

**A NEW FACILITY FOR: CUSTOM ADVERTISING**  
**DRAINAGE CALCULATIONS – SUMMARY**  
**10/6/2022**

**DESCRIPTION OF PROJECT**

Custom Advertising is an approximately 15.45 Acre development located in the City of Bryant, Arkansas at the north Portion of I-30 N Frontage Rd. There is a ridge that runs through the site creating four main drainage basins. Basin 3 will be detained in a ditch located in the east of the site. The detention of the basin will be detained by a 19 ft. wide ditch. Basin 1 and 2 will not be detained. Basin 4 runs to west of the site and in-lieu-fee provided for this basin.

Stormwater Calculations were prepared with the intent to comply with the City of Bryant's Drainage Code. The primary intent of this analysis is to produce a drainage system adequately sized to convey post development runoff while attenuating post development discharge levels equal to or less than pre development flows.

Hydraulic calculations were made using the Rational Method. Design frequencies were analyzed for 2, 5, 10, 25, 50, and 100 year return periods.

These calculations are divided into the following sections:

**Summary of Drainage Basins**

**Summary of Pipes**

**Detention Summary**

**Appendices**

Exhibit A – Pre-Development Drainage Basins

Exhibit B – Post-Development Drainage Basins

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**DRAINAGE CALCULATIONS – SUMMARY**  
**10/6/2022**

**SUMMARY OF DRAINAGE BASINS**

**PRE-DEVELOPMENT CONDITIONS**

The existing site contains four drainage basins. The existing site is a mixture of grass and clay soil with moderate slopes. Basin 1 drains to the south western side of the property, basin 2 drains to the south eastern side of the property, basin 3 drains to the north eastern side of the property and basin 4 drains to the south side of the property.

**POST-DEVELOPMENT CONDITIONS**

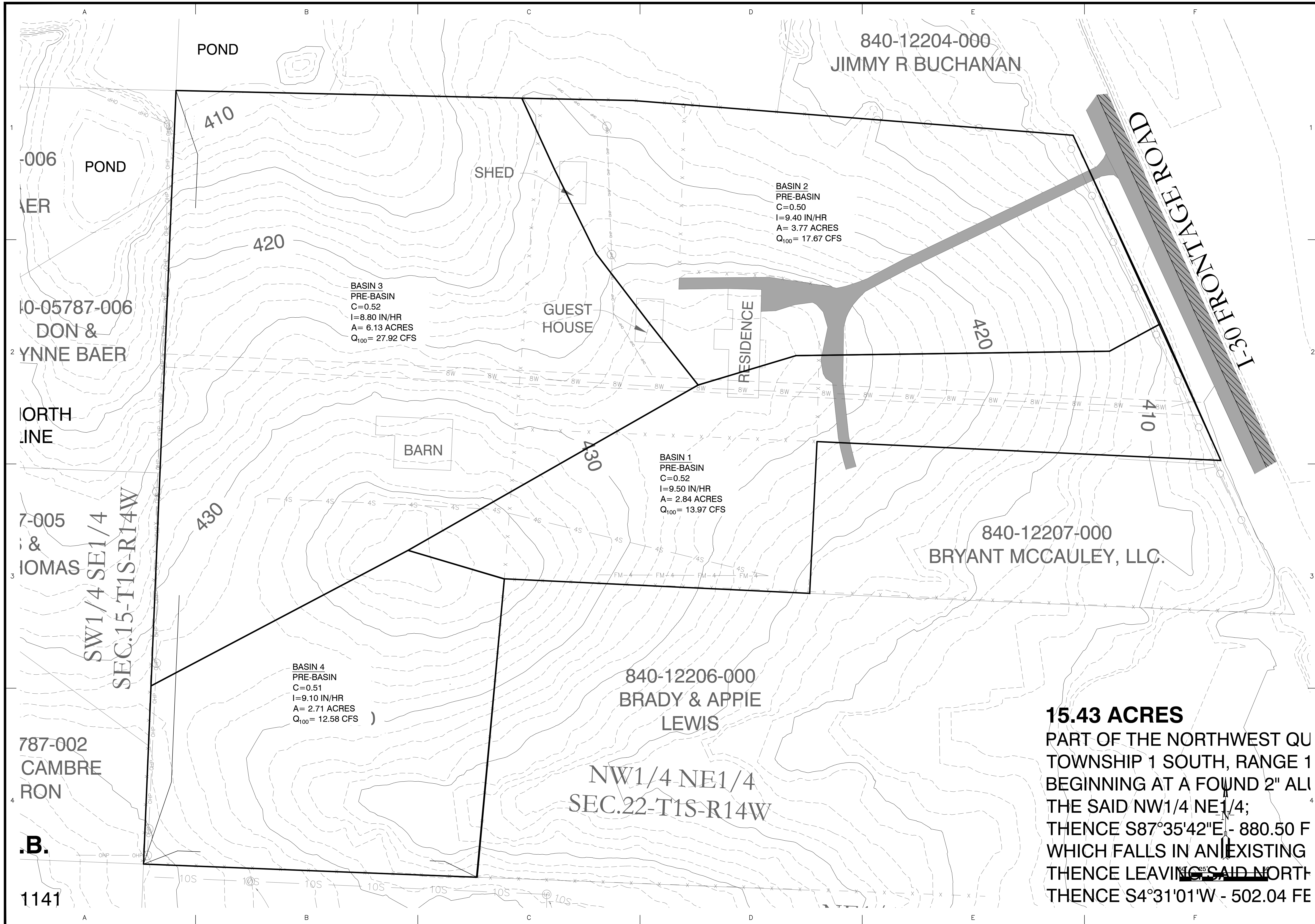
As previously described, this site is being developed into a commercial office. Slopes range from 2% to 6%. Runoff from the developed areas of basin 3 collects by a ditch and finally detained in the eastern corner of the property. Runoff from basin 1, 2 and 4 will not be captured.

**SUMMARY OF PIPES**

All pipes used in this project are HDPE. Therefore, a manning's of 0.012 was used on all pipes in the analysis.

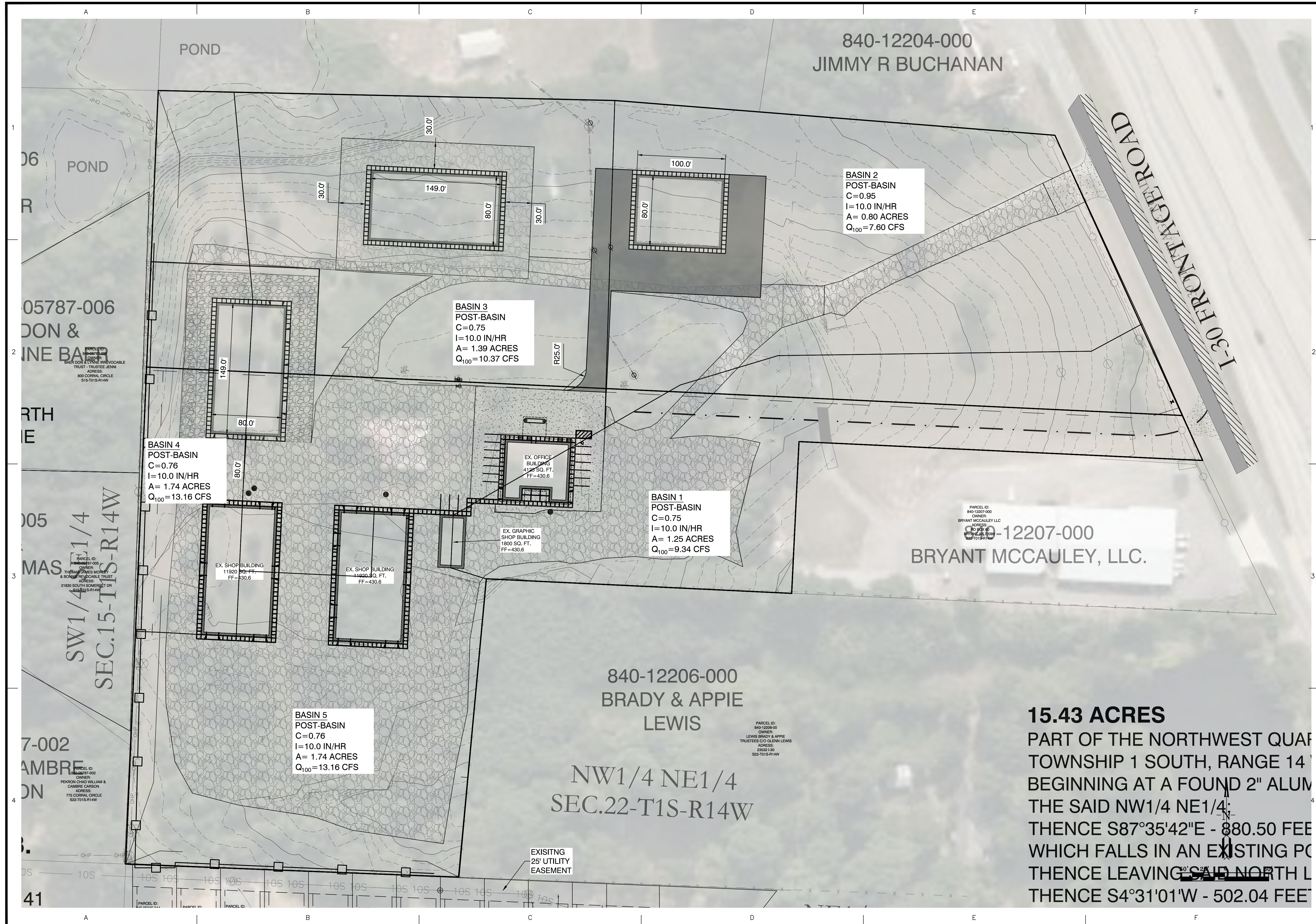
**DETENTION BASIN 1 SUMMARY**

The ditch storage in these calculations detains flows from the basin 3. The ditch storage is located in the eastern portion of the property. The ditch storage is made of 300 linear feet of 1' concrete bottom trickle channel and has a volume of 4,800 cf. A concrete control structure is constructed on the east side of the ditch. This control structure uses a slotted weir to limit the discharge through the structure to that of the 2, 5, 10, 25, 50, and 100-year pre-development flow. The ditch storage is designed to hold the 100-year storm event.



BY	
REVISION	
DATE	
<b>Designing our client's success</b> <b>GNE</b> <b>GarNat Engineering, LLC</b> P.O. Box 116 Benton, AR 72018 Ph: (501) 408-4650 garnatengineering@gmail.com	
<b>A NEW FACILITY FOR:</b> <b>CUSTOM ADVERTISING</b> <b>JIMMY PARKER</b> <b>BRYANT, AR</b>	
CONTENTS:	
PRE DRAINAGE BASIN	
PROJECT NO:	21069
DATE:	JULY 2021
SHEET NO:	1

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BY	
REVISION	
DATE	
<p><b>GNE</b> Designing our client's success</p> <p><b>GarNat Engineering, LLC</b> 3825 Mt Carmel Rd Bryant, AR 72022 gamateengineering@gmail.com</p>	
<p><b>A NEW FACILITY FOR:</b> <b>CUSTOM ADVERTISING</b> <b>JIMMY PARKER</b> <b>BRYANT, AR</b></p>	
<p><b>CONTENTS:</b></p> <p>POST DRAINAGE BASIN</p>	
PROJECT NO:	21069
DATE:	JULY 2021
SHEET NO:	2

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**Stormwater Calcs - 23738 I-30 N**  
**Using Rational Method**

Pre-development

**Calculated Tc values - Drainage Basin 1**

$$T_c = \frac{56 * L^{1.48} * n^{1.48}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 220 feet  
 n1 = 0.033 Gravel  
 S1 = 0.036 ft/ft  
 I<sub>assumed</sub> = 6.90 inches  
 T<sub>Ccalculated</sub> = 230 seconds  
 T<sub>Ccalculated</sub> = 3.84 minutes

L1 = 465 feet  
 n1 = 0.035 Streams on plain, more stones & weeds  
 S1 = 0.036 ft/ft  
 I<sub>assumed</sub> = 6.90 inches  
 T<sub>Ccalculated</sub> = 374 seconds  
 T<sub>Ccalculated</sub> = 6.23 minutes

Tc = 10.07 minutes  
 I = 6.90 inches

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
 I for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

Use Tc = 10.00 minutes

I - 100 yr = 8.2  
 I - 50 yr = 7.6  
 I - 25 yr = 6.90  
 I - 10 yr = 6  
 I - 5 yr = 5.5  
 I - 2 yr = 4.7

**Calculated Tc values - Drainage Basin 2**

$$T_c = \frac{56 * L^{1.48} * n^{1.48}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 100 feet  
 n1 = 0.15 Sheet flow  
 S1 = 0.033 ft/ft  
 I<sub>assumed</sub> = 6.00 inches  
 T<sub>Ccalculated</sub> = 386 seconds  
 T<sub>Ccalculated</sub> = 6.44 minutes

L1 = 500 feet  
 n1 = 0.045 Grass, some weeds  
 S1 = 0.033 ft/ft  
 I<sub>assumed</sub> = 6.00 inches  
 T<sub>Ccalculated</sub> = 493 seconds  
 T<sub>Ccalculated</sub> = 8.21 minutes

Tc = 14.65 minutes  
 I = 6.00 inches

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
 I for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

Use Tc = 14.50 minutes

I - 100 yr = 7.5  
 I - 50 yr = 6.8  
 I - 25 yr = 6.00  
 I - 10 yr = 5.5  
 I - 5 yr = 4.9  
 I - 2 yr = 4.2

**Calculated Tc values - Drainage Basin 3**

$$T_c = \frac{56 * L^{1.48} * n^{1.48}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 829 feet  
 n1 = 0.045 Grass, some weeds  
 S1 = 0.034 ft/ft  
 I<sub>assumed</sub> = 6.80 inches  
 T<sub>Ccalculated</sub> = 630 seconds  
 T<sub>Ccalculated</sub> = 10.51 minutes

Tc = 10.51 minutes  
 I = 6.80 inches

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
 I for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

Use Tc = 10.50 minutes

I - 100 yr = 8.1  
 I - 50 yr = 7.4  
 I - 25 yr = 6.80  
 I - 10 yr = 6  
 I - 5 yr = 5.4  
 I - 2 yr = 4.7

**Calculated Tc values - Drainage Basin 4**

$$T_c = \frac{56 * L^{1.48} * n^{1.48}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 491 feet  
 n1 = 0.045 Grass, some weeds  
 S1 = 0.028 ft/ft  
 I<sub>assumed</sub> = 7.70 inches  
 T<sub>Ccalculated</sub> = 464 seconds  
 T<sub>Ccalculated</sub> = 7.73 minutes

Tc = 7.73 minutes  
 I = 7.70 inches

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
 I for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

Use Tc = 7.70 minutes

I - 100 yr = 9.1  
 I - 50 yr = 8.8  
 I - 25 yr = 7.70  
 I - 10 yr = 6.9  
 I - 5 yr = 6.1  
 I - 2 yr = 5.2

**Stormwater Calcs - 23738 I-30 N  
Using Rational Method**

Post-development

**Calculated Tc values - Drainage Basin 1**

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 220 feet  
n1 = 0.033 Gravel  
S1 = 0.035 ft/ft  
I<sub>assumed</sub> = 6.90 inches  
T<sub>calculated</sub> = 232 seconds  
T<sub>calculated</sub> = 3.87 minutes

Tc = 10.10 minutes  
I = 6.90 inches

Use Tc = 10.00 minutes

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}}$$

L1 = 465 feet  
n1 = 0.035 Streams on plain, more stones & weeds  
S1 = 0.036 ft/ft  
I<sub>assumed</sub> = 6.90 inches  
T<sub>calculated</sub> = 374 seconds  
T<sub>calculated</sub> = 6.23 minutes

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
i for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

I <sub>100</sub> = 8.2 Inches	I <sub>10</sub> = 6.0 Inches
I <sub>50</sub> = 7.5 Inches	I <sub>5</sub> = 5.5 Inches
I <sub>25</sub> = 6.9 Inches	I <sub>2</sub> = 4.7 Inches

**Calculated Tc values - Drainage Basin 2**

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 100 feet  
n1 = 0.15 Sheet Flow  
S1 = 0.033 ft/ft  
I<sub>assumed</sub> = 6.30 inches  
T<sub>calculated</sub> = 379 seconds  
T<sub>calculated</sub> = 6.32 minutes

Tc = 13.24 minutes  
I = 6.30 inches

Use Tc = 13.20 minutes

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 500 feet  
n1 = 0.035 Streams on plain, more stones & weeds  
S1 = 0.033 ft/ft  
I<sub>assumed</sub> = 6.30 inches  
T<sub>calculated</sub> = 416 seconds  
T<sub>calculated</sub> = 6.93 minutes

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
i for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

I <sub>100</sub> = 7.8 Inches	I <sub>10</sub> = 5.8 Inches
I <sub>50</sub> = 7 Inches	I <sub>5</sub> = 5.0 Inches
I <sub>25</sub> = 6.3 Inches	I <sub>2</sub> = 4.3 Inches

**Calculated Tc values - Drainage Basin 3**

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 170 feet  
n1 = 0.033 Gravel  
S1 = 0.058 ft/ft  
I<sub>assumed</sub> = 6.80 inches  
T<sub>calculated</sub> = 172 seconds  
T<sub>calculated</sub> = 2.87 minutes

Tc = 10.58 minutes  
I = 6.80 inches

Use Tc = 10.50 minutes

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 285 feet  
n1 = 0.035 Streams on plain, more stones ;  
S1 = 0.058 ft/ft  
I<sub>assumed</sub> = 6.80 inches  
T<sub>calculated</sub> = 243 seconds  
T<sub>calculated</sub> = 4.05 minutes

Tc for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual  
i for 25-yr Storm from Exhibit 400-1 of Bryant Drainage Manual

I <sub>100</sub> = 8.1 Inches	I <sub>10</sub> = 6.0 Inches
I <sub>50</sub> = 7.4 Inches	I <sub>5</sub> = 5.4 Inches
I <sub>25</sub> = 6.8 Inches	I <sub>2</sub> = 4.7 Inches

L1 = 175 feet  
n1 = 0.02 Earth, straight and uniform ditch  
S1 = 0.01 ft/ft  
I<sub>assumed</sub> = 6.80 inches  
T<sub>calculated</sub> = 220 seconds  
T<sub>calculated</sub> = 3.66 minutes

**Calculated Tc values - Drainage Basin 4**

$$T_c = \frac{56 * L^{0.6} * n^{0.6}}{i^{0.4} * S^{0.3}} \text{ seconds}$$

L1 = 491 feet  
n1 = 0.045 Grass, some weeds  
S1 = 0.028 ft/ft  
I<sub>assumed</sub> = 7.70 inches  
T<sub>calculated</sub> = 463 seconds  
T<sub>calculated</sub> = 7.72 minutes

Tc = 7.72 minutes  
I = 7.70 inches

Use Tc = 7.70 minutes

I <sub>100</sub> = 9.1 Inches	I <sub>10</sub> = 6.9 Inches
I <sub>50</sub> = 8.8 Inches	I <sub>5</sub> = 6.1 Inches
I <sub>25</sub> = 7.7 Inches	I <sub>2</sub> = 5.2 Inches

Stormwater Calcs - 23738 I-30 N  
**using Rational Method**

**Pre-development**

**Calculated C values - Drainage Basin 1**

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	
Roof	0.02	0.97	0.92	0.88	0.83	0.8	0.75	(C values taken from Bryant Drainage Manual)
Asphalt	0.03	0.95	0.9	0.86	0.81	0.77	0.73	Developed - Concrete/Roof -Table 400-2
Grass	2.79	0.51	0.48	0.44	0.41	0.38	0.35	Developed - Asphaltic -Table 400-2
<b>Total</b>	<b>2.84</b>	<b>0.52</b>	<b>0.49</b>	<b>0.45</b>	<b>0.42</b>	<b>0.39</b>	<b>0.36</b>	Undeveloped - Pasture/Range - Average, 2-7% - Table 400-2

**Calculated C values - Drainage Basin 2**

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	
Roof	0.14	0.97	0.92	0.88	0.83	0.8	0.75	(C values taken from Bryant Drainage Manual)
Asphalt	0.21	0.95	0.9	0.86	0.81	0.77	0.73	Developed - Concrete/Roof -Table 400-2
Grass	3.42	0.51	0.48	0.44	0.41	0.38	0.35	Developed - Asphaltic -Table 400-2
<b>Total</b>	<b>3.77</b>	<b>0.50</b>	<b>0.47</b>	<b>0.43</b>	<b>0.40</b>	<b>0.37</b>	<b>0.35</b>	Undeveloped - Pasture/Range - Average, 2-7% - Table 400-2

**Calculated C values - Drainage Basin 3**

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	
Roof	0.10	0.97	0.92	0.88	0.83	0.8	0.75	(C values taken from Bryant Drainage Manual)
Grass	6.03	0.51	0.48	0.44	0.41	0.38	0.35	Developed - Concrete/Roof -Table 400-2
<b>Total</b>	<b>6.13</b>	<b>0.52</b>	<b>0.49</b>	<b>0.45</b>	<b>0.42</b>	<b>0.39</b>	<b>0.36</b>	Undeveloped - Pasture/Range - Average, 2-7% - Table 400-2

**Calculated C values - Drainage Basin 4**

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	
Grass	2.71	0.51	0.48	0.44	0.41	0.38	0.35	(C values taken from Bryant Drainage Manual)
<b>Total</b>	<b>2.71</b>	<b>0.51</b>	<b>0.48</b>	<b>0.44</b>	<b>0.41</b>	<b>0.38</b>	<b>0.35</b>	Undeveloped - Pasture/Range - Average, 2-7% - Table 400-2

Stormwater Calcs - 23738 I-30 N  
 using Rational Method

Post-development

Calculated C values - Drainage Basin 1

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	(C values taken from Bryant Drainage Manual)
Concrete/Roof	0.41	0.97	0.92	0.88	0.83	0.8	0.75	Developed - Concrete/Roof -Table 400-2
Grass	1.57	0.46	0.42	0.39	0.35	0.32	0.29	Developed - Good Condition (larger than 75% cover of the area) - Average, 2 to 7% - Table 400-2
Gravel	0.81	0.65	0.55	0.50	0.35	0.30	0.25	Streets - Gravel -Table 2.2 City of Little Rock Drainage Manual
<b>Total</b>	<b>2.79</b>	<b>0.59</b>	<b>0.53</b>	<b>0.49</b>	<b>0.42</b>	<b>0.38</b>	<b>0.35</b>	

Calculated C values - Drainage Basin 2

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	(C values taken from Bryant Drainage Manual)
Concrete/Roof	0.11	0.97	0.92	0.88	0.83	0.8	0.75	Developed - Concrete/Roof -Table 400-2
Grass	2.24	0.46	0.42	0.39	0.35	0.32	0.29	Developed - Good Condition (larger than 75% cover of the area) - Average, 2 to 7% - Table 400-2
Gravel	0.39	0.65	0.55	0.50	0.35	0.30	0.25	Streets - Gravel -Table 2.2 City of Little Rock Drainage Manual
Asphalt	0.20	0.95	0.90	0.86	0.81	0.77	0.73	Developed - Asphaltic - Table 400-2
<b>Total</b>	<b>2.94</b>	<b>0.54</b>	<b>0.49</b>	<b>0.45</b>	<b>0.40</b>	<b>0.37</b>	<b>0.33</b>	

Calculated C values - Drainage Basin 3

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	(C values taken from Bryant Drainage Manual)
Concrete/Roof	1.34	0.97	0.92	0.88	0.83	0.8	0.75	Developed - Concrete/Roof -Table 400-2
Asphalt	0.25	0.95	0.90	0.86	0.81	0.77	0.73	Developed - Asphaltic - Table 400-2
Grass	2.83	0.46	0.42	0.39	0.35	0.32	0.29	Developed - Good Condition (larger than 75% cover of the area) - Average, 2 to 7% - Table 400-2
Gravel	2.33	0.65	0.55	0.50	0.35	0.30	0.25	Streets - Gravel -Table 2.2 City of Little Rock Drainage Manual
<b>Total</b>	<b>6.74</b>	<b>0.64</b>	<b>0.58</b>	<b>0.54</b>	<b>0.46</b>	<b>0.42</b>	<b>0.38</b>	

Calculated C values - Drainage Basin 4

	Area	C <sub>100</sub>	C <sub>50</sub>	C <sub>25</sub>	C <sub>10</sub>	C <sub>5</sub>	C <sub>2</sub>	(C values taken from Bryant Drainage Manual)
Concrete/Roof	0.35	0.97	0.92	0.88	0.83	0.8	0.75	Developed - Concrete/Roof -Table 400-2
Gravel	1.81	0.65	0.55	0.50	0.35	0.30	0.25	Streets - Gravel -Table 2.2 City of Little Rock Drainage Manual
Grass	0.81	0.46	0.42	0.39	0.35	0.32	0.29	Developed - Good Condition (larger than 75% cover of the area) - Average, 2 to 7% - Table 400-2
<b>Total</b>	<b>2.97</b>	<b>0.64</b>	<b>0.56</b>	<b>0.51</b>	<b>0.41</b>	<b>0.36</b>	<b>0.32</b>	



Stormwater Calcs -23738 I-30 N  
using Rational Method

**Pre-development**

**Drainage Basin 1**

Q<sub>100</sub> = 12.06 CFS  
c = 0.52  
i = 8.20 in/hr  
A = 2.84 acres

Q<sub>30</sub> = 10.52 CFS  
c = 0.49  
i = 7.60 in/hr  
A = 2.84 acres

Q<sub>25</sub> = 8.77 CFS  
c = 0.45  
i = 6.90 in/hr  
A = 2.84 acres

Q<sub>10</sub> = 7.11 CFS  
c = 0.42  
i = 6.00 in/hr  
A = 2.84 acres

Q<sub>5</sub> = 6.05 CFS  
c = 0.39  
i = 5.50 in/hr  
A = 2.84 acres

Q<sub>2</sub> = 4.76 CFS  
c = 0.36  
i = 4.70 in/hr  
A = 2.84 acres

**Drainage Basin 2**

Q<sub>100</sub> = 14.10 CFS  
c = 0.50  
i = 7.50 in/hr  
A = 3.77 acres

Q<sub>30</sub> = 12.04 CFS  
c = 0.47  
i = 6.80 in/hr  
A = 3.77 acres

Q<sub>25</sub> = 9.77 CFS  
c = 0.43  
i = 6.00 in/hr  
A = 3.77 acres

Q<sub>10</sub> = 8.35 CFS  
c = 0.40  
i = 5.50 in/hr  
A = 3.77 acres

Q<sub>5</sub> = 6.92 CFS  
c = 0.37  
i = 4.90 in/hr  
A = 3.77 acres

Q<sub>2</sub> = 5.47 CFS  
c = 0.35  
i = 4.20 in/hr  
A = 3.77 acres

**Drainage Basin 3**

Q<sub>100</sub> = 25.70 CFS  
c = 0.52  
i = 8.10 in/hr  
A = 6.13 acres

Q<sub>30</sub> = 22.10 CFS  
c = 0.49  
i = 7.40 in/hr  
A = 6.13 acres

Q<sub>25</sub> = 18.64 CFS  
c = 0.45  
i = 6.80 in/hr  
A = 6.13 acres

Q<sub>10</sub> = 15.33 CFS  
c = 0.42  
i = 6.00 in/hr  
A = 6.13 acres

Q<sub>5</sub> = 12.81 CFS  
c = 0.39  
i = 5.40 in/hr  
A = 6.13 acres

Q<sub>2</sub> = 10.27 CFS  
c = 0.36  
i = 4.70 in/hr  
A = 6.13 acres

**Drainage Basin 4**

Q<sub>100</sub> = 12.58 CFS  
c = 0.51  
i = 9.10 in/hr  
A = 2.71 acres

Q<sub>30</sub> = 11.45 CFS  
c = 0.48  
i = 8.80 in/hr  
A = 2.71 acres

Q<sub>25</sub> = 9.18 CFS  
c = 0.44  
i = 7.70 in/hr  
A = 2.71 acres

Q<sub>10</sub> = 7.67 CFS  
c = 0.41  
i = 6.90 in/hr  
A = 2.71 acres

Q<sub>5</sub> = 6.28 CFS  
c = 0.38  
i = 6.10 in/hr  
A = 2.71 acres

Q<sub>2</sub> = 4.93 CFS  
c = 0.35  
i = 5.20 in/hr  
A = 2.71 acres

Total 64.44 CFS

56.11 CFS

46.36 CFS

38.46 CFS

32.05 CFS

25.44 CFS

**Post-development**

**Drainage Basin 1**

Q<sub>100</sub> = 13.50 CFS  
c = 0.59  
i = 8.20 in/hr  
A = 2.79 acres

Q<sub>30</sub> = 11.12 CFS  
c = 0.53  
i = 7.50 in/hr  
A = 2.79 acres

Q<sub>25</sub> = 9.51 CFS  
c = 0.49  
i = 6.90 in/hr  
A = 2.79 acres

Q<sub>10</sub> = 7.04 CFS  
c = 0.42  
i = 6.00 in/hr  
A = 2.79 acres

Q<sub>5</sub> = 5.90 CFS  
c = 0.38  
i = 5.50 in/hr  
A = 2.79 acres

Q<sub>2</sub> = 4.54 CFS  
c = 0.35  
i = 4.70 in/hr  
A = 2.79 acres

**Drainage Basin 2**

Q<sub>100</sub> = 12.33 CFS  
c = 0.54  
i = 7.80 in/hr  
A = 2.94 acres

Q<sub>30</sub> = 10.06 CFS  
c = 0.49  
i = 7.00 in/hr  
A = 2.94 acres

Q<sub>25</sub> = 8.43 CFS  
c = 0.45  
i = 6.30 in/hr  
A = 2.94 acres

Q<sub>10</sub> = 6.81 CFS  
c = 0.40  
i = 5.80 in/hr  
A = 2.94 acres

Q<sub>5</sub> = 5.38 CFS  
c = 0.37  
i = 5.00 in/hr  
A = 2.94 acres

Q<sub>2</sub> = 4.20 CFS  
c = 0.33  
i = 4.30 in/hr  
A = 2.94 acres

**Drainage Basin 3**

Q<sub>100</sub> = 35.21 CFS  
c = 0.64  
i = 8.10 in/hr  
A = 6.74 acres

Q<sub>30</sub> = 29.02 CFS  
c = 0.58  
i = 7.40 in/hr  
A = 6.74 acres

Q<sub>25</sub> = 24.86 CFS  
c = 0.54  
i = 6.80 in/hr  
A = 6.74 acres

Q<sub>10</sub> = 18.69 CFS  
c = 0.46  
i = 6.00 in/hr  
A = 6.74 acres

Q<sub>5</sub> = 15.46 CFS  
c = 0.42  
i = 5.40 in/hr  
A = 6.74 acres

Q<sub>2</sub> = 12.15 CFS  
c = 0.38  
i = 4.70 in/hr  
A = 6.74 acres

**Drainage Basin 4**

Q<sub>100</sub> = 17.19 CFS  
c = 0.64  
i = 9.10 in/hr  
A = 2.97 acres

Q<sub>30</sub> = 14.59 CFS  
c = 0.56  
i = 8.80 in/hr  
A = 2.97 acres

Q<sub>25</sub> = 11.77 CFS  
c = 0.51  
i = 7.70 in/hr  
A = 2.97 acres

Q<sub>10</sub> = 8.33 CFS  
c = 0.41  
i = 6.90 in/hr  
A = 2.97 acres

Q<sub>5</sub> = 6.60 CFS  
c = 0.36  
i = 6.10 in/hr  
A = 2.97 acres

Q<sub>2</sub> = 4.94 CFS  
c = 0.32  
i = 5.20 in/hr  
A = 2.97 acres

Total 78.22 CFS

64.78 CFS

54.57 CFS

40.87 CFS

33.35 CFS

25.82 CFS

**Detention Volume**

Pond-1 for Q100	
Cundev=	0.52
lundev=	8.20 in/hr
Cdev=	0.59
ldev=	8.20 in/hr
R=	0.592
A=	2.79 acres
Tc=	10.00 minutes
	60 sec/min
Detention Volume=	991 cubic feet

Pond-2 for Q100	
Cundev=	0.50
lundev=	7.50 in/hr
Cdev=	0.54
ldev=	7.80 in/hr
R=	0.453
A=	2.94 acres
Tc=	13.20 minutes
	60 sec/min
Detention Volume=	1056 cubic feet

Pond-3 for Q100	
Cundev=	0.52
lundev=	8.10 in/hr
Cdev=	0.64
ldev=	8.10 in/hr
R=	1.031
A=	6.74 acres
Tc=	10.50 minutes
	60 sec/min
Detention Volume=	4,378 cubic feet

Pond-4 for Q100	
Cundev=	0.51
lundev=	9.10 in/hr
Cdev=	0.64
ldev=	9.10 in/hr
R=	1.146
A=	2.97 acres
Tc=	7.70 minutes
	60 sec/min
Detention Volt	1,572 cubic feet

**Stormwater Calcs - 23738 I-30 N**  
**using Rational Method**  
**Ditch Detention Volume**

Required Detention Volume = 4378.204 cft

Ditch Bottom	1	ft
Ditch Height	3	ft
Ditch Slope	3	:1
Ditch Top	19	ft
Ditch Cross Sectional Area	30	sft

**EAST Side**

Ditch Length 320 ft  
 Ditch Volume 4800 cft

Total Volume = 4837.5 cft

Required Detention Volume = 0 cft

Ditch Bottom	0	ft
Ditch Height	0.5	ft
Ditch Slope	3	:1
Ditch Top	3	ft
Ditch Cross Sectional Area	0.75	sft

**EAST Side**

Ditch Length 100 ft  
 Ditch Volume 37.5 cft

Stormwater Calcs - 23738 I-30 N  
 using Rational Method  
 Weir-1 Sizing

Storm Event	Flow (cfs)
Q2 - Pre	10.27
Q10 - Pre	15.33
Q25 - Pre	18.64
Q100 - Pre	25.70
Q2 - Post	12.15
Q10 - Post	18.69
Q25 - Post	24.86
Q100 - Post	35.21

**Rectangular Weir**

Q100

Q (cfs)	CLH <sup>1.5</sup>
C	2.5
L	1.917
H	3
Q (cfs)	24.90

23 INCHES

Q25

Q (cfs)	CLH <sup>1.5</sup>
C	2.5
L	1.917
H	2.4
Q (cfs)	17.82

23 INCHES

Q10

Q (cfs)	CLH <sup>1.5</sup>
C	2.5
L	1.917
H	2.1
Q (cfs)	14.58

23 INCHES

Q2

Q (cfs)	CLH <sup>1.5</sup>
C	2.5
L	1.917
H	1.6
Q (cfs)	9.70

23 INCHES