

# WYNDGATE

## Stormwater Detention Report

Prepared for:  
Summit Pointe, L.C.  
239 Fox Hill Road  
St. Charles, MO 63301  
940-9300

Prepared by:  
Pickett, Ray & Silver, Inc.  
333 Mid Rivers Mall Drive  
St. Peters, MO 63376  
(636) 397-1211  
July, 2004



Wyndgate is a proposed residential subdivision of a tract of land in O'Fallon, Missouri. The tract is generally bounded by Highway N on the north, Falling Leaf Farms on the west, Dardenne Creek on the south, and undeveloped farms on the east. Prior to development, this tract was open fields and wooded areas used primarily by hunters for dog training.

A creek tributary to Dardenne Creek flows through the northern part of the tract. After crossing the east line of Wyndgate, this creek flows southeastwardly approximately 2.5 miles to the point where it joins Dardenne Creek. Approximately 78% of Wyndgate drains to this creek. The remaining 22% drains directly to Dardenne Creek. Diehr Road runs along the ridge between the two watersheds.

Pondpack Version 8 was used to model runoff before development from the entire watershed tributary to the northern creek at the point it leaves the property and from that part of Wyndgate tributary directly to Dardenne Creek. These same areas were modeled after development with the runoff routed through the stormwater detention basins to calculate discharge hydrographs to the point where the northern creek leaves the property and to Dardenne Creek.

In the existing conditions model, the northern watershed was divided into five subareas to calculate flows in the creek at various locations. Subarea 1 is the area tributary to the creek at the point the creek enters Wyndgate at the west property line. Part of this area is developed with three-acre minimum residential lots and the rest of the watershed is generally open pastures with some woods. If this area is developed to a higher density, we assumed there would be stormwater detention in that development so the flow in the creek would be very similar to the flow from open pastures. Subarea 2 is the area tributary to a small branch of the creek that enters the creek from the north about 500 feet downstream from the west property line. Most of this area is wooded with a small area of open meadow. This area was modeled conservatively as all wooded areas. Subarea 2 also includes a small off-site area that drains into Wyndgate that is currently farmed with row crops. This area was modeled as row crops. Subarea 3 is the area tributary to a small branch of the creek that enters from the east about 1,000 feet downstream from Subarea 2. This area is also mostly wooded so it was modeled conservatively as woods. Subarea 4 is the area on the west side of the creek that flows to the creek. This subarea includes some three-acre development that drains to the creek downstream from the point where the creek enters the property. The on-site part of this subarea was modeled as woods and the off-site area was modeled as three-acre lots. Subarea 5 is the remaining part of Wyndgate north of Diehr Road. This area was also modeled as woods. The area south of Diehr Road was divided into two subareas. Subarea 6 is the area tributary to a small branch of Dardenne Creek near the west property line. Subarea 7 is the rest of Wyndgate south of Diehr Road. Most of the woods in Subarea 6 and 7 will be left undisturbed with only enough of the woods cut out to be able to build the roads and homes. To accurately model the difference in runoff before and after development, these two subareas were modeled as woods and as open pasture. The attached existing conditions exhibit shows the limits of Subareas 2 through 7, as well as the flow path used in the model for these subareas. The attached off-site exhibit shows the limits of Subarea 1.

Development of Wyndgate will include six detention basins. There is an existing pond near the northwest corner of the development. This pond will be made larger and an outfall structure and pipe will be built so this pond will function as a detention pond. The area tributary to this pond was divided into three subareas. Off-site 1 includes some three-acre lots, as well as the area set aside as a church. Stormwater detention for the church will not be part of the Wyndgate stormwater detention system; therefore, this area was modeled as woods. The remaining off-site areas were modeled as three-acre lots. Off-site 2 is the area tributary to the northeast corner of the site. This is the off-site area of Subarea 2 of the existing conditions model. The area was modeled as row crops. On-site 1 is the area tributary to the pond. The average lot size in this area is about 8,000 square feet and this area was modeled as 1/8-acre lots. Basin 2 is a detention basin located next to the creek immediately upstream of proposed Street U. The area tributary to Basin 2 contains about 12,000 square feet average lot size and was modeled as 1/4-acre lots. Bypass 2 is the area between Pond 1 and Basin 2 that drains directly to the creek. This area has both small 5,000 square-foot lots and larger 12,000

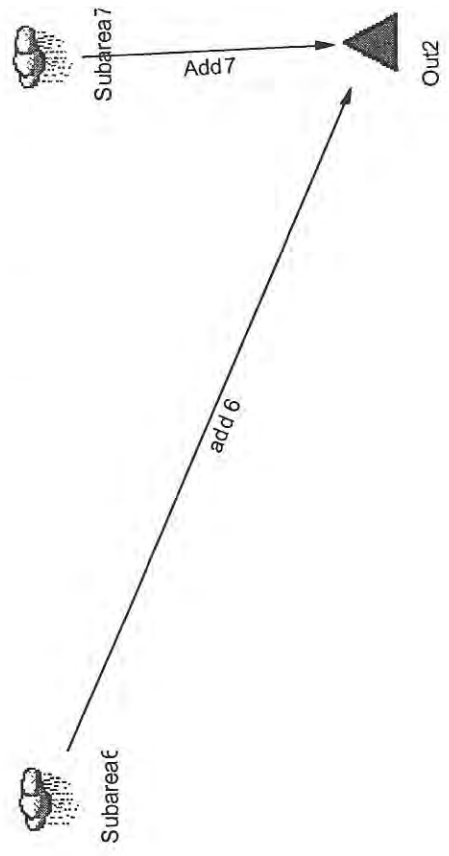
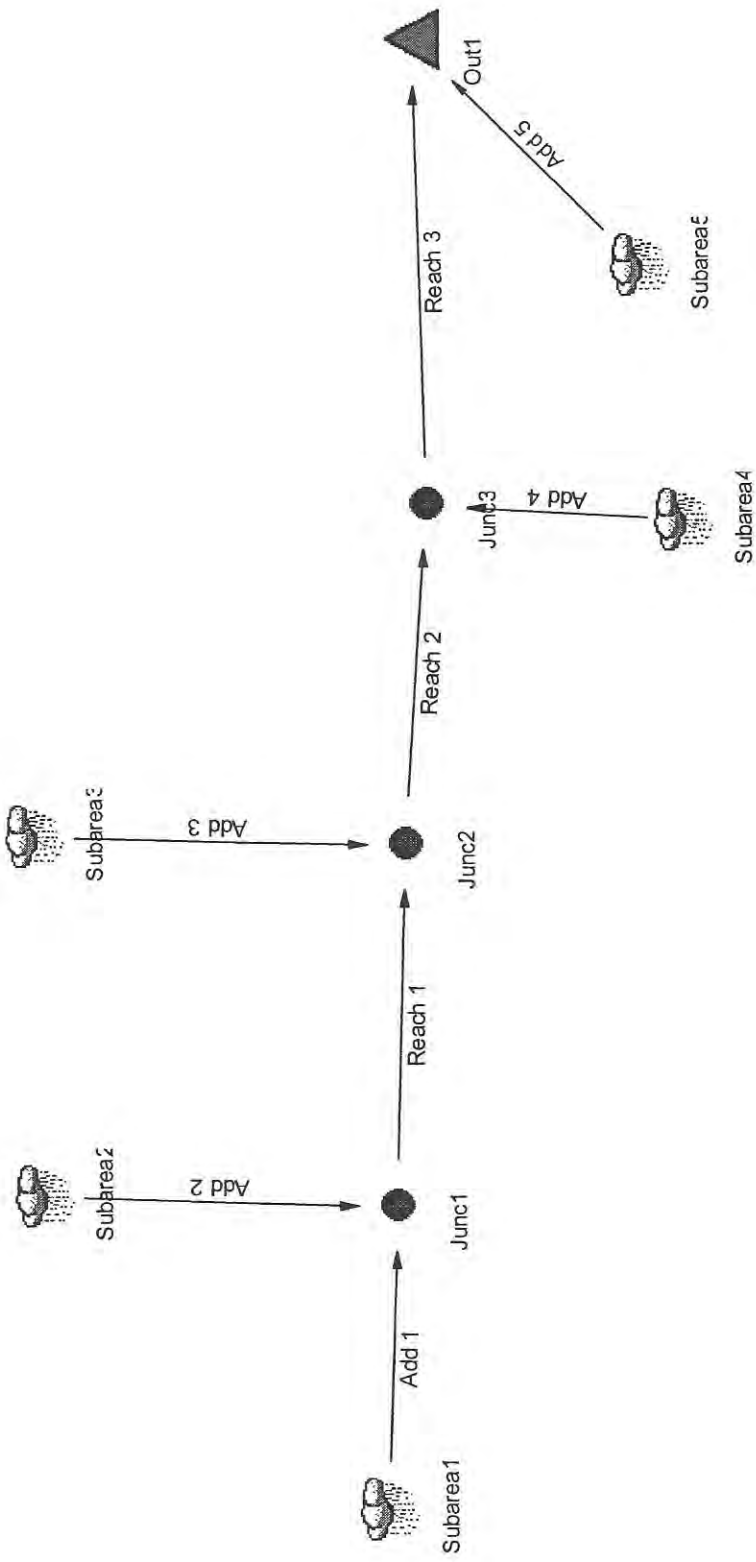
square-foot lots. The entire area was conservatively modeled as 1/8-acre lots. Basins 3A and 3B are located near the west property line. The area tributary to these basins is generally the same area as the existing conditions model Subarea 3. Basins 3A and 3B are connected by two culverts, allowing water to flow from one basin to the other in either direction. Most of the watershed drains to Basin 3A and the outfall structure for the two basins is in Basin 3B so the flow usually will be from Basin 3A to Basin 3B. The area tributary to these two basins is nearly all off-site so it was modeled as three-acre lots. Basin 4 is a small basin near the west property line north of Diehr Road. The area tributary to Basin 4 is mostly off-site and is modeled as three-acre lots. Bypass 2 is the remaining area of Wyndgate north of Diehr Road. The lots in this area range in size from 10,000 square feet to more than one acre. This area was conservatively modeled as 1/4-acre lots. Basin 5 is a small detention basin created by constructing a concrete dam across the small branch tributary to Dardenne Creek in Subarea 6 of the existing conditions model. Much of the area tributary to Basin 5 is left as undisturbed woods. This area was modeled as 1/4-acre lots for the disturbed areas and woods for the undisturbed areas. Bypass 3 is the remaining area south of Diehr Road. Nearly all of this area will be left undisturbed clearing only enough for the houses and streets. This area was modeled as 1/4-acre lots for the disturbed areas and as woods for the undisturbed areas.

The total area of Wyndgate exceed 100 acres; therefore, the city of O'Fallon Subdivision Ordinance requires using the Soil Conservation method to analyze runoff. The ordinance requires that the peak rate of discharge from the site after development does not exceed the peak runoff before development in a 25-year storm and that the 15-year and 100-year storm models are submitted. For this study we used Pondpack to model the three storms before and after development. The complete report for both models is on the attached CD. The files can be opened using notepad or most other word processing software. The Master Design Storm Summary for both models was printed and made a part of this report. The following table summarizes the peak discharge in the creek north of Diehr Road at the point the creek leaves the development and peak discharge from the site to Dardenne Creek both before and after development for the three storms.

Storm Frequency	PEAK DISCHARGE (CFS)			
	Creek North of Diehr Road at East Property Line		Direct to Dardenne Creek	
	Before Predevelopment	After Development	Before Development	After Development
15 Year	1,193	1,141	112	112
25 Year	1,403	1,310	139	136
100 Year	1,976	1,752	214	226

#### **CONCLUSION:**

These models show that the peak discharge from Wyndgate after development with detention is less than the site before development in a 25-year storm at both points where runoff leaves the site. The stormwater detention provided meets the requirements of the city of O'Fallon Subdivision Ordinance.



MASTER DESIGN STORM SUMMARY

Network Storm Collection: St Charles Count

Return Event	Total Depth in	Rainfall Type	RNF ID	
15-Yr	5.2000	Synthetic Curve	TypeII	24hr
25-yr	5.7000	Synthetic Curve	TypeII	24hr
100-yr	7.0000	Synthetic Curve	TypeII	24hr

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
JUNC1	JCT	15	8222483		12.5500	1034.73		
JUNC1	JCT	25	9509534		12.5500	1202.53		
JUNC1	JCT	100	12974970		12.5500	1650.42		
JUNC2	JCT	15	8688653		12.6000	1063.25		
JUNC2	JCT	25	10062620		12.6000	1237.09		
JUNC2	JCT	100	13768150		12.6000	1700.57		
JUNC3	JCT	15	9686770		12.6500	1167.60		
JUNC3	JCT	25	11235830		12.6500	1365.53		
JUNC3	JCT	100	15420470		12.6000	1894.89		
*OUT1	JCT	15	10354690		12.8000	1192.69		
*OUT1	JCT	25	12036460		12.8000	1402.54		
*OUT1	JCT	100	16591560		12.7500	1975.75		
*OUT2	JCT	15	494759		12.1500	111.98		
*OUT2	JCT	25	599168		12.1500	138.91		
*OUT2	JCT	100	893629		12.1500	214.34		

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
SUBAREA1	AREA	15	6942341		12.6000	857.97		
SUBAREA1	AREA	25	8025762		12.6000	997.04		
SUBAREA1	AREA	100	10941700		12.6000	1368.25		
SUBAREA2	AREA	15	1280135		12.3500	228.78		
SUBAREA2	AREA	25	1483778		12.3500	266.16		
SUBAREA2	AREA	100	2033274		12.3500	365.97		
SUBAREA3	AREA	15	466214		12.1500	115.14		
SUBAREA3	AREA	25	553124		12.1500	138.22		
SUBAREA3	AREA	100	793217		12.1500	201.41		
SUBAREA4	AREA	15	998188		12.4000	157.79		
SUBAREA4	AREA	25	1173276		12.4000	187.42		
SUBAREA4	AREA	100	1652400		12.4000	267.96		
SUBAREA5	AREA	15	668035		12.5000	91.22		
SUBAREA5	AREA	25	800750		12.5000	111.76		
SUBAREA5	AREA	100	1171205		12.5000	168.91		
SUBAREA6	AREA	15	167968		12.2500	32.42		
SUBAREA6	AREA	25	204509		12.2500	40.70		
SUBAREA6	AREA	100	308101		12.2500	64.07		
SUBAREA7	AREA	15	326791		12.1500	83.57		
SUBAREA7	AREA	25	394659		12.1000	102.80		
SUBAREA7	AREA	100	585527		12.1000	157.93		



MASTER DESIGN STORM SUMMARY

Network Storm Collection: St Charles Count

Return Event	Total Depth in	Rainfall Type	RNF ID	
15-Yr	5.2000	Synthetic Curve	TypeII	24hr
25-yr	5.7000	Synthetic Curve	TypeII	24hr
100-yr	7.0000	Synthetic Curve	TypeII	24hr

ICPM CALCULATION TOLERANCES

Target Convergence= .000 cfs +/-  
 Max. Iterations = 35 loops  
 ICPM Time Step = .0500 hrs  
 Output Time Step = .0500 hrs  
 ICPM Ending Time = 35.0000 hrs

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BASIN2	AREA	15	273261		12.1000	75.00		
BASIN2	AREA	25	312030		12.1000	85.53		
BASIN2	AREA	100	415166		12.1000	113.14		
BASIN2	IN POND	15	273261		12.1000	75.00		
BASIN2	IN POND	25	312030		12.1000	85.53		
BASIN2	IN POND	100	415166		12.1000	113.14		



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 ICPM CALCULATION TOLERANCES  
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Target Convergence= .000 cfs +/-  
 Max. Iterations = 35 loops  
 ICPM Time Step = .0500 hrs  
 Output Time Step = .0500 hrs  
 ICPM Ending Time = 35.0000 hrs  
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MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation; Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BASIN2	OUT POND	15	273261		12.4000	32.23	580.39	62666
BASIN2	OUT POND	25	312030		12.4000	34.38	581.17	75832
BASIN2	OUT POND	100	415166		12.3000	77.06	582.06	92049
BASIN3A	AREA	15	736750		12.1500	185.97		
BASIN3A	AREA	25	856233		12.1500	216.84		
BASIN3A	AREA	100	1179491		12.1500	299.42		
BASIN3A	POND	15	736751		12.1500	185.97		
BASIN3A	POND	25	856233		12.1500	216.84		
BASIN3A	POND	100	1179491		12.1500	299.42		
BASIN3A	OUT POND	15	736788		12.4500	79.47	571.42	159232
BASIN3A	OUT POND	25	856289		12.4000	89.69	572.13	196895
BASIN3A	OUT POND	100	1179564		12.4500	110.98	573.68	305391
BASIN3B	POND	15	747895		12.4000	80.46		
BASIN3B	POND	25	869345		12.4000	90.87		
BASIN3B	POND	100	1197950		12.4000	112.37		
BASIN3B	OUT POND	15	747912		12.6000	77.35	568.17	29676
BASIN3B	OUT POND	25	869357		12.6500	86.46	568.52	34204
BASIN3B	OUT POND	100	1197973		12.6500	109.60	569.20	42704
BASIN3B	AREA	15	11107		12.0500	3.44		
BASIN3B	AREA	25	13055		12.0500	4.07		
BASIN3B	AREA	100	18387		12.0500	5.79		

ICPM CALCULATION TOLERANCES

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 Max. Iterations = 35 loops  
 ICPM Time Step = .0500 hrs  
 Output Time Step = .0500 hrs  
 ICPM Ending Time = 35.0000 hrs  
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MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
BASIN4	AREA	15	90257		12.1500	23.54		
BASIN4	AREA	25	105180		12.1500	27.51		
BASIN4	AREA	100	145662		12.1500	38.16		
BASIN4	IN POND	15	90257		12.1500	23.54		
BASIN4	IN POND	25	105180		12.1500	27.51		
BASIN4	IN POND	100	145662		12.1500	38.16		
BASIN4	OUT POND	15	90257		12.5000	9.10	584.09	22315
BASIN4	OUT POND	25	105179		12.5000	9.69	584.66	28083
BASIN4	OUT POND	100	145662		12.5500	10.96	585.99	44831
BASIN5	AREA	15	158941		12.1000	47.49		
BASIN5	AREA	25	186272		12.1000	55.82		
BASIN5	AREA	100	260841		12.1000	78.24		
BASIN5	IN POND	15	158941		12.1000	47.49		
BASIN5	IN POND	25	186272		12.1000	55.82		
BASIN5	IN POND	100	260841		12.1000	78.24		
BASIN5	OUT POND	15	158934		12.7500	6.03	557.54	66398
BASIN5	OUT POND	25	186265		12.5000	13.85	558.15	73968
BASIN5	OUT POND	100	260834		12.2500	45.03	558.93	84383
BYPASS1	AREA	15	898134		12.1500	215.37		
BYPASS1	AREA	25	1005090		12.1500	239.77		
BYPASS1	AREA	100	1285189		12.1500	302.90		

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 ICPM CALCULATION TOLERANCES  
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Target Convergence= .000 cfs +/-  
 Max. Iterations = 35 loops  
 ICPM Time Step = .0500 hrs  
 Output Time Step = .0500 hrs  
 ICPM Ending Time = 35.0000 hrs  
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MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
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BYPASS2	AREA	15	1339369		12.1500	345.44		
BYPASS2	AREA	25	1540566		12.1500	397.19		
BYPASS2	AREA	100	2079438		12.1500	533.90		
BYPASS3	AREA	15	440781		12.1500	106.51		
BYPASS3	AREA	25	528347		12.1500	129.96		
BYPASS3	AREA	100	772769		12.1500	194.95		
J1	JCT	15	6942342		12.6000	857.97		
J1	JCT	25	8025762		12.6000	997.04		
J1	JCT	100	10941700		12.6000	1368.25		
J2	JCT	15	1758509		12.6500	128.06		
J2	JCT	25	1979628		12.6500	136.17		
J2	JCT	100	2562159		12.7000	155.11		
J3	JCT	15	8700833		12.7000	985.87		
J3	JCT	25	10005370		12.6500	1132.48		
J3	JCT	100	13503850		12.6500	1521.15		
J4	JCT	15	9872170		12.7500	1046.73		
J4	JCT	25	11322420		12.7500	1200.15		
J4	JCT	100	15204130		12.7000	1602.68		
J5	JCT	15	10619960		12.8500	1101.62		
J5	JCT	25	12191700		12.8500	1263.07		
J5	JCT	100	16402000		12.8000	1686.49		

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 ICPM CALCULATION TOLERANCES  
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 Max. Iterations = 35 loops  
 ICPM Time Step = .0500 hrs  
 Output Time Step = .0500 hrs  
 ICPM Ending Time = 35.0000 hrs  
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MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
J6	JCT	15	10710180		12.9000	1104.89		
J6	JCT	25	12296830		12.9000	1266.81		
J6	JCT	100	16547600		12.8500	1690.70		
OFFSITE1	AREA	15	289494		12.1000	84.48		
OFFSITE1	AREA	25	334668		12.1000	97.69		
OFFSITE1	AREA	100	456243		12.1000	132.77		
OFFSITE2	AREA	15	417229		12.2000	89.66		
OFFSITE2	AREA	25	467919		12.2000	100.10		
OFFSITE2	AREA	100	600849		12.2000	127.15		
ONSITE1	AREA	15	1051818		12.1500	245.42		
ONSITE1	AREA	25	1177074		12.1500	273.32		
ONSITE1	AREA	100	1505099		12.1500	345.52		
*OUT1	JCT	15	12049510		12.9500	1140.84		
*OUT1	JCT	25	13837340		12.9500	1309.69		
*OUT1	JCT	100	18627030		12.9000	1751.73		
*OUT2	JCT	15	599715		12.1500	111.86		
*OUT2	JCT	25	714611		12.1500	135.60		
*OUT2	JCT	100	1033602		12.2000	225.97		
POND1	IN POND	15	1758541		12.1500	411.30		
POND1	IN POND	25	1979661		12.1500	461.54		
POND1	IN POND	100	2562195		12.1500	592.31		

Name.... Watershed

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 ICPM CALCULATION TOLERANCES  
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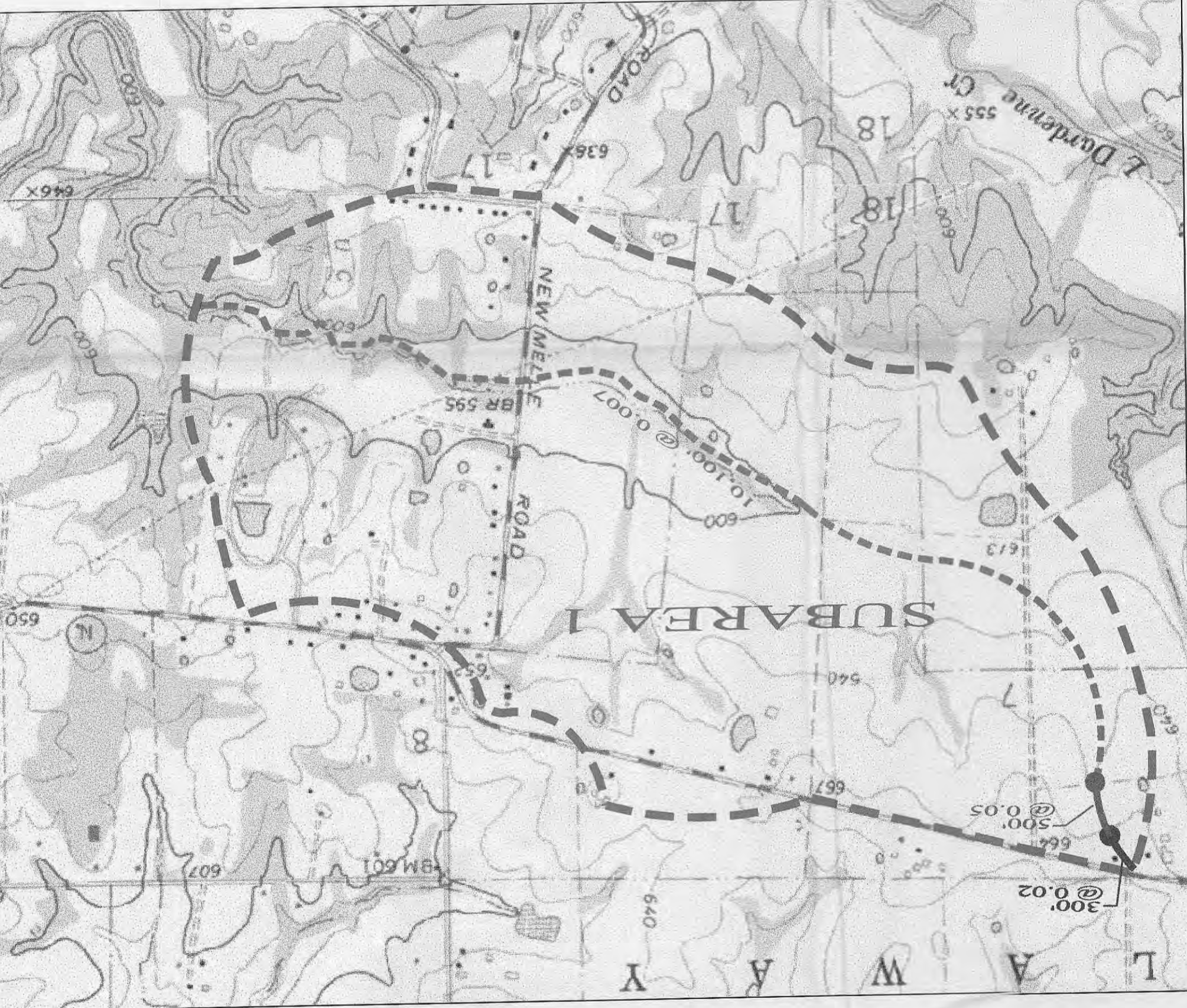
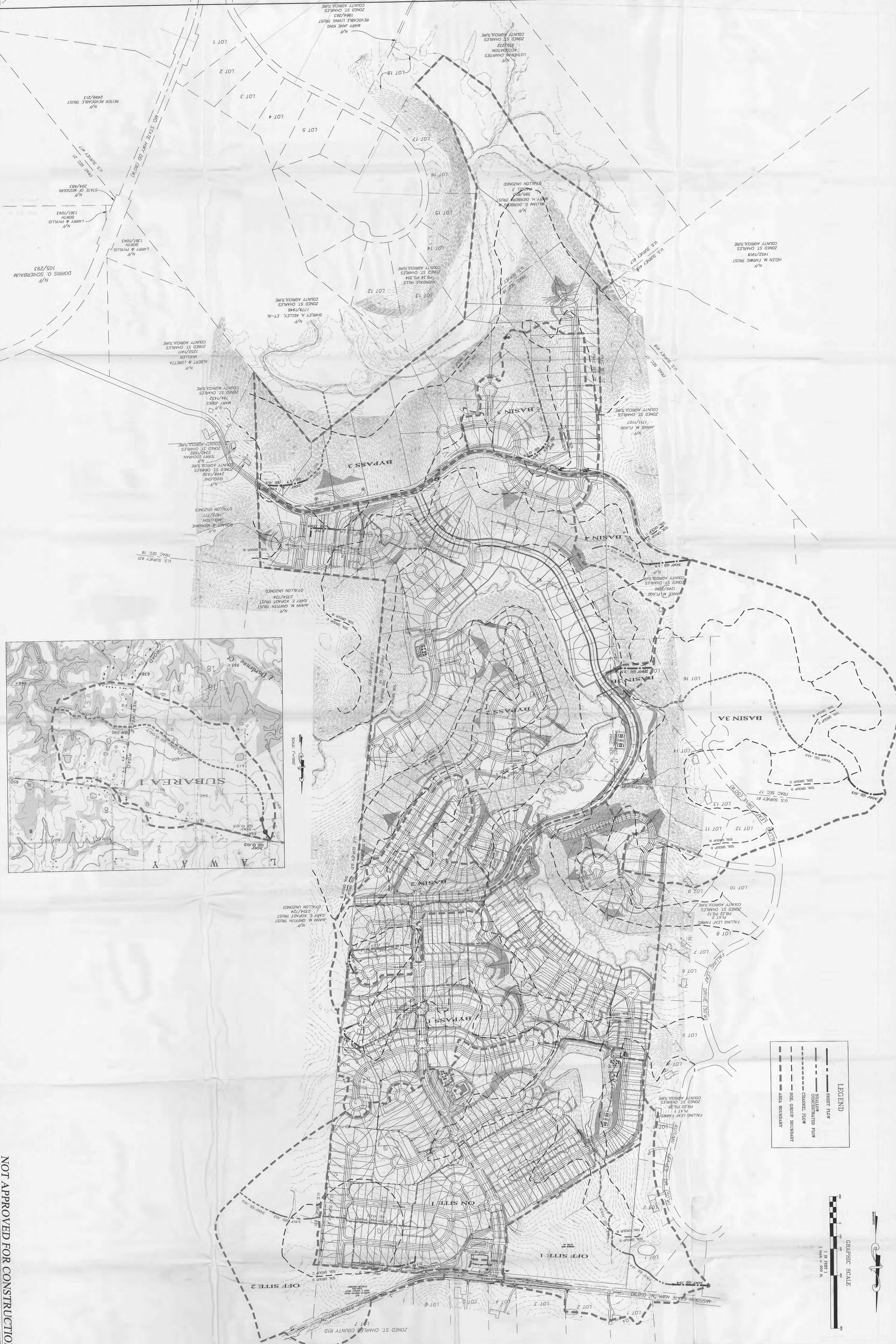
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MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
POND1	OUT POND	15	1758510		12.6500	128.06	603.61	635285
POND1	OUT POND	25	1979628		12.6500	136.17	604.08	727800
POND1	OUT POND	100	2562159		12.7000	155.11	605.30	976088
SUBAREA1	AREA	15	6942341		12.6000	857.97		
SUBAREA1	AREA	25	8025762		12.6000	997.04		
SUBAREA1	AREA	100	10941700		12.6000	1368.25		





NOT APPROVED FOR CONSTRUCTION

DESIGNED BY	DATE
CHECKED BY	DATE
PROJECT #	FIELD #
TASK #	BOOK #
SHEET 1 OF 1	

NO.	DATE	REVISIONS

**ENGINEER'S AUTHORIZATION**  
 I, the undersigned, being a duly licensed Professional Engineer in the State of Missouri, do hereby certify that the foregoing is a true and correct copy of the plans as submitted to me, and that I am a duly licensed Professional Engineer in the State of Missouri.  
 PROJECT: WYNGATE, RAY & SILVER, INC.

## WYNGATE DETENTION EXHIBIT DEVELOPED

Prepared For:  
**SUMMIT POINTE, L.C.**

239 FOX HILL ROAD  
ST. CHARLES, MO 63301  
(636) 946-9300

## PICKETT RAY & SILVER

CIVIL ENGINEERS  
PLANNERS  
LAND SURVEYORS

333 Mid Rivers Mall Drive  
St. Peters, MO 63376  
Phone (636) 397-1211  
Fax (636) 397-1104