	7.21	0.87	0.21	0.04	0.21	OK
205	Curb Inlet (EJIW 7030M2)	0.12	0.82	7.21	0.71	0.19	0.03	0.19	OK
206	Curb Inlet (EJIW 7030M2)	0.06	0.79	7.21	0.34	0.11	0.01	0.11	OK
207	Curb Inlet (EJIW 7030M2)	0.15	0.75	7.21	0.81	0.20	0.03	0.20	OK
301	Flat Inlet (EJIW V5660)	0.27	0.74	7.21	1.44	0.21	0.05	0.21	OK
303	Curb Inlet (EJIW 7030M2)	0.25	0.72	7.21	1.30	0.28	0.09	0.28	OK
304	Curb Inlet (EJIW 7030M2)	0.33	0.55	7.21	1.31	0.28	0.09	0.28	OK
401	Curb Inlet (EJIW 7030M2)	0.28	0.69	7.21	1.39	0.29	0.10	0.29	OK
401B	Curb Inlet (EJIW 7030M2)	0.28	0.72	7.21	1.45	0.30	0.11	0.30	OK
401A	Curb Inlet (EJIW 7030M2)	0.28	0.67	7.21	1.35	0.29	0.09	0.29	OK

TAB 5
COMPENSATORY STROAGE AND FLOOD CONSIDERATIONS

STORMWATER MANAGEMENT PERMIT APPLICATION
FOR
FRANKLIN FLATS
FRANKLIN, JOHNSON COUNTY, INDIANA

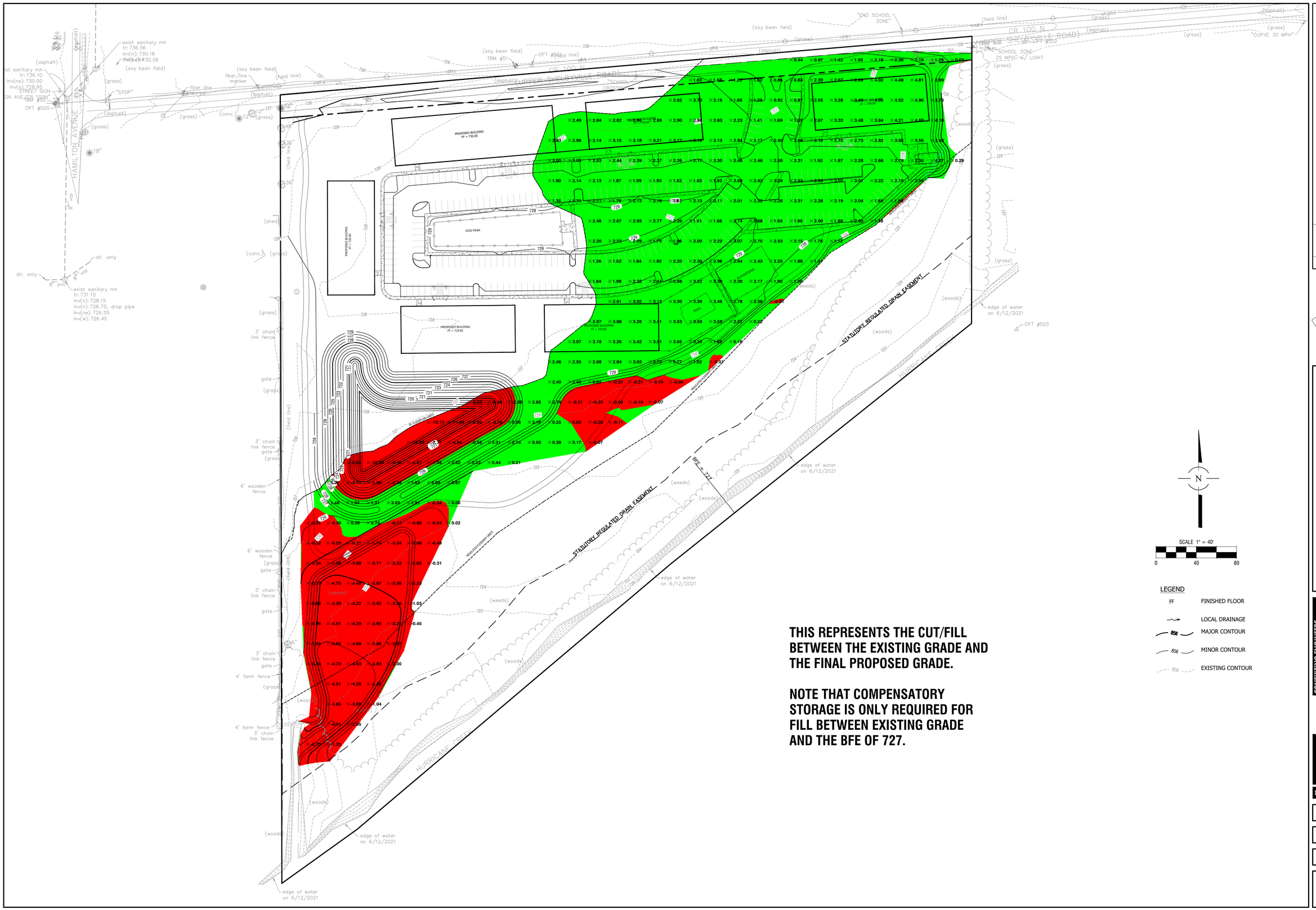
PREPARED FOR
LAUTH GROUP, INC.

PREPARED BY
SPACECO, INC.
INDIANAPOLIS, IN

SPACECO PROJECT # 11582

AUGUST 4, 2021

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS



THIS REPRESENTS THE CUT/FILL BETWEEN THE EXISTING GRADE AND THE FINAL PROPOSED GRADE.

NOTE THAT COMPENSATORY STORAGE IS ONLY REQUIRED FOR FILL BETWEEN EXISTING GRADE AND THE BFE OF 727.

N

SCALE 1" = 40'

0 40 80

LEGEND

FF	FINISHED FLOOR
	LOCAL DRAINAGE
856	MAJOR CONTOUR
856	MINOR CONTOUR
856	EXISTING CONTOUR

NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

COMPENSATORY STORAGE - EG TO PG

FRANKLIN FLATS APARTMENTS

UPPER SHELBYVILLE ROAD
FRANKLIN, IN 46131

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

Indianapolis
Indiana
Phone: (317) 779-2194

SPACECO INC.

FILENAME: 11582COMP

DATE: 08/04/2021

JOB NO. 11582

SHEET **FILL-1**

Cut/Fill Report

Generated: 2021-08-03 10:27:00

By user: dreynolds

Drawing: N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\11582COMP - FILL.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
EG TO PG	full	1.000	1.000	305854.08	9189.33	19173.58	9984.25<Fill>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	305854.08	9189.33	19173.58	9984.25<Fill>

* Value adjusted by cut or fill factor other than 1.0

TOTAL FILL BETWEEN EXISTING GRADE AND PROPOSED GRADE

THIS REPRESENTS THE CUT/FILL BETWEEN THE BFE (727) AND THE FINAL PROPOSED GRADE.

NOTE THAT COMPENSATORY STORAGE IS ONLY REQUIRED FOR FILL BETWEEN EXISTING GRADE AND THE BFE OF 727.

LEGEND

FF	FINISHED FLOOR
	LOCAL DRAINAGE
856	MAJOR CONTOUR
856	MINOR CONTOUR
856	EXISTING CONTOUR

NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

COMPENSATORY STORAGE - BFE TO PG

FRANKLIN FLATS APARTMENTS

UPPER SHELBYVILLE ROAD & SHELBYVILLE ROAD
FRANKLIN, IN 46131

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

Indianapolis
Indiana
Phone: (317) 779-2184

SPACECO INC.

FILENAME: 11582COMP

DATE: 08/04/2021

JOB NO. 11582

SHEET **FILL-2**

Cut/Fill Report

Generated: 2021-08-03 10:28:18

By user: dreynolds

Drawing: N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\11582COMP - FILL.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
BFE TO PG	full	1.000	1.000	305854.08	17398.90	15236.66	2162.24<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	305854.08	17398.90	15236.66	2162.24<Cut>

* Value adjusted by cut or fill factor other than 1.0

TOTAL FILL BETWEEN THE BFE (727) AND PROPOSED GRADE. THIS AMOUNT WILL BE SUBTRACTED FROM THE FILL BETWEEN EXISTING AND PROPOSED GRADE.

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700, Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

CALCULATION TITLE: **COMPENSATORY STORAGE**
DESCRIPTION: FILL CALCULATION
SITE CONDITION: PROPOSED

PROPOSED FILL IN FLOODPLAIN

1.) BASE FLOOD ELEVATION = 727

2.) FILL FROM EXISTING GRADE = 19,173 CY
TO PROPOSED GRADE

3.) FILL FROM BFE TO = 15,237 CY
PROPOSED GRADE

4.) **TOTAL FILL IN FLOODPLAIN = 3,936 CY**
(LINE 2 - LINE 3)

THIS REPRESENTS THE CUT BETWEEN THE EXISTING GRADE AND THE FINAL PROPOSED GRADE.

SINCE THIS AREA IS ENTIRELY OUTSIDE OF THE NEW FLOODPLAIN LIMITS (PROPOSED 727 CONTOUR), IT COUNTS TOWARDS THE CUT NEEDED FOR COMPENSATORY STORAGE

LEGEND

FF	FINISHED FLOOR
	LOCAL DRAINAGE
856	MAJOR CONTOUR
856	MINOR CONTOUR
856	EXISTING CONTOUR

NO.	DATE	REMARKS

NOT FOR CONSTRUCTION

COMPENSATORY STORAGE - CUT EXHIBIT

FRANKLIN FLATS APARTMENTS

UPPER SHELBYVILLE ROAD
FRANKLIN, IN 46131

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

Indianapolis
Indiana
Phone: (317) 779-2184

SPACECO INC.

FILENAME: 11582COMP

DATE: 08/04/2021

JOB NO. 11582

SHEET **CUT**

Cut/Fill Report

Generated: 2021-08-03 10:17:00

By user: dreynolds

Drawing: N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\N:\Projects\11582 - INDY\DRAINAGE\Calcs\Flood\11582COMP - CUT.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
EG-PG	full	1.000	1.000	84608.48	4932.33	341.53	4590.80<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	84608.48	4932.33	341.53	4590.80<Cut>

* Value adjusted by cut or fill factor other than 1.0

TOTAL CUT TO ACCOUNT FOR COMPENSATORY STORAGE

SPACECO INC.
CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700, Rosemont, Illinois 60018
Phone: (847) 696-4060 Fax: (847) 696-4065

PROJECT:	**Franklin Flats**	**PROJECT #:**	11582
LOCATION:	**Franklin, Indiana**	**DATE:**	8/4/2021
		LAST REVISED:	

CALCULATION TITLE: **COMPENSATORY STORAGE**
DESCRIPTION: CUT CALCULATION
SITE CONDITION: PROPOSED

PROPOSED CUT IN FLOODPLAIN

1.) BASE FLOOD ELEVATION = 727

2.) TOTAL CUT FROM EXISTING = 4,932 CY
GRADE TO PROPOSED GRADE
(OUTSIDE NEW FLOOD BOUNDARY)

Summary for Pond P: Pond

Inflow Area = 8.950 ac, 0.00% Impervious, Inflow Depth = 4.09" for 100yr event
Inflow = 44.80 cfs @ 12.08 hrs, Volume= 3.053 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link HC : Hurricane Creek

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 725.68' @ 24.95 hrs Surf.Area= 0.887 ac Storage= 3.053 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	721.50'	6.446 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
721.50	0.581	0.000	0.000
722.00	0.616	0.299	0.299
723.00	0.686	0.651	0.950
724.00	0.759	0.723	1.673
725.00	0.835	0.797	2.470
726.00	0.912	0.874	3.343
727.00	0.992	0.952	4.295
728.00	1.075	1.034	5.329
729.00	1.159	1.117	6.446

Device	Routing	Invert	Outlet Devices
#1	Primary	721.50'	**12.0" Round Culvert** L= 82.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 721.50' / 721.00' S= 0.0061 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=721.50' TW=727.00' (Fixed TW Elev= 727.00')
1=Culvert (Controls 0.00 cfs)

POND ROUTING FOR A TAILWATER ELEVATION OF 727

Events for Pond P: Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1yr	11.75	**0.00**	722.77	0.792
2yr	16.14	0.00	723.19	1.082
5yr	22.22	0.00	723.76	1.489
10yr	27.11	0.00	724.19	1.821
25yr	33.91	0.00	724.78	2.290
50yr	39.30	0.00	725.23	2.665
100yr	**44.80**	0.00	**725.68**	**3.053**
WQv	1.23	0.00	721.69	0.113

POND EVENTS FOR A TAILWATER ELEVATION OF 727. NO OUTFLOW FROM THE POND DUE TO HIGH TAILWATER, HOWEVER, THE POND STILL CONTAINS 3.3 FEET OF FREEBOARD.