



Route 7 Corridor Improvements Project

Reston Avenue to Jarrett Valley Drive

Stormwater Management Strategy
June 16, 2016



Regulatory Requirements

- **The proposed project will add additional impervious area increasing runoff**
 - **Widening from 4 lanes to 6 lanes**
 - **10' shared use path on both sides**
- **We are obligated by law to control (detain) and treat stormwater runoff from roads after a rain**
- **Detention of runoff is needed to reduce:**
 - **Flood damage**
 - **Erosion of natural streams**
 - **Pollution of natural water ways**
- **New regulations that took affect in July, 2014 make it more difficult to design facilities to treat such stormwater, especially in a constrained urban road corridor**



Regulatory Requirements

- **Detention of the stormwater runoff is made up of two parts:**
 - **Water Quality**
 - **Water Quantity**
- **Water Quality is the reduction of pollutants from runoff**
 - **Phosphorus is the key pollutant runoff from pavement**
- **Water Quantity is the reduction of the volume and speed of water to minimize flood damage and erosion of natural stream channels**
- **An Outfall is a defined channel where stormwater runoff leaves the VDOT Right-of-Way. An outfall can naturally occurring based on low points in topography or from an existing storm drain system**
- **1% Rule: Water Quantity requirements can be waived if the drainage area being treated for an outfall is less than 1% of the overall watershed**



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VDOT

Phosphorus Loading



- A pound of phosphorus is generated from an acre of right of way that has 65% impervious (paved) cover (application of Simple Method per VDOT SWM Regulations)



Stormwater Management Approach

- **Constrained space along corridor**
- **13 outfall locations on the project**
- **Locate stormwater detention facilities in places that minimizes impacts to wetlands, streams, and trees**
- **Utilize the “1% Rule” where possible to eliminate the need for detention ponds**
- **Maximize purchase of “nutrient credit” by law in lieu of building ponds for water quality (max of 25% of water quality treatment requirements can be purchased from Nutrient Credit Bank for a project this size)**



Stormwater Management Project Requirements

Part II of the VSMP Regulations (9VAC25-870-40 et. seq.) provides technical criteria to address stream channel erosion, flooding and water quality.

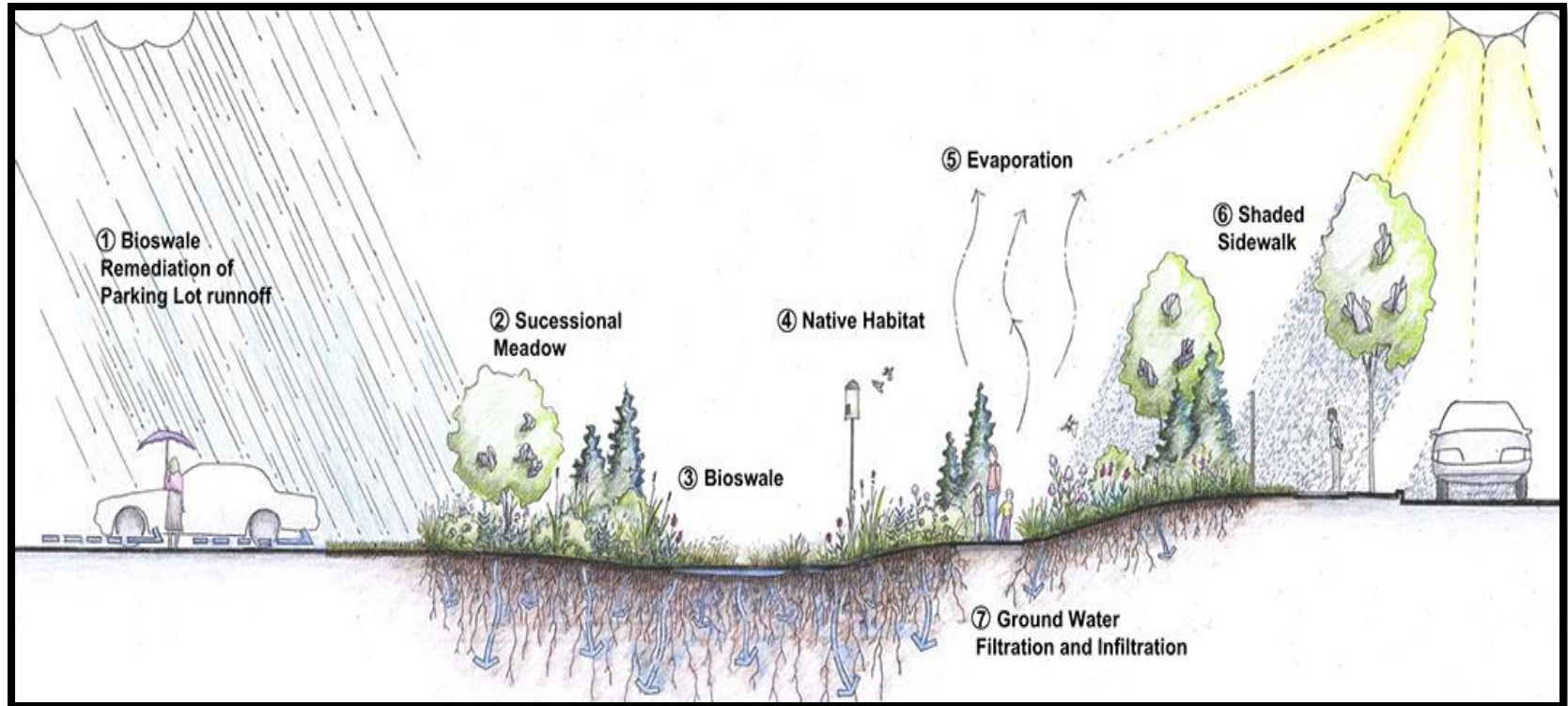
Part IIB (9VAC25-870-62 et. seq.) contains the “new” technical criteria that include the Runoff Reduction methodology (for determining compliance with water quality requirements) and the Energy Balance Equation (for determining compliance with stream channel flooding and erosion requirements). Part IIB technical criteria are applicable to non-grandfathered projects (see Section 19.1 of this IIM for additional information on grandfathered projects).

Required to treat 71.29 lbs of Phosphorus for project

- **Up to 25% can be purchased as nutrient credits = 17.82 lbs**
- **53.73 lbs to be treated with BMP's**



Bio-swales



Applicable to small drainage areas, un-concentrated sheet flow



Dry Swale



Suited for small drainage areas, 5 acres or less; difficult to use on urban projects



Underground Detention



Suited for large drainage areas of 10 acres or greater; can treat concentrated flow from storm sewer



Wet Pond



Suited for large drainage areas of 10 acres or greater; can handle concentrated flow from storm sewer



Project Specific Outfalls/Ponds

Outfall/ Pond #	DA* (ac)	Property Type	Non - Proprietary BMPs							Proprietary BMPs			
			Bioretention	Dry Swale	Wet Swale	Constructed Wetland	Wet Pond	Dry Pond	Extended Detention (ED)	Underground Facilities			
1	8.2	Private HOA	N/A: Drainage Area is > 5 acres	N/A: Drainage Area is > 5 acres	N/A: Drainage Area is > 5 acres	Increased construction costs; long-term maintenance needs; DA < 10 acres	✓		15% phosphorus removal efficiency; increased facility footprint	Large facility footprint; increased construction costs; long-term maintenance needs			
2	8.8	Fairfax Co. Park					✓						
3A	20.8	Private Property				Increased construction costs; long-term maintenance needs	✓						
3B	8.8	Private HOA				Increased construction costs; long-term maintenance needs; DA < 10 acres	✓						
4	12.3	Private Property				Increased construction costs; long-term maintenance needs		✓					
8	24.0	Private HOA					✓						
9	14.4	Private HOA					✓						
10	6.3	Private HOA					✓						
11	12.6	Private HOA					✓						
12	4.7	Private Property					✓	✓			✓	Increased construction costs; long-term maintenance needs; DA < 10 acres	✓
13	8.1	Private Church				N/A (see above)	N/A (see above)	N/A (see above)			Increased construction costs; long-term maintenance needs	✓	

* Drainage Area



Stormwater Management Requirements

Pond #	IMP DA (acres)	BMP Type	Treating Water Quality	Treating Water Quantity	Phos. Load Redux (lb//yr)	
1	2.60	Wet Pond	Yes	Yes	3.47	
2	3.05	Wet Pond	Yes	Yes	4.02	
3A	6.52	Wet Pond	Yes	Yes	8.64	
3B	6.06	Wet Pond	Yes	Yes	6.95	
4	N/A	Dry Pond	No	Yes	0.00	
5	N/A	N/A	Nutrient Credits	1% rule	0.00	
6	N/A	N/A	Nutrient Credits	1% rule	0.00	
7	N/A	N/A	Nutrient Credits	1% rule	0.00	
8	6.41	Wet Pond	Yes	Yes	8.40	
9	3.76	Wet Pond	Yes	Yes	4.69	
10	3.31	Wet Pond	Yes	Yes	4.03	
11	5.67	Wet Pond	Yes	Yes	6.95	
12	1.90	Wet Pond	Yes	Yes	2.62	
13	2.96	Wet Pond	Yes	Yes	3.96	
					53.73	Total



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Outfall # 1: Dog Run

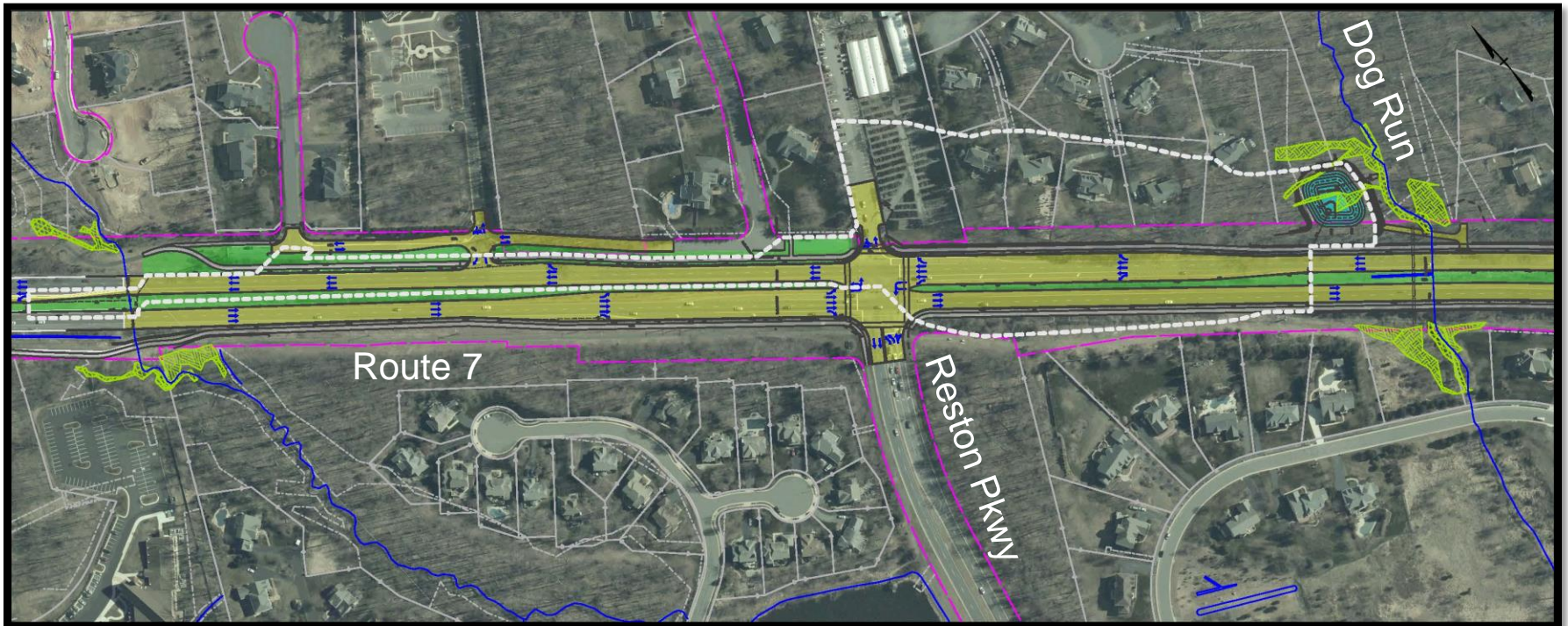
Total Drainage Area

8.2 acres

Required pond volume

630 CY (quality)

1932 CY (quantity)





ROUTE 7 CORRIDOR IMPROVEMENTS



SWM Pond #1 Detail





Pond Volume Comparison

Required Pond Volume : 21 Dumpsters (Quality)
65 Dumpsters (Quantity)



30 yard dumpster



Wet Pond vs. Underground Storage

Cost Comparison	Wet Pond	Underground Storage
Construction	\$300,000	\$1,000,000
Maintenance (50 Years)	\$150,000	\$500,000
Total	\$450,000	\$1,500,000



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Outfall # 2: Nike Park

East of Utterback Store Rd

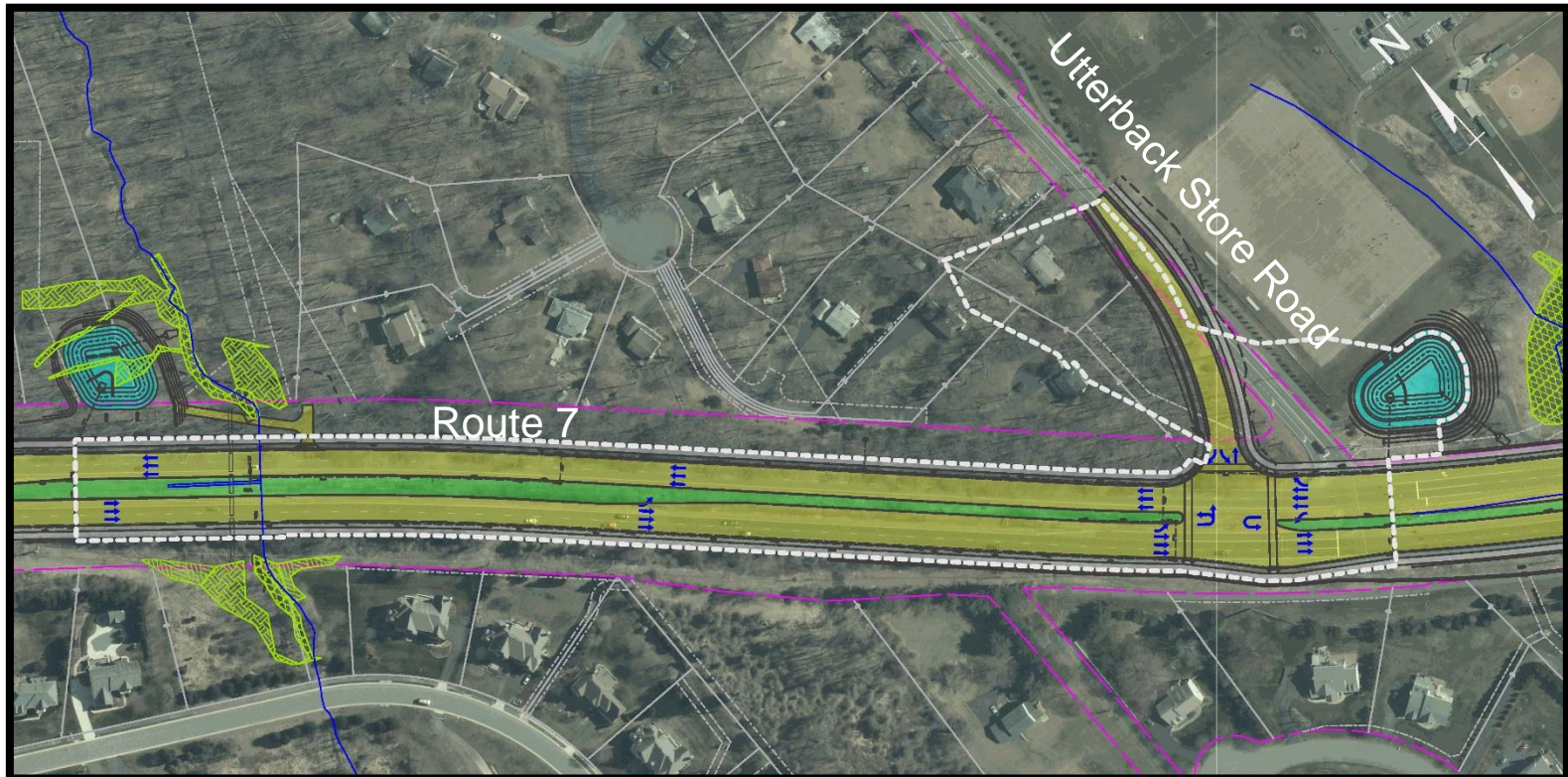
Total Drainage Area

8.8 acres

Required pond volume

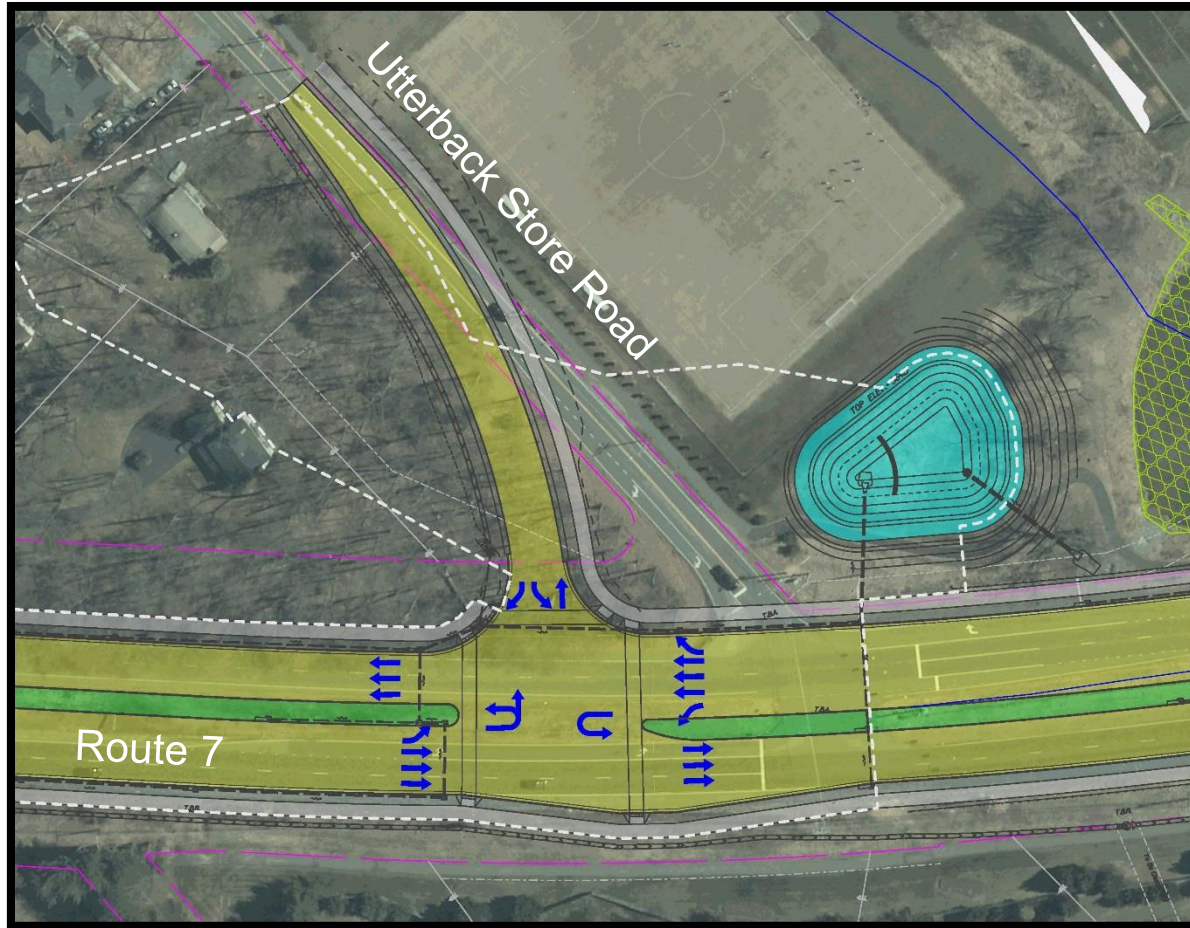
500 CY (quality)

1990 CY (quantity)





SWM Pond #2 Detail





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Outfall # 3A: Piney Run

West of Baron Cameron Intersection

Total Drainage Area	20.8 acres	
Required pond volume	1240 CY (quality)	4440 CY (quantity)

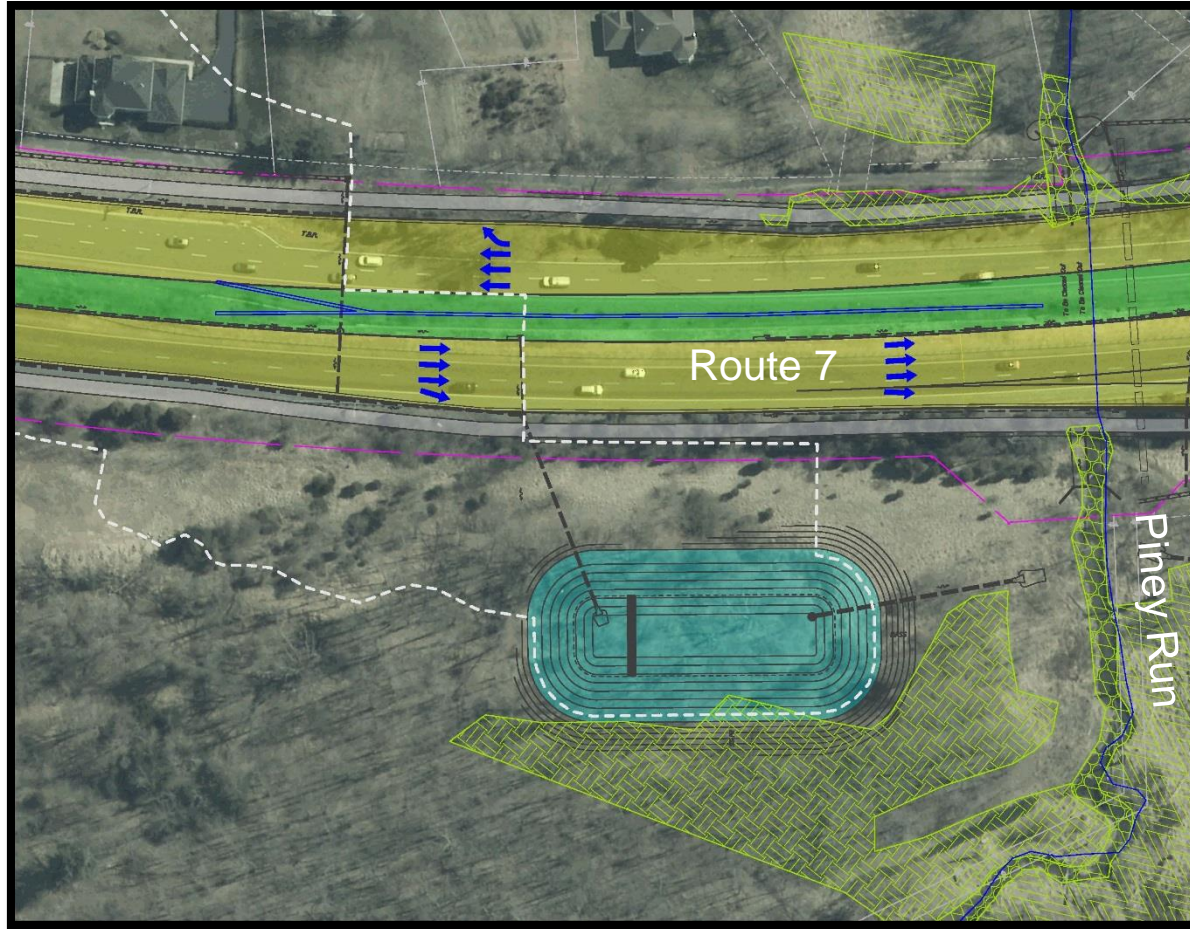




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SWM Pond #3A Detail





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Outfall # 3B: Piney Run

West of Baron Cameron Intersection

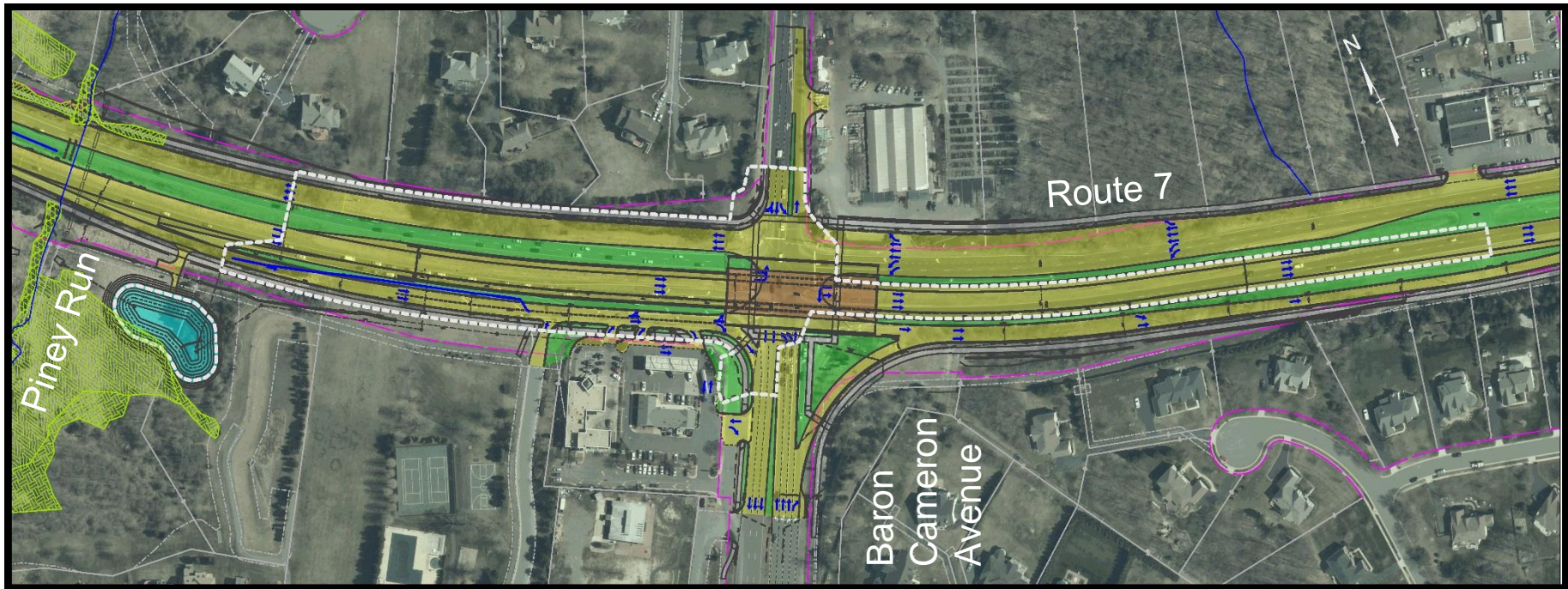
Total Drainage Area

8.8 acres

Required pond volume

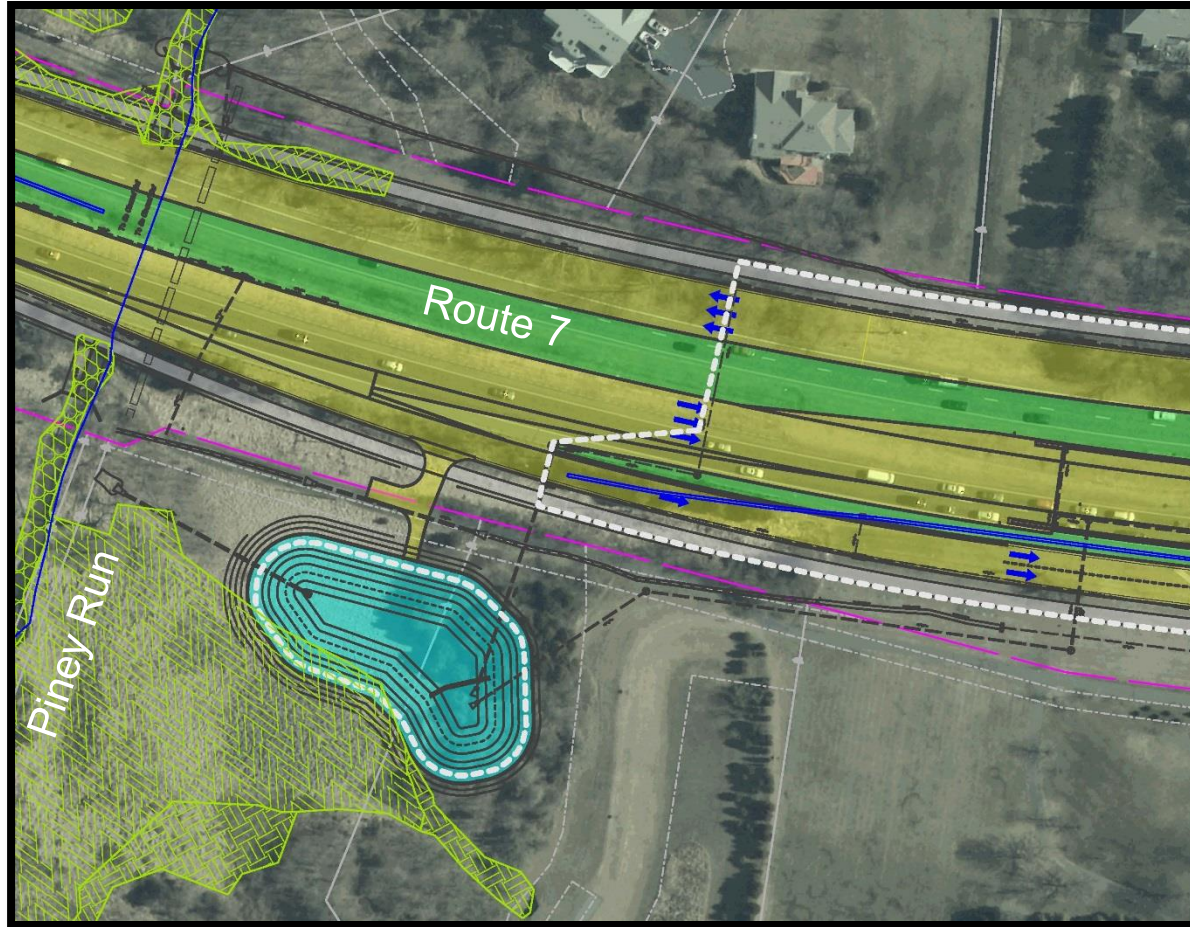
900 CY (quality)

2520 CY (quantity)





SWM Pond #3B Detail





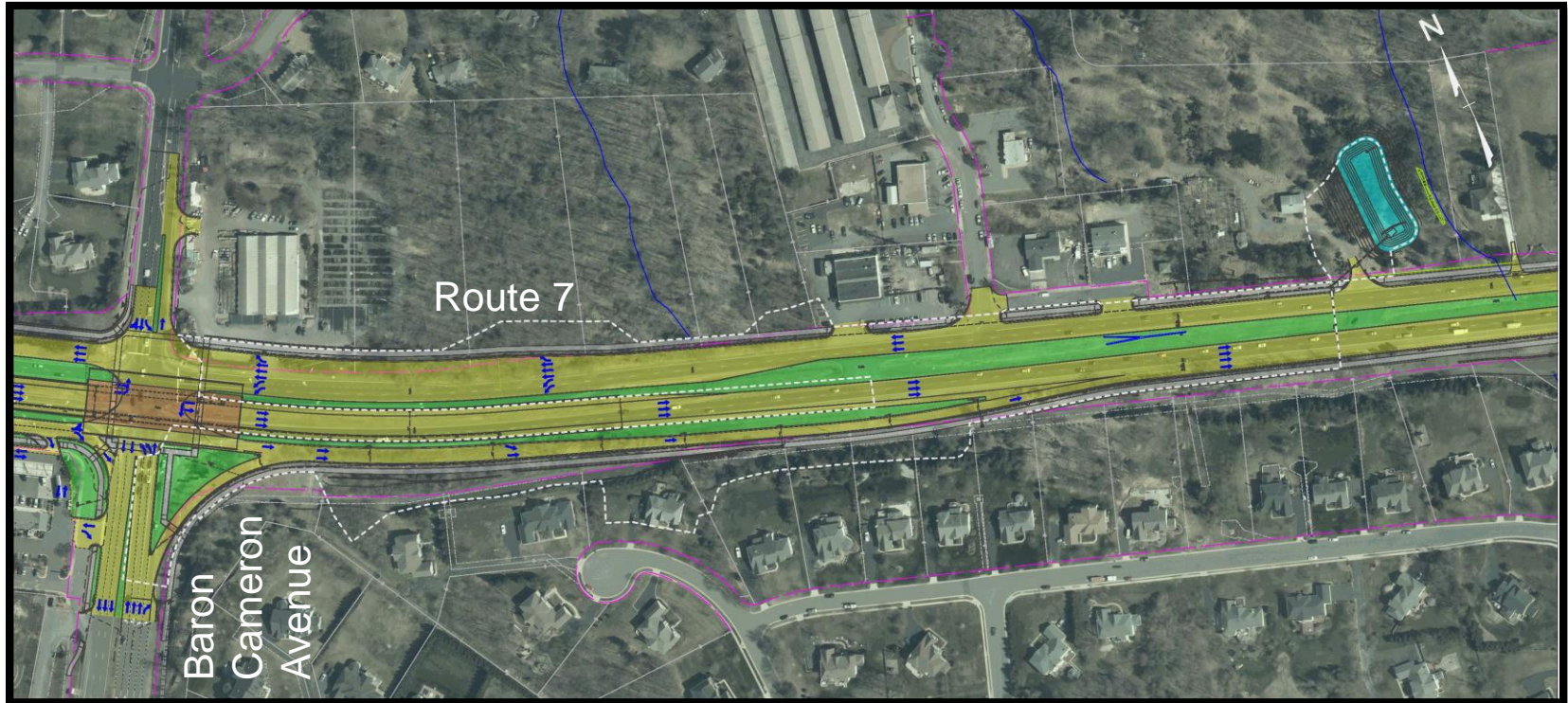
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Outfall # 4 Near Mills Nursery

Total Drainage Area	12.3 acres	
Required pond volume	0 CY (quality)*	3100 CY (quantity)

*Quantity only due to site constraints





SWM Pond #4 Detail





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Outfall # 5, 6 & 7 Colvin Run & Difficult Run Stream Area

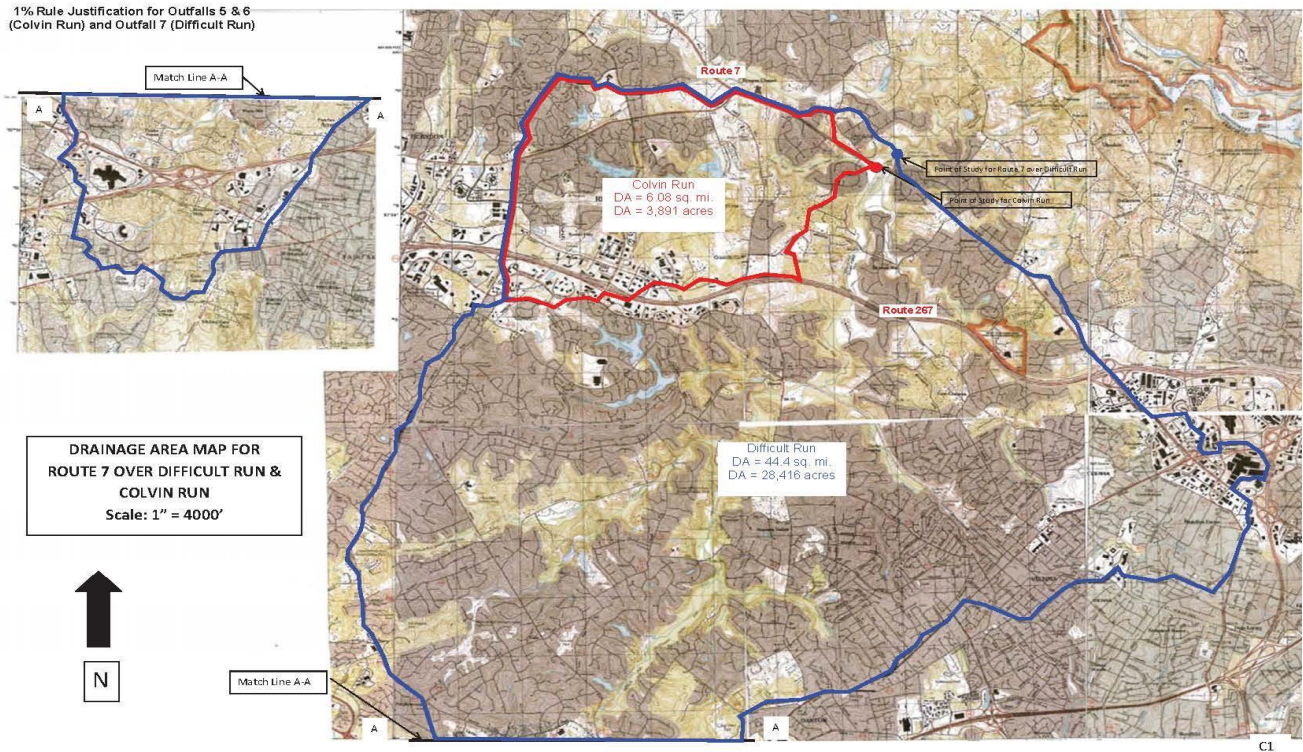
Colvin Run Total Drainage Area: 3,891 Acres

Difficult Run Total Drainage Area: 28,416 Acres

Outfall 5 – 18.62 ac

Outfall 6 – 12.77 ac

Outfall 7 – 12.85 ac





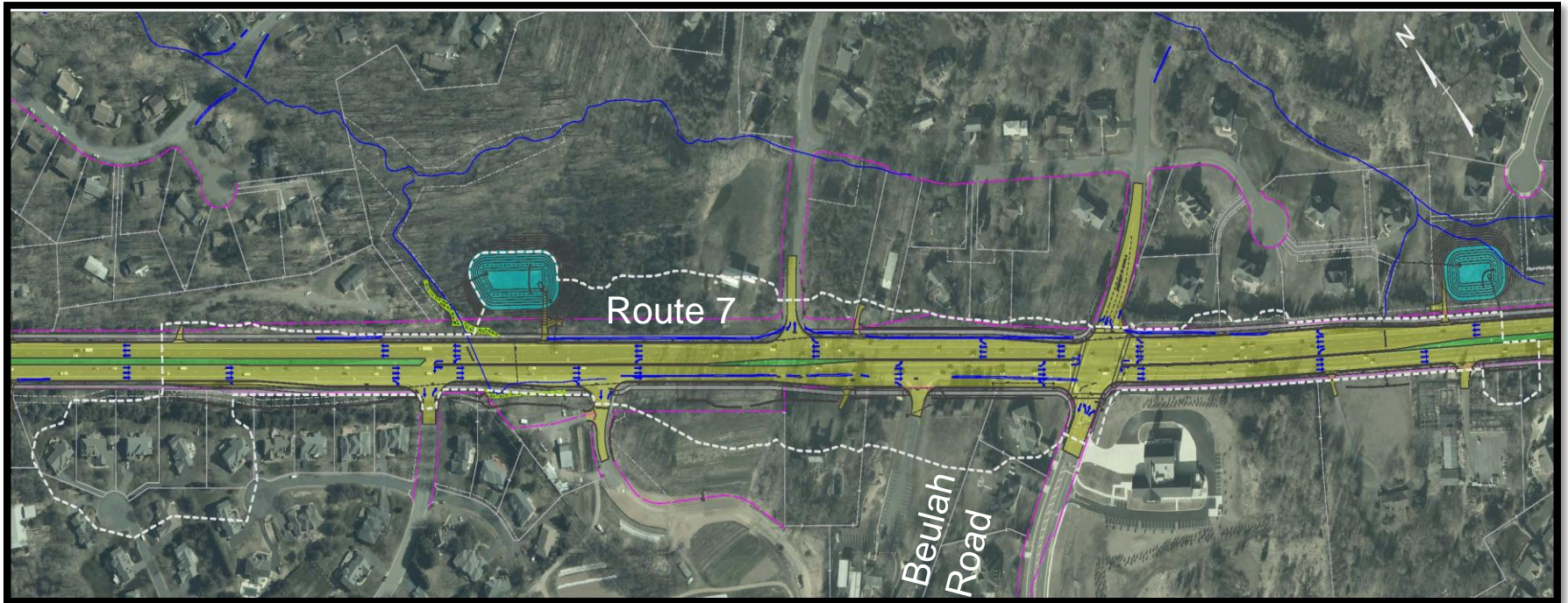
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Outfall # 8

Near Middleton Ridge

Total Drainage Area	24.0 acres	
Required pond volume	1320 CY (quality)	5230 CY (quantity)

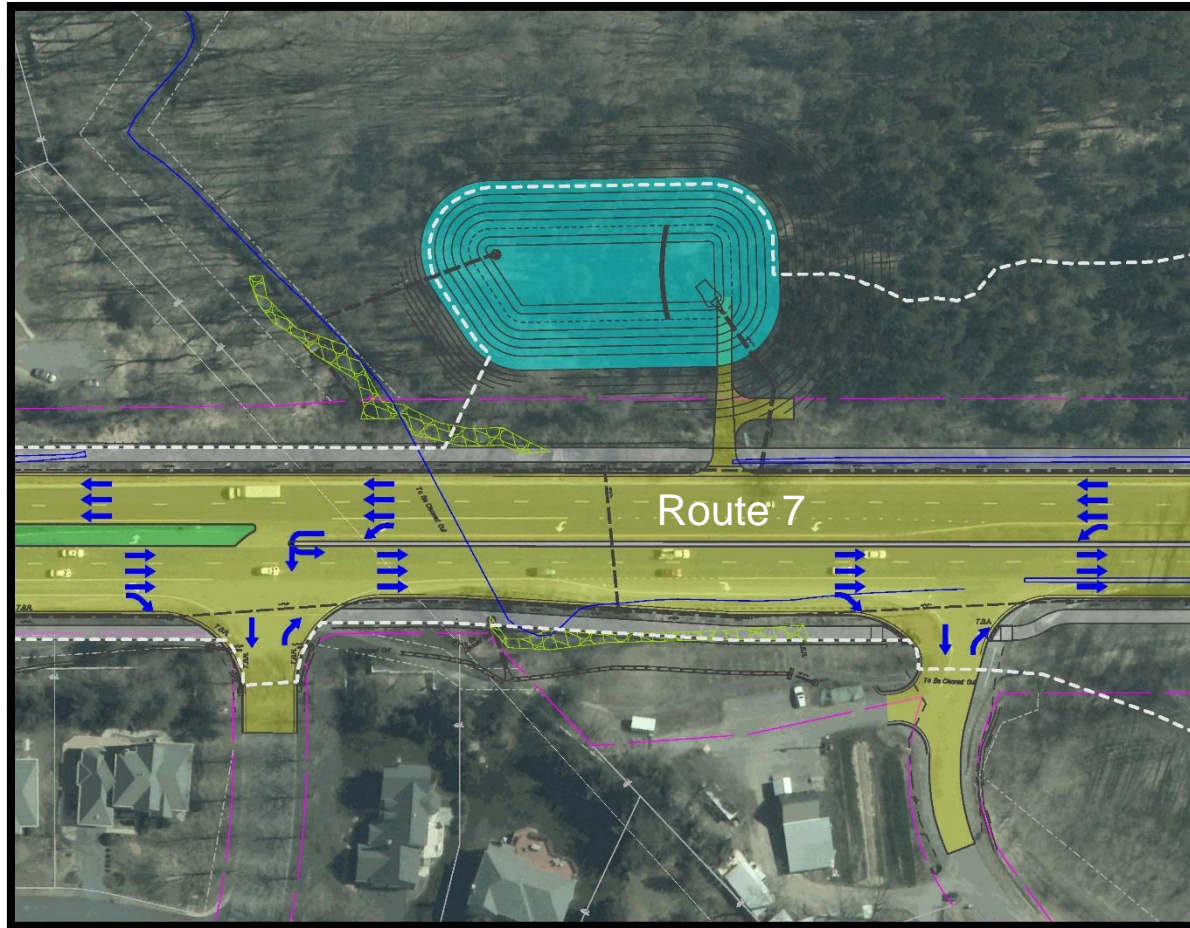




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SWM Pond #8 Detail





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Outfall # 9

Across from Wolftrap Nursery

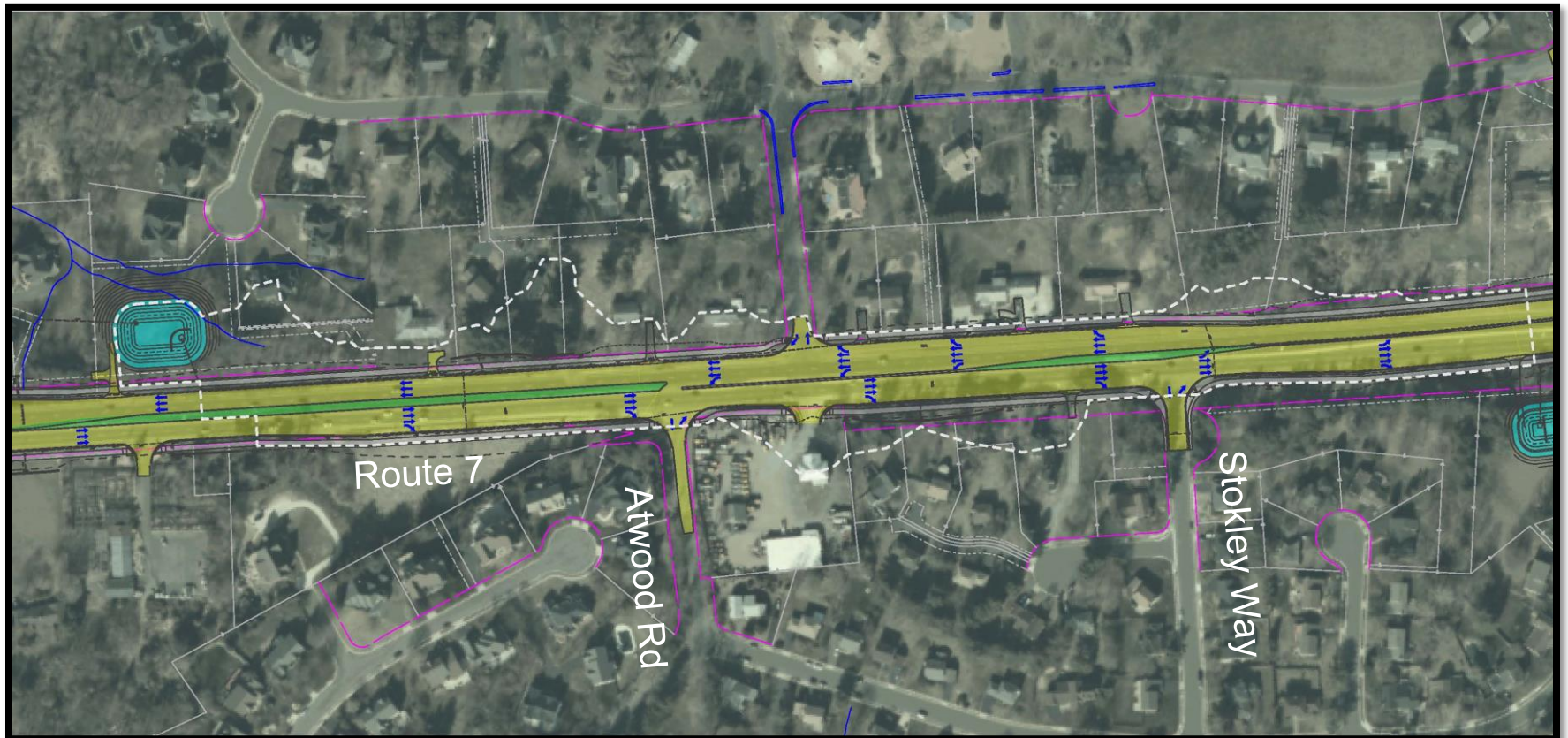
Total Drainage Area

14.4 acres

Required pond volume

790 CY (quality)

2350 CY (quantity)

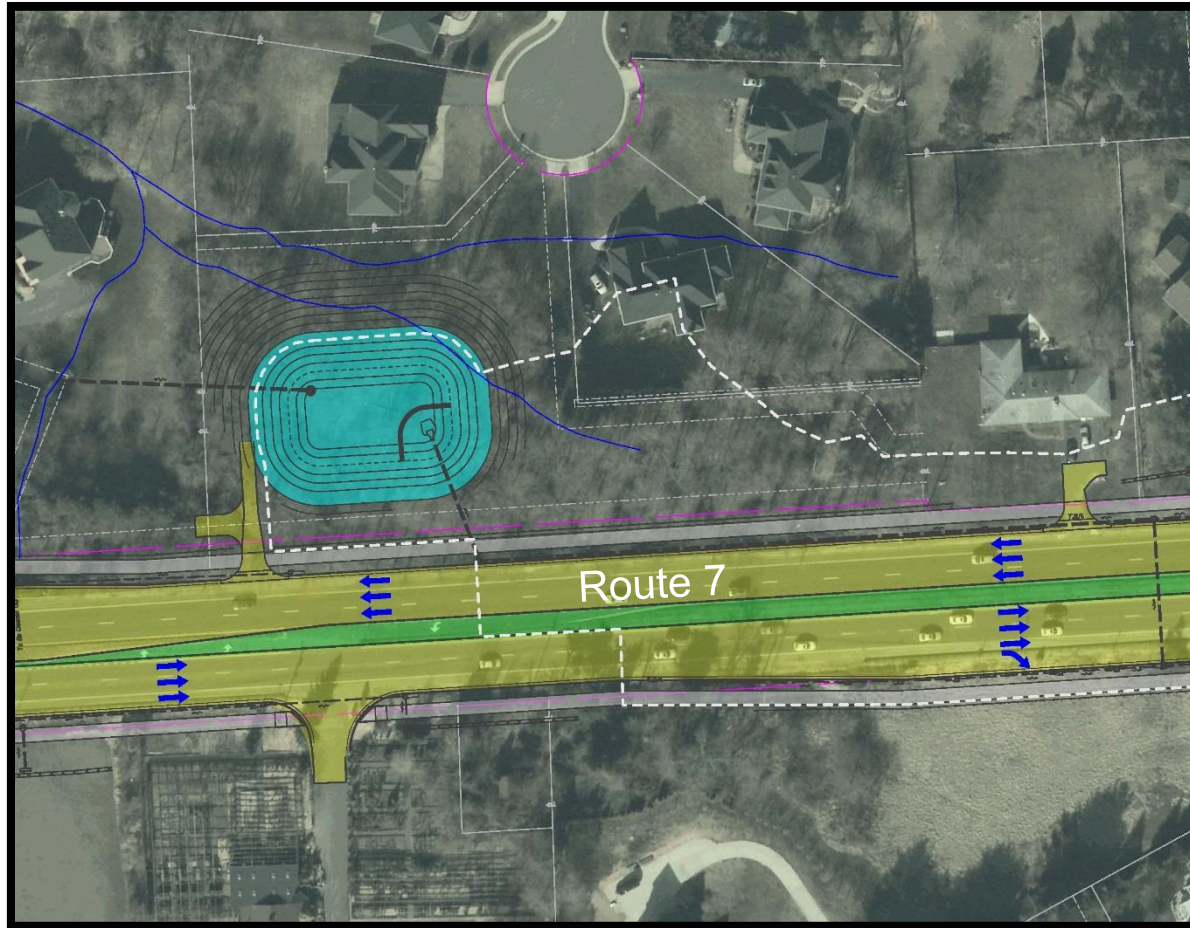




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SWM Pond #9 Detail





Outfall # 10

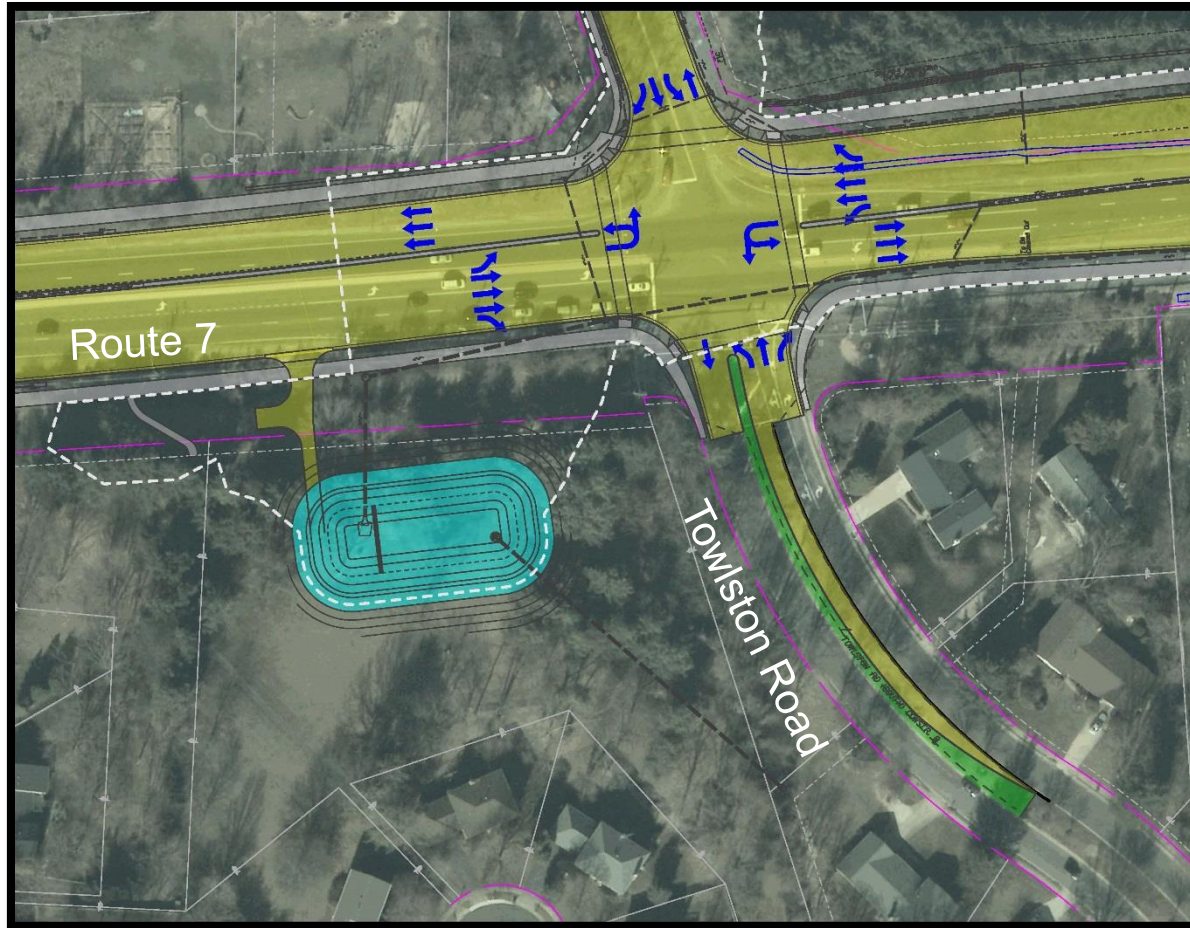
Along Towlston Road

Total Drainage Area	6.3 acres	
Required pond volume	630 CY (quality)	2060 CY (quantity)





SWM Pond #10 Detail





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Outfall # 11

Along Wolftrap Run Rd

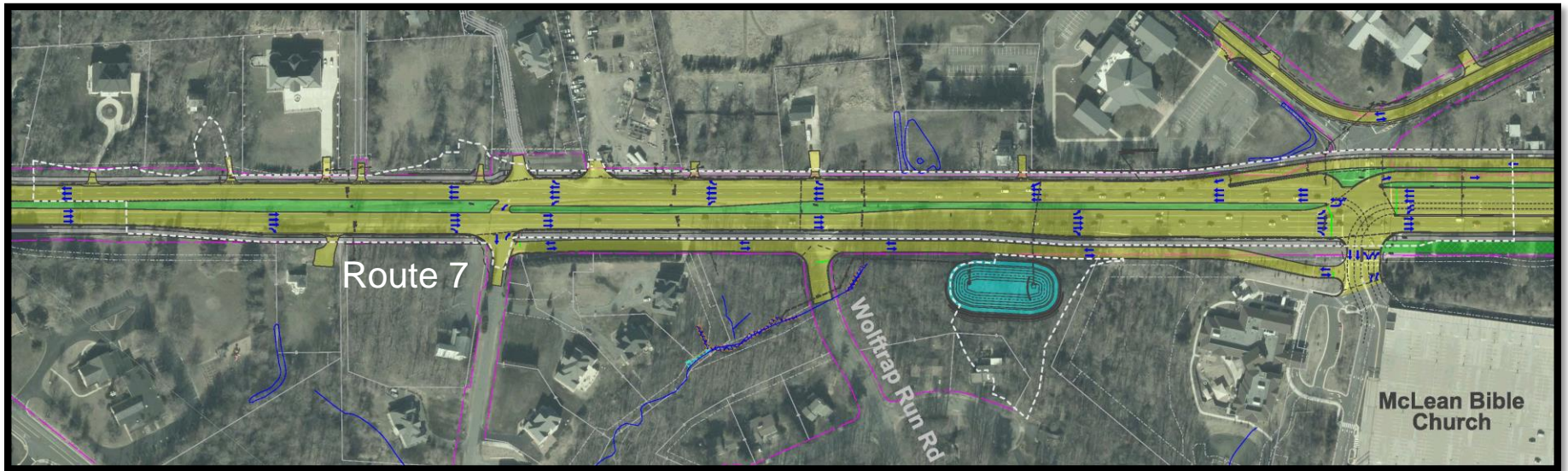
Total Drainage Area

12.6 acres

Required pond volume

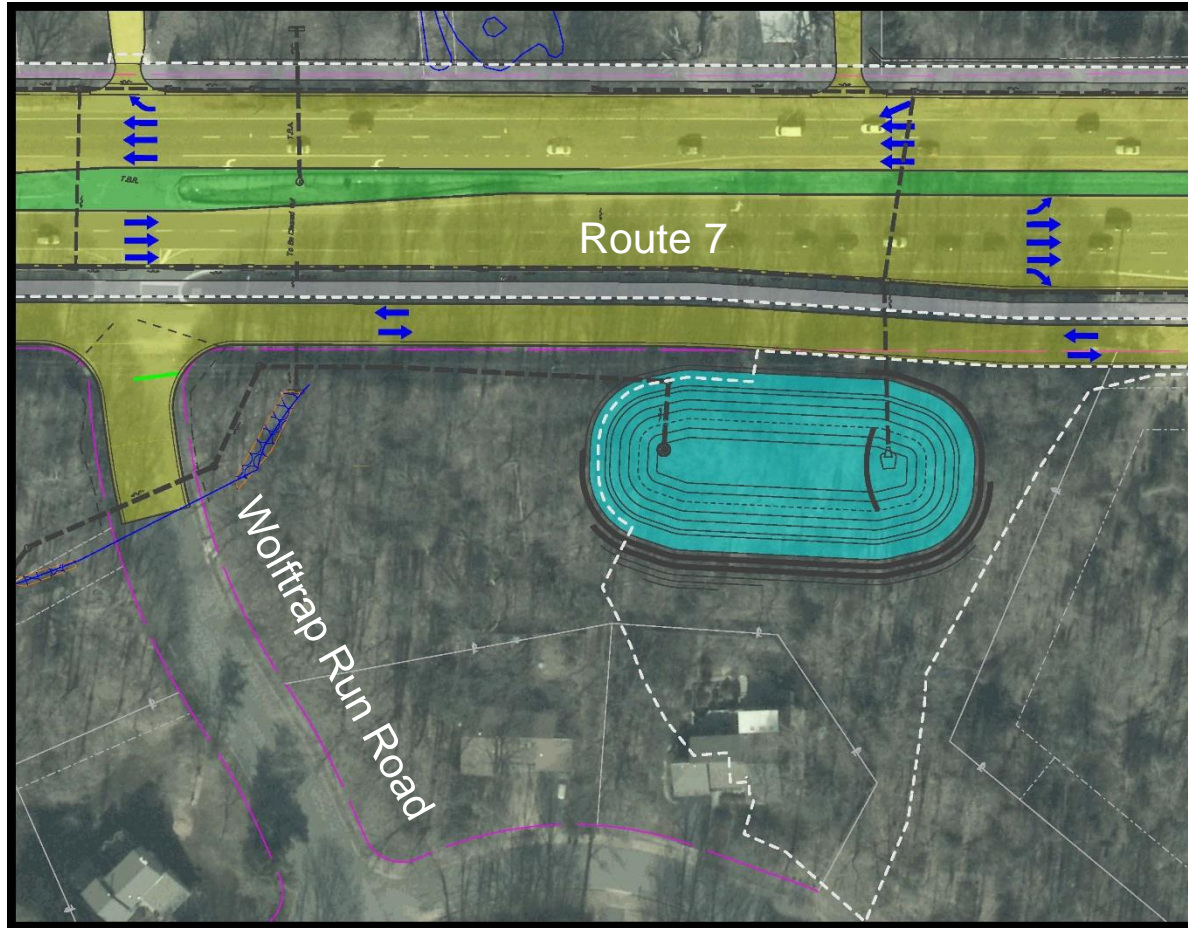
946 CY (quality)

3650 CY (quantity)





SWM Pond #11 Detail





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Outfall # 12

Relocated Lewinsville Rd Intersection

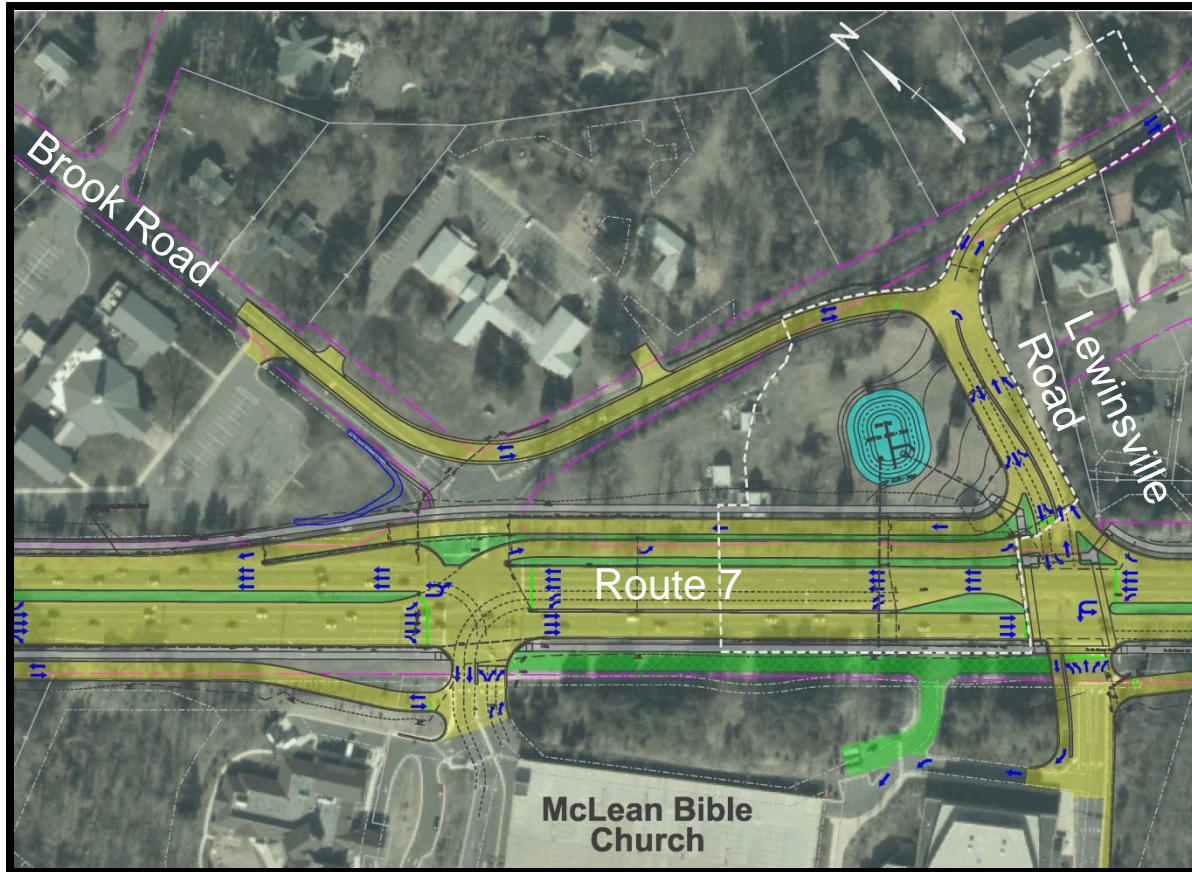
Total Drainage Area

4.7 acres

Required pond volume

530 CY (quality)

1000 CY (quantity)

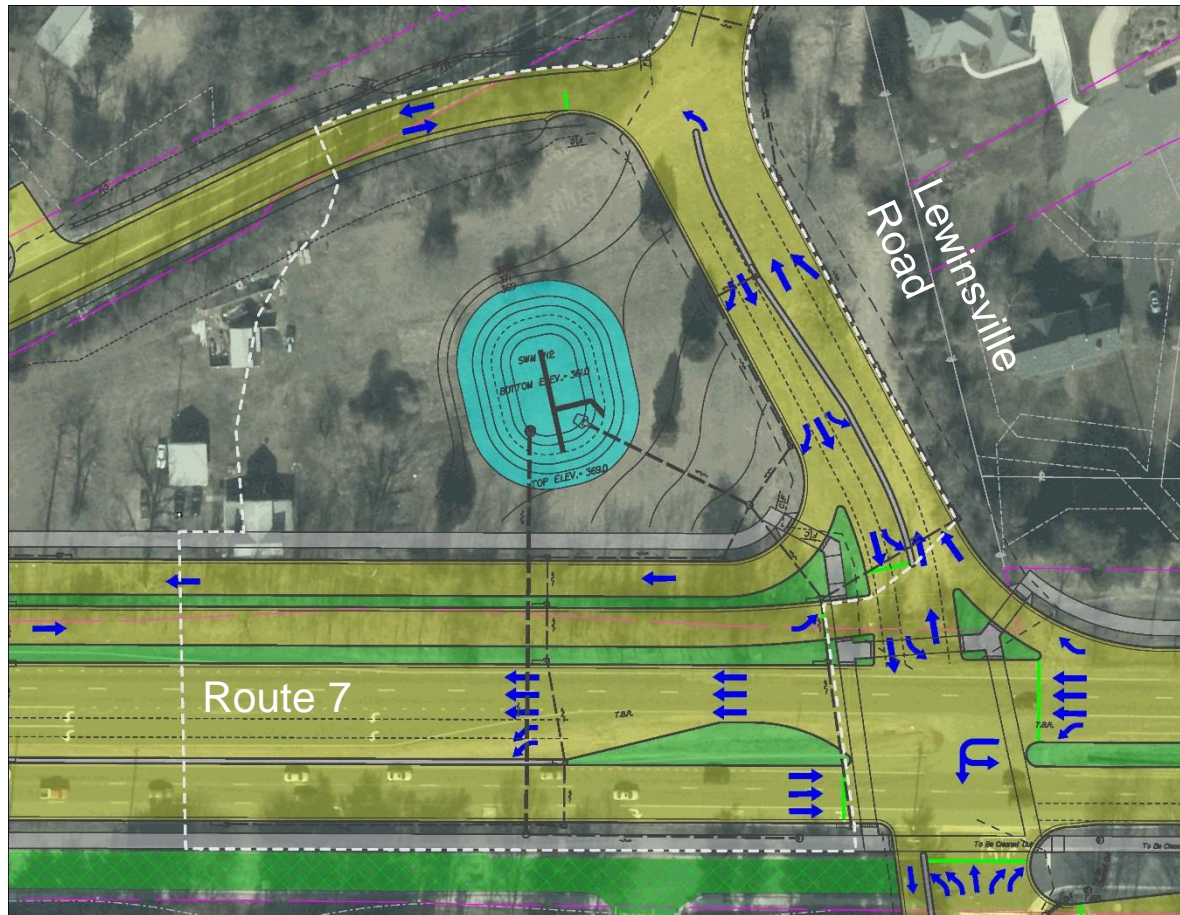




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SWM Pond #12 Detail





Outfall # 13

East of McLean Bible Church

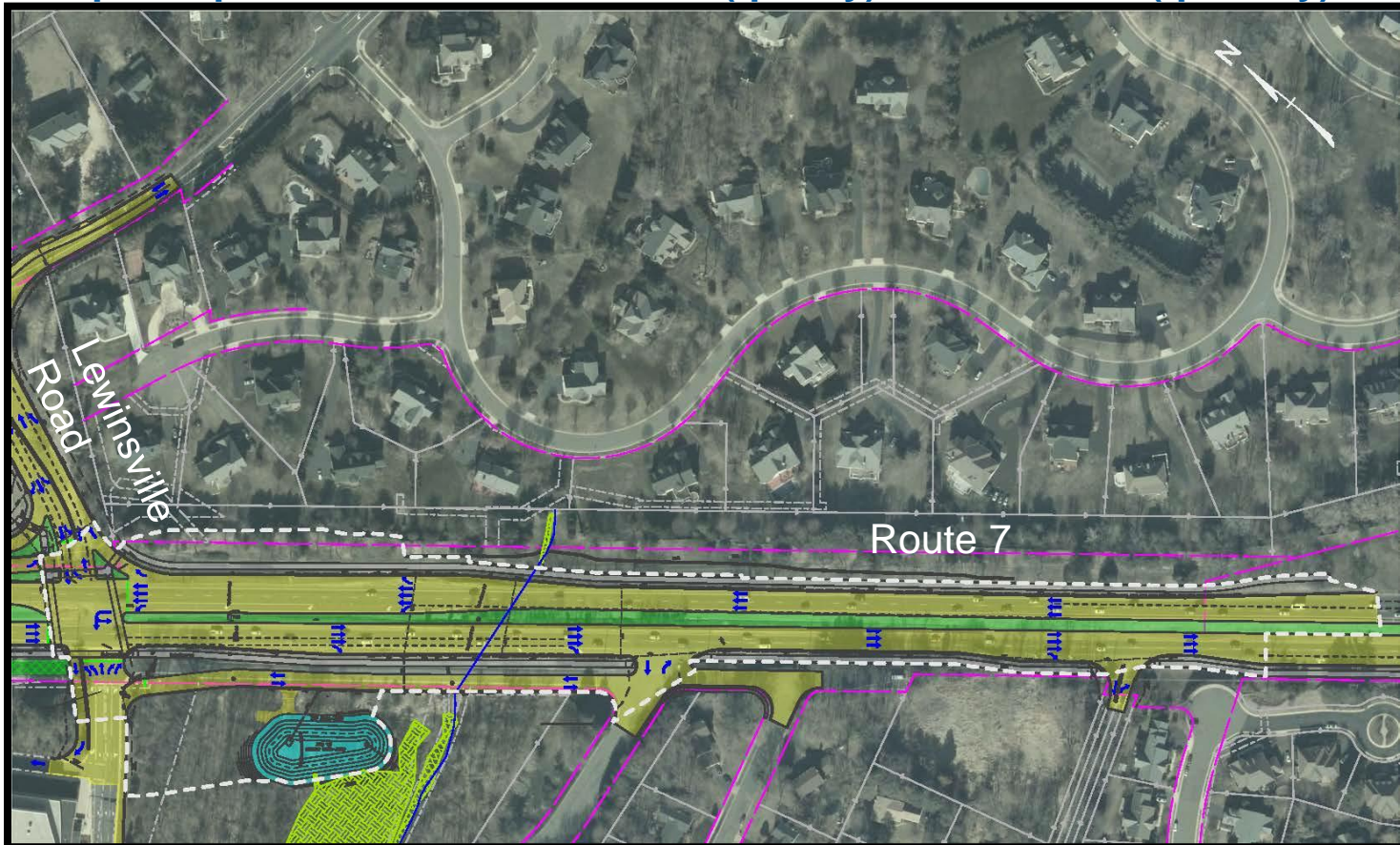
Total Drainage Area

8.1 acres

Required pond volume

762 CY (quality)

2565 CY (quantity)

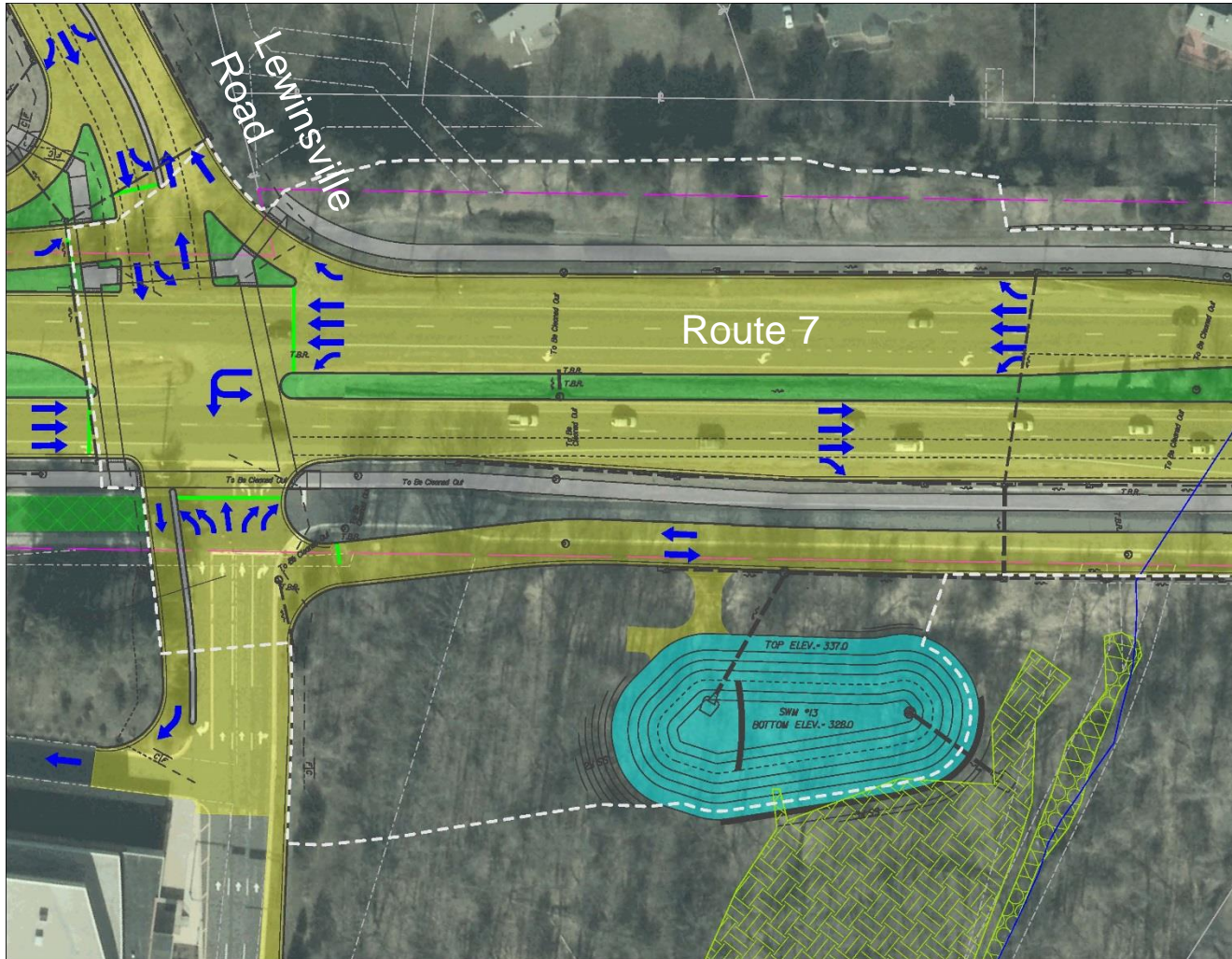




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SWM Pond #13 Detail





Community Concerns

- Mosquitos
- Flooding
- Landscaping
- Fencing



SWM Pond from Adjacent Route 7 Project