DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
TIA PROJECT CONCEPT REPORT

Project Type: Widening and Reconstruction
GDOT District: 2
Federal Route Number: N/A
State Route Number: N/A

P.I. Number: 250600
County: Columbia
MPO ID Number: STP-7062-(1)

Project Description (provide a very brief description of the project)
Road widening and reconstruction of Flowing Wells Road in Columbia County. Project begins at the I-20/Wheeler Road interchange and extends towards Washington Road (SR104) for approximately 1.2 miles.

Submitted for approval:

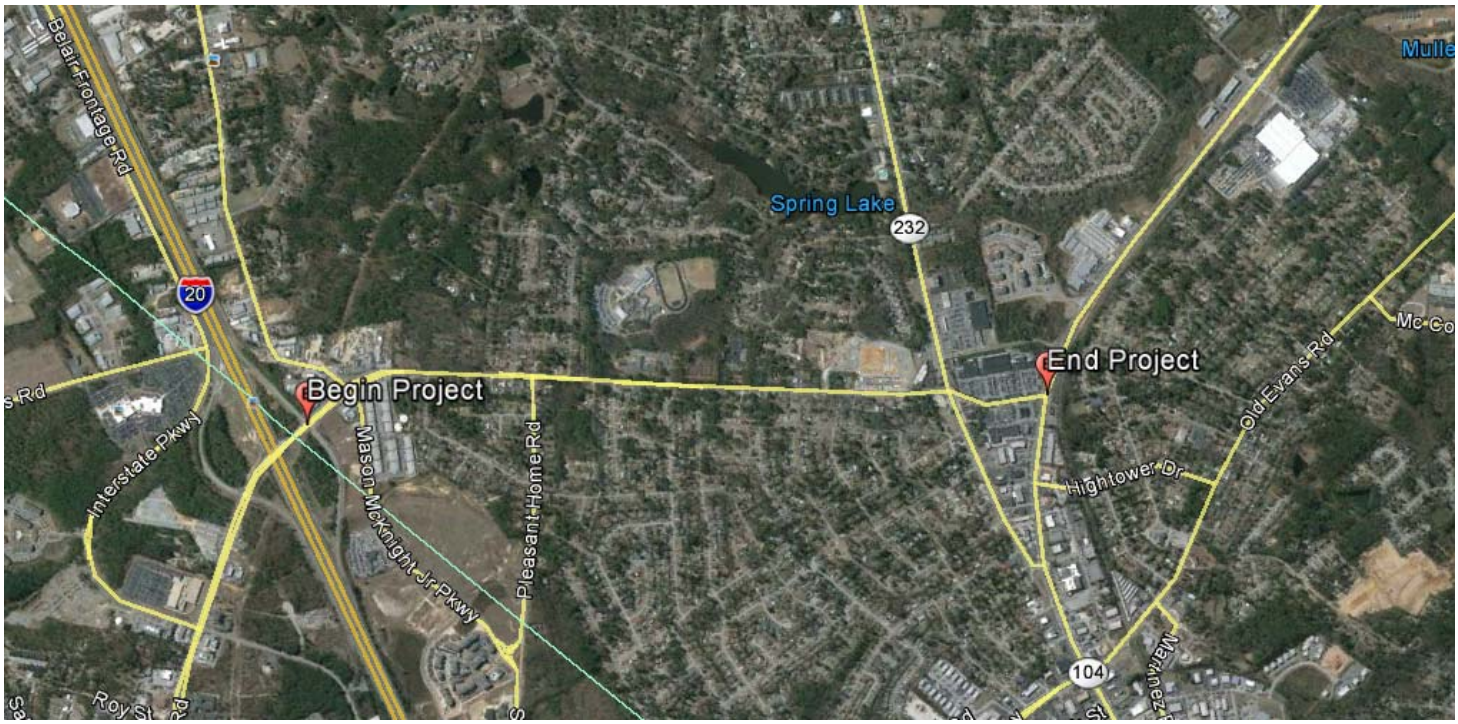
Local Government Representative	3/4/16 DATE
Robert Brandon, W.R. TOOLE ENGINEERS Consultant & Firm	3/3/16 DATE
TIA Project Manager	3/7/16 DATE
GDOT TIA Regional Coordinator	3/7/16 DATE
TIA Program Manager	3/8/16 DATE
GDOT State TIA Administrator	03/08/2016 DATE

Approval:

Concur: GDOT Director of Engineering	3/9/2016 DATE
Approve: Margaret B. Pinkel GDOT Chief Engineer	3/14/2016 DATE

PROJECT LOCATION

Project Location Map



PLANNING & BACKGROUND DATA

Description of the proposed project:

Federal Oversight: ☐ Exempt ☐ State Funded ☒ TIA ☐ Other

MPO: Augusta Regional Transportation Study (ARTS)
MPO Project ID STP-7062-(1)

Regional Commission: Central Savannah River RC RC Project ID RC07-000019
Congressional District(s): 12
Projected Traffic: ADT
Current Year (2015): 14,970 Open Year (2020): 15,730 Design Year (2040): 19,190
Traffic Projections Performed by: Pond & Co.

Functional Classification (Mainline): Urban Minor Arterial Street

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes

Will Context Sensitive Solutions procedures be utilized? ☐ No ☒ Yes

DESIGN AND STRUCTURAL DATA - Mainline Design Features: *Flowing Wells Road*

Feature	Existing	Standard*	Proposed
Typical Section			
- **Number of Lanes**	**2**	**n/a**	**2**
- **Lane Width(s)**	**12-ft**	**11 -12-ft**	**11-ft**
- **Median Width & Type**	**N/A**	**20-ft Raised (4 lane)**	**14-ft flush 14-ft raised**
- **Outside Shoulder or Border Area Width**	**10-ft**	**10 – 16-ft**	**12-ft**
- **Outside Shoulder Slope**	**Varies**	**2%**	**2%**
- **Sidewalks**	**N/A**	**5-ft**	**5-ft**
- **Bike Lanes**	**N/A**	**4-ft**	**4-ft**
sPosted Speed	**45 mph**		**45 mph**
Design Speed	**n/a**	**45 mph**	**45 mph**
Min Horizontal Curve Radius	**750-ft**	**711-ft**	**750-ft**
Superelevation Rate	**Varies**	**4%**	**4%**
Grade	**6.5%**	**8%**	**6.5%**
Access Control	**no**	**n/a**	**No**
Right-of-Way Width	**varies**	**n/a**	**Varies**
Maximum Grade – Crossroad	**9%**	**11%**	**8%**
Design Vehicle	**n/a**	**WB-40**	**WB-40 (left/right turns) P (u-turns)**

*According to current GDOT design policy if applicable

Major Interchanges/Intersections: Flowing Wells Road/Wheeler Road/McKnight Blvd., Columbia Rd (SR 232), Washington Rd (SR 104)

Utility Involvements: Water, Sanitary Sewer, Power, Communications

Public Interest Determination Policy and Procedure recommended (Utilities)? ☒ No ☐ Yes

SUE Required: ☒ No ☐ Yes

Railroad Involvement: N/A

Complete Streets - Bicycle, Pedestrian, and/or Transit Warrants:
Warrants met: ☒ None ☐ Bicycle ☐ Pedestrian ☐ Transit

Right-of-Way:
Required Right-of-Way anticipated: ☐ No ☒ Yes ☐ Undetermined
Easements anticipated: ☐ None ☒ Temporary ☒ Permanent ☐ Utility ☐ Other

Anticipated number of impacted parcels:	97
Displacements Anticipated:	11
Businesses:	20
Residences:	76
Other:	1

Transportation Management Plan [TMP] Required: ☒ No ☐ Yes
If Yes: Project classified as: ☐ Non-Significant ☐ Significant
TMP Components Anticipated: ☐ TTC ☐ TO ☐ PI

Design Exceptions to FHWA/AASHTO controlling criteria anticipated: N/A

Design Variances to GDOT Standard Criteria anticipated: N/A

ENVIRONMENTAL DATA

Anticipated Environmental Document:
GEPA: ☐ Type A Letter ☒ Type B Letter
NEPA: ☐ CE ☐ EA/FONSI

Project Air Quality: *(On-system projects only)*

Is the project located in a PM 2.5 Non-attainment area? ☒ No ☐ Yes
Is the project located in an Ozone Non-attainment area? ☒ No ☐ Yes
Is a Carbon Monoxide hotspot analysis required? ☐ No ☒ Yes

MS4 Compliance – Is the project located in an MS4 area? ☐ No ☒ Yes

Environmental Permits/Variances/Commitments/Coordination anticipated: Stream buffer variance and 404 permit not anticipated.

NEPA/GEPA Comments & Information:
Two waters were identified along the corridor; one non buffered state water and one intermittent stream. The intermittent stream is along a side road and it is not likely to be impacted. The stream's buffer is not anticipated to be impacted. Six potentially eligible historic resources have been identified. Concurrence has not be received from the SHPO on their eligibility. Archeology survey is pending preliminary plans. The project could result in impacts to community resources including schools and churches. Access to these resources should remain open during construction. Potential displacements may occur, but have not been verified from preliminary plans.

If the project would result in physical effects to a large enough proportion of historic resources this project would need to be evaluated for exceeding the "significance" threshold under GEPA guidelines. This could impact the preliminary evaluation that the project would qualify as a GEPA Type B Letter and may need to be evaluated as a GEPA Environmental Effects Report, which would significantly extend the period of time needed for environmental approval compared to the GEPA Type B Letter process.

PROJECT RESPONSIBILITIES

Project Activities:

Project Activity	Party Responsible for Performing Task(s)
Concept Development	*W. R. Toole Engineers*
Design	*W. R. Toole Engineers*
Right-of-Way Acquisition	Columbia County
Utility Relocation	Columbia County
Letting to Contract	Columbia County
Construction Supervision	Columbia County
Providing Detours	*W. R. Toole Engineers* is responsible for staging and detour plans
Environmental Studies, Documents, and Permits	Edwards Pitman
Environmental Mitigation	Columbia County / Edwards Pitman to provide documents
Construction Inspection & Materials Testing	Columbia County

Lighting required: ☒ No ☐ Yes

Other projects in the area: N/A

Other coordination to date:

1. Kickoff meeting with Columbia County: 8-19-2015
2. Concept review meeting with the Columbia County: 12-01-2015

This should be $13,062,518

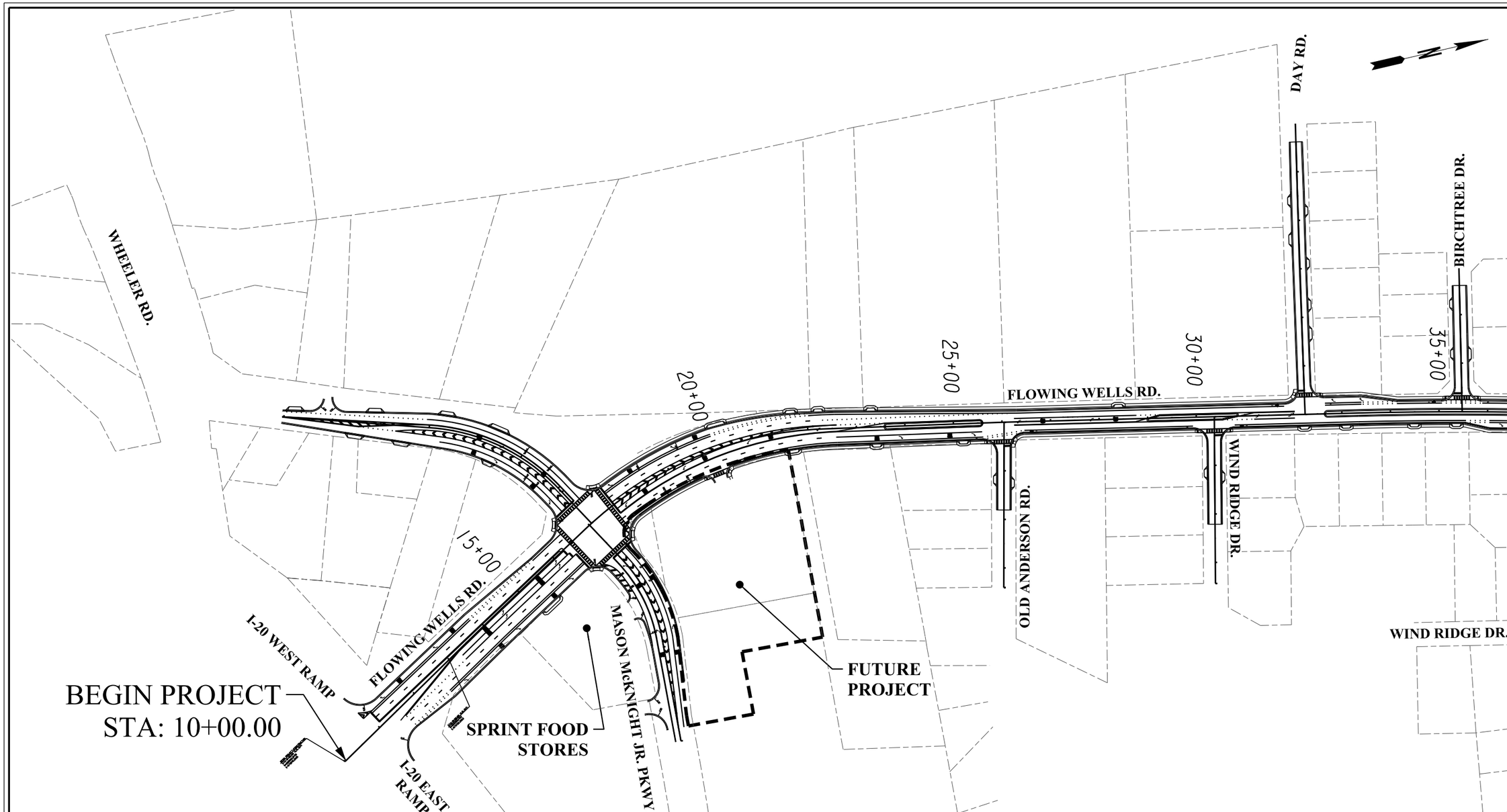
Project Cost Estimate and Funding Responsibilities:

	Breakdown of PE	ROW	Reimbursable Utility	CST	Environmental Mitigation	Total Cost
By Whom	WRTE	Columbia Co.	Columbia Co.	WRTE	Columbia Co.	
$ Amount	966,017	5,091,465	580,000	13,642,518	n/a	20,000,000
Date of Estimate	1/11/2016	2/15/2016	2/15/2016	2/16/2016	1/11/2016	

Comments/additional information: TE Study and Signal Warrant to be completed during preliminary engineering.

Attachments:

1. Concept Layout
    - Project Layout Sheet 1
    - Project Layout Sheet 2
    - Project Layout Sheet 3
2. Typical sections
    - Typical Section 05-01
3. Construction Cost Estimate
4. Preliminary ROW Cost Estimate
5. Utility Cost Estimate
6. Meeting Minutes
    - Kickoff meeting with the Columbia County: 8-19-2015
7. Traffic Study



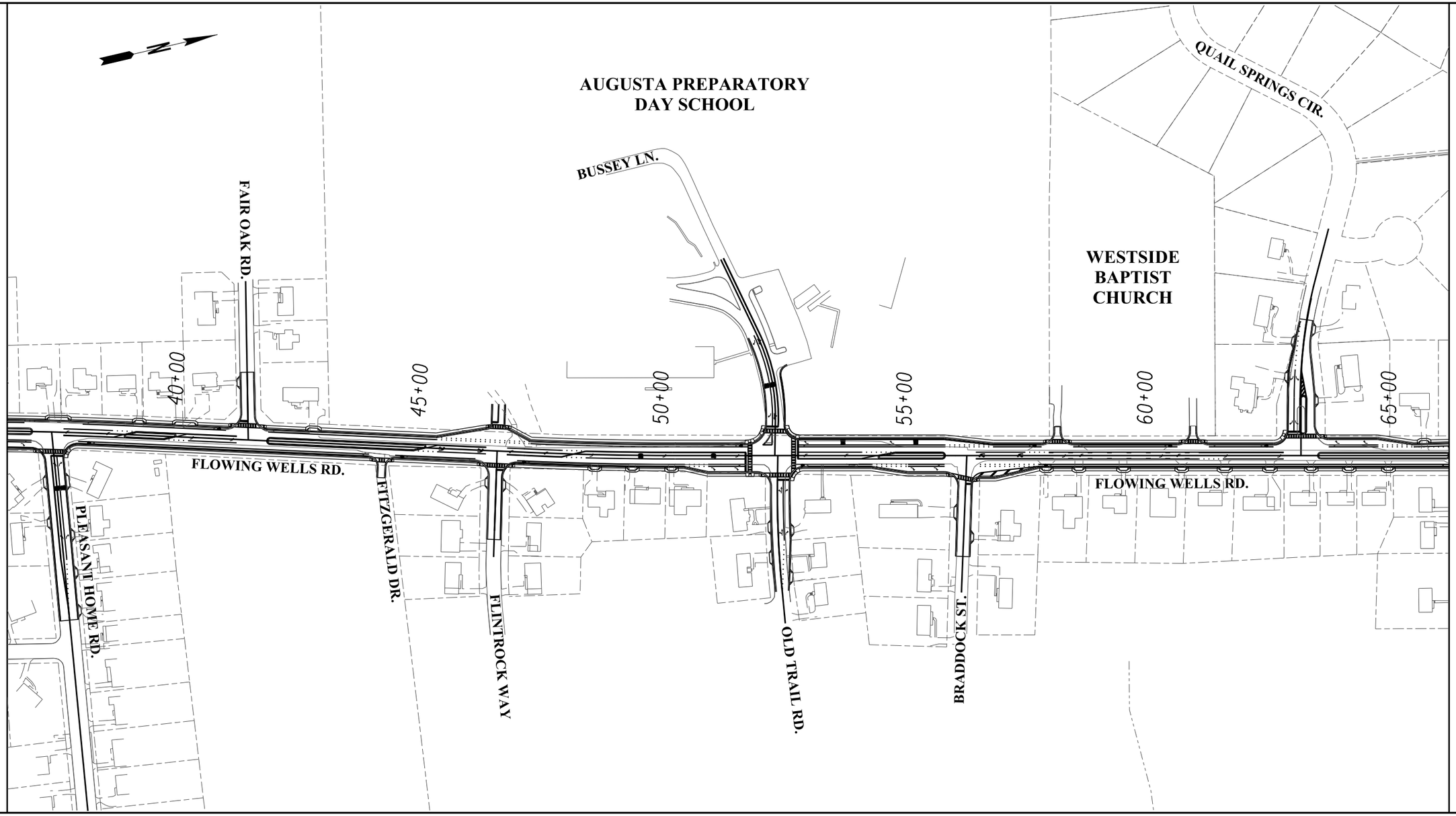
200 0 200
SCALE IN FEET

PROJECT LAYOUT
SCALE: 1" = 200'

Flowing Wells Rd.
Road Widening & Improvements Project

W R Toole Engineers, Inc.
1005 Broad St., Suite 200 • Augusta, Ga. 30901 • 706.722.4114 • www.wrtoole.com
Engineers • Consultants • Planners

SHEET 1 OF 3



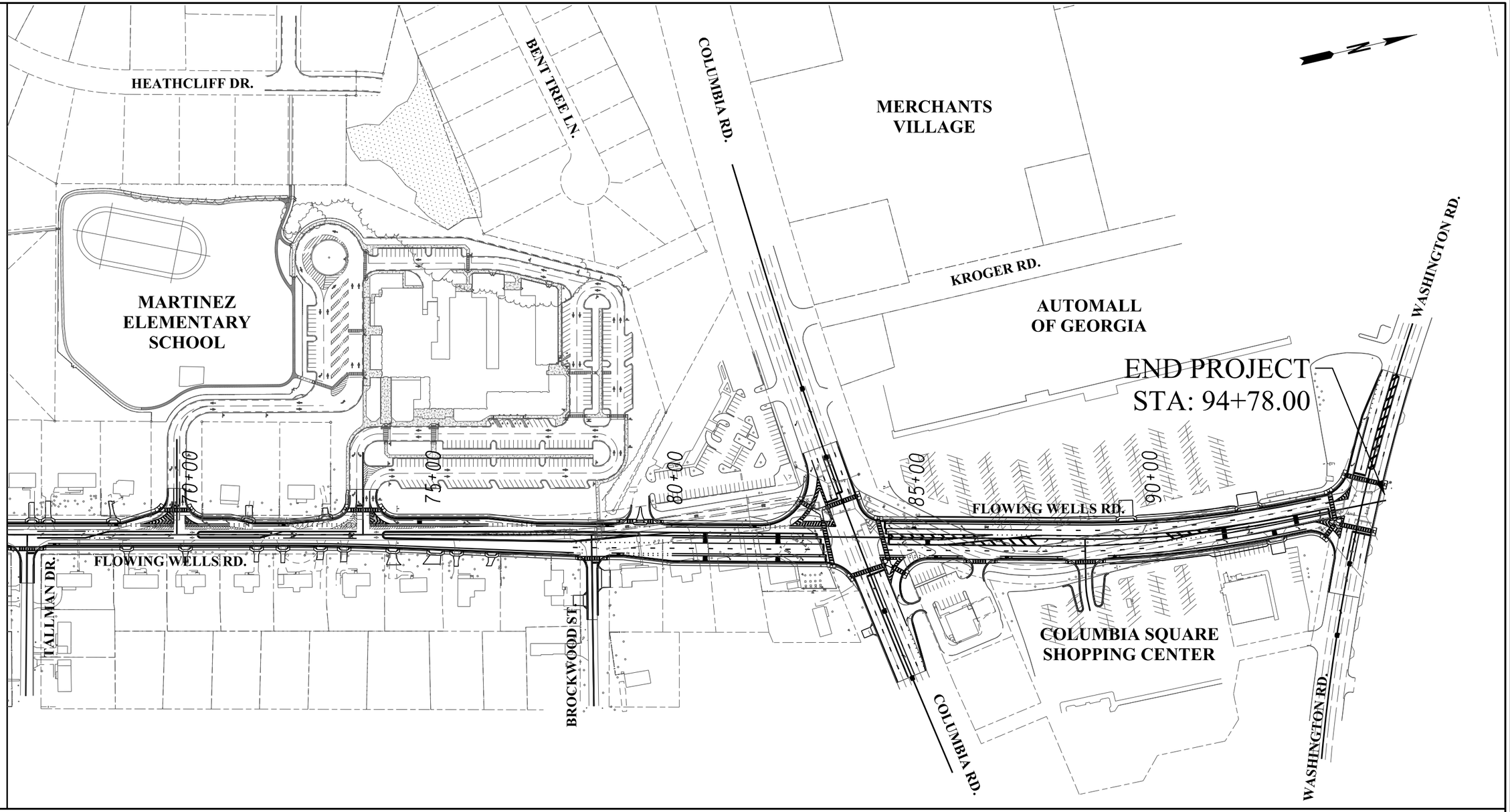
200 0 200
SCALE IN FEET

PROJECT LAYOUT

SCALE: 1" = 200'

Flowing Wells Rd.
Road Widening & Improvements Project

W R Toole Engineers, Inc.
1005 Broad St., Suite 200 • Augusta, Ga. 30901 • 706.722.4114 • www.wrtoole.com
Engineers • Consultants • Planners



200 0 200
SCALE IN FEET

PROJECT LAYOUT

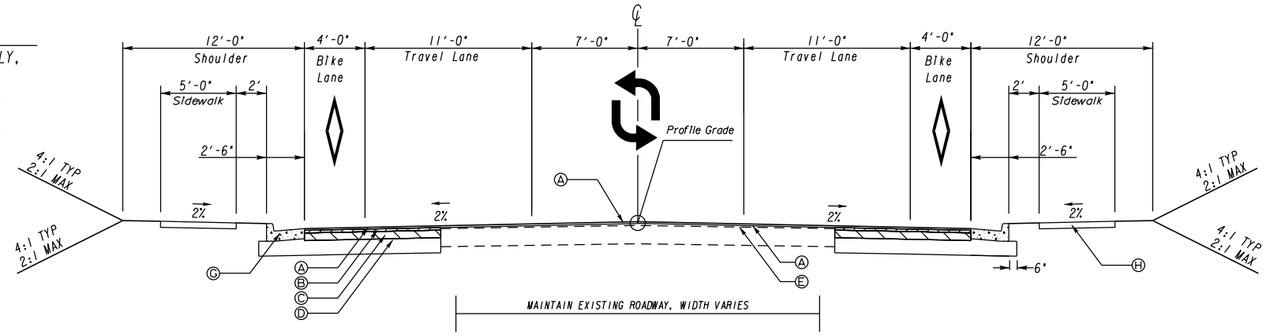
SCALE: 1" = 200'

Flowing Wells Rd.
Road Widening & Improvements Project

W R Toole Engineers, Inc.
1005 Broad St., Suite 200 • Augusta, Ga. 30901 • 706.722.4114 • www.wrtoole.com
Engineers • Consultants • Planners

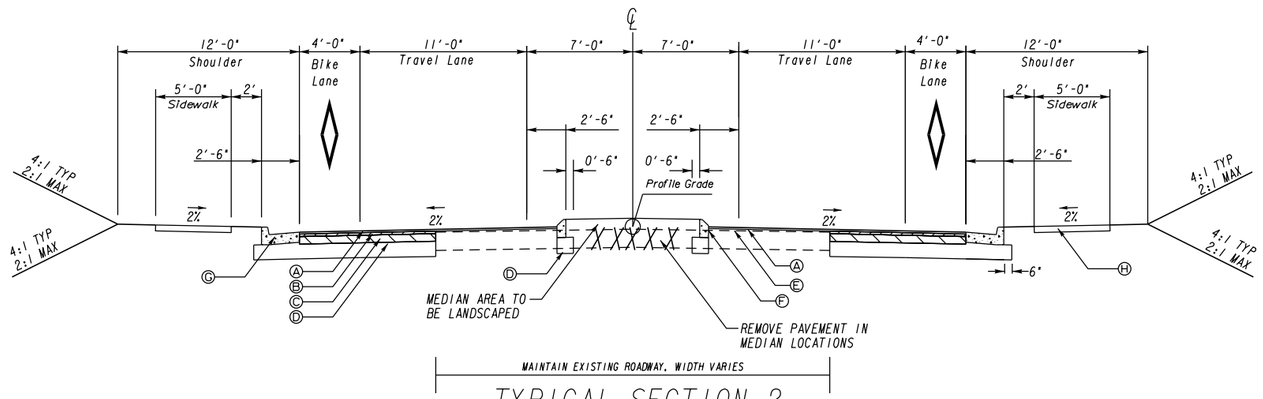
PAVEMENT MATERIAL SCHEDULE

A: RECYCLED ASPHALTIC CONCRETE, 12.5mm SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 lb./sq.yd.)
B: RECYCLED ASPHALTIC CONCRETE, 19mm SUPERPAVE, GP 1 OR 2, INLC BITUM MATL & H LIME (220 lb./sq.yd.)
C: RECYCLED ASPHALTIC CONCRETE, 25mm SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (440 lb./sq.yd.)
D: 12" GR AGGR BASE CRS, INCL MATL
E: RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
F: CONC HEADER CURB, 6 IN X 30 IN, TP 7
G: CONC CURB & GUTTER, 8 IN X 30 IN, TP 2
H: CONCRETE SIDEWALK, 4 IN



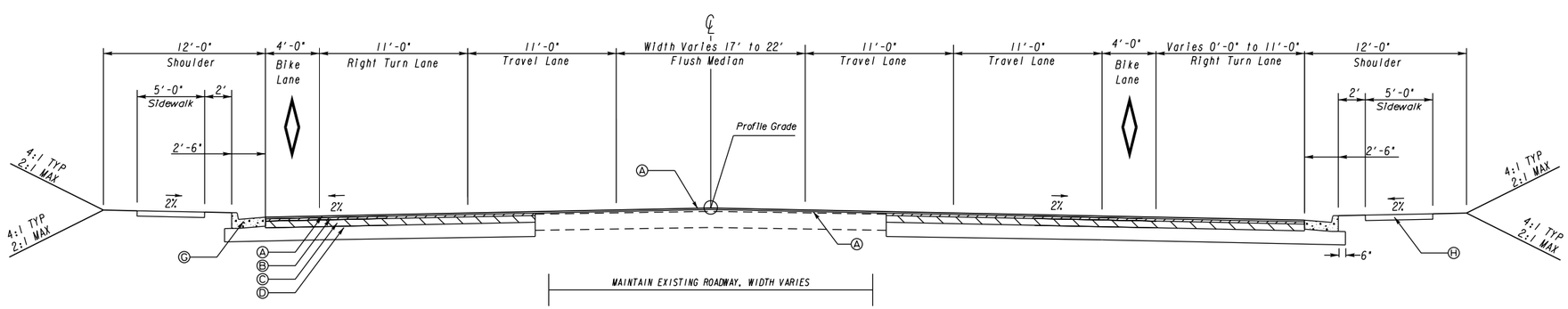
TYPICAL SECTION 1

OVERLAY AND WIDENING (FLUSH MEDIAN) - FLOWING WELLS ROAD



TYPICAL SECTION 2

OVERLAY AND WIDENING (RAISED MEDIAN) - FLOWING WELLS ROAD



TYPICAL SECTION 3

OVERLAY AND WIDENING (FLUSH MEDIAN) - FLOWING WELLS ROAD
COLUMBIA ROAD TO WASHINGTON ROAD

GEORGIA
DEPARTMENT OF TRANSPORTATION

W.R. TOOLE ENGINEERS, INC.
1005 BROAD STREET
SUITE 200
AUGUSTA, GA. 30901
(706) 722-4114

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

OFFICE:

TYPICAL SECTIONS

FLOWING WELLS ROAD

DRAWING No. 05-001

Flowing Wells Road Widening and Improvements Project

OPINION OF PROBABLE CONSTRUCTION COST

DATE: February 16, 2016

Section 1 - ROADWAY

Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	$350,000.00	TRAFFIC CONTROL -	$350,000.00
153-1300	1	EA	$90,000.00	FIELD ENGINEERS OFFICE TP 3	$90,000.00
205-0001	2500	CY	$10.00	UNCLASS EXCAV	$25,000.00
206-0002	15500	CY	$5.00	BORROW EXCAV, INCL MATL	$77,500.00
207-0203	3400	CY	$50.00	FOUND BKFILL MATL, TP 11	$170,000.00
210-0100	1	LS	$1,470,000.00	GRADING COMPLETE -	$1,470,000.00
310-1101	24583	TN	$25.00	10" GR AGGR BASE CRS, INCL MATL	$614,575.00
318-3000	2500	TN	$22.00	AGGREGATE SURFACE COURSE	$55,000.00
402-1812	3000	TN	$85.00	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	$255,000.00
402-3121	8090	TN	$76.00	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2,INCL BITUM MATL & H LIME	$614,840.00
402-3130	6850	TN	$80.00	RECYCLED ASPH CONC 12.5MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	$548,000.00
402-3190	4045	TN	$80.00	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2,INCL BITUM MATL & H LIME	$323,600.00
413-1000	9110	GL	$4.00	BITUM TACK COAT	$36,440.00
432-5010	8500	SY	$2.25	MILL ASPH CONC PVMT, VARIABLE DEPTH	$19,125.00
441-0104	7580	SY	$35.00	CONC SIDEWALK, 4 IN	$265,300.00
441-4020	2325	SY	$42.00	CONCRETE VALLEY GUTTER. 6 IN	$97,650.00
441-6222	24930	LF	$17.00	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	$423,810.00
441-6740	4740	LF	$17.00	CONC CURB & GUTTER, 8 IN X 30 IN, TP 7	$80,580.00
446-1100	12500	LF	$4.00	PVMT REINF FABRIC STRIPS, TP 2, 18 INCH WIDTH	$50,000.00
500-3201	2075	CY	$800.00	CLASS B CONCRETE (RETAINING WALL)	$1,660,000.00
500-3900	14	CY	$750.00	CLASS B CONCRETE, INCL REINF STEEL	$10,500.00
500-9999	348	CY	$250.00	CLASS B CONC, BASE OR PVMT WIDENING	$87,000.00
603-2182	500	SY	$45.00	STN DUMPED RIP RAP, TP 3, 24 IN	$22,500.00
603-7000	500	SY	$3.00	PLASTIC FILTER FABRIC	$1,500.00
610-0200	5000	LF	$7.00	REM CH LK FENCE, ALL SIZES & TYPES	$35,000.00
610-0301	20	EA	$165.00	REM GATE, ALL SIZES & TYPES	$3,300.00
611-4001	20	EA	$1,315.00	RECONSTRUCT MINOR STRUCTURE	$26,300.00
611-8050	29	EA	$545.00	ADJUST MANHOLE TO GRADE	$15,805.00
611-8055	10	EA	$880.00	ADJUST MINOR STRUCTURE TO GRADE	$8,800.00
641-1200	800	LF	25.00	GUARDRAIL, TP W	$20,000.00
641-5001	4	EA	800.00	GUARDRAIL ANCHORAGE, TP 1	$3,200.00
643-1132	1750	LF	$30.00	CH LK FENCE, ZC COAT, 4 FT, 9 GA	$52,500.00
643-1152	1605	LF	$35.00	CH LK FENCE, ZC COAT, 6 FT, 9 GA	$56,175.00
643-8010	8	EA	$400.00	GATE, CHAIN LINK ZC COAT	$3,200.00
643-8200	15000	LF	$1.43	BARRIER FENCE (ORANGE), 4 FT	$21,450.00
643-8300	200	LF	$40.00	ORNAMENTAL FENCE	$8,000.00
	425	SY	$35.00	CONCRETE PAVERS FOR MEDIANS	$14,875.00
	1	LS	$250,579.00	IRRIGATION AND LANDSCAPING	$250,579.00
				Section Sub Total	**$7,867,104.00**

Section 2 - DRAINAGE

Item Number	Quantity	Units	Unit Price	Item Description	Cost
550-1180	12000	LF	$32.00	STORM DRAIN PIPE, 18 IN, H 1-10 (R.C.P.)	$384,000.00
550-1240	5760	LF	$45.00	STORM DRAIN PIPE, 24 IN, H 1-10 (R.C.P.)	$259,200.00
550-1300	945	LF	$55.00	STORM DRAIN PIPE, 30 IN, H 1-10 (R.C.P.)	$51,975.00
550-1360	2175	LF	$85.00	STORM DRAIN PIPE, 36 IN, H 1-10 (R.C.P.)	$184,875.00
550-1420	317	LF	$100.00	STORM DRAIN PIPE, 42 IN, H 1-10 (R.C.P.)	$31,700.00
550-1540	620	LF	$150.00	STORM DRAIN PIPE, 54 IN, H 1-10 (R.C.P.)	$93,000.00
550-3518	1	EA	$575.00	SAFETY END SECTION 18 IN, STORM DRAIN, 6:1 SLOPE	$575.00
550-3530	1	EA	$800.00	SAFETY END SECTION 36 IN, STORM DRAIN, 6:1 SLOPE	$800.00
550-4218	1	EA	$500.00	FLARED END SECTION 18 IN, STORM DRAIN	$500.00
550-4224	2	EA	$550.00	FLARED END SECTION 24 IN, STORM DRAIN	$1,100.00
668-1100	94	EA	$2,250.00	CATCH BASIN, GP 1	$211,500.00
668-1110	15	LF	$245.00	CATCH BASIN, GP 1, ADDL DEPTH	$3,675.00
668-2100	24	EA	$1,800.00	DROP INLET, GP 1	$43,200.00
668-2110	23	LF	$195.00	DROP INLET, GP 1, ADDL DEPTH	$4,485.00
668-4300	1	EA	$1,950.00	STORM SEWER MANHOLE, TP 1	$1,950.00
668-4311	4	LF	$225.00	STORM SEWER MANHOLE, TP 1, ADDL DEPTH	$900.00
668-4400	2	EA	$2,800.00	STORM SEWER MANHOLE, TP 2	$5,600.00
999-3110	3	EA	$50,000.00	DETENTION POND	$150,000.00
	4	EA	$50,000.00	BIORETENTION AREAS (MS4)	$200,000.00
				Section Sub Total	**$1,629,035.00**

Section 3 - EROSION CONTROL

Item Number	Quantity	Units	Unit Price	Item Description	Cost
700-6910	6	AC	$2,000.00	PERMANENT GRASSING	$12,000.00
700-7000	12	TN	$95.00	AGRICULTURAL LIME	$1,140.00
700-8000	2	TN	$600.00	FERTILIZER MIXED GRADE	$1,200.00
700-8100	600	LB	$3.00	FERTILIZER NITROGEN CONTENT	$1,800.00
716-2000	6000	SY	$1.25	EROSION CONTROL MATS, SLOPES	$7,500.00
				Section Sub Total	**$23,640.00**

Section 4 - TEMPORARY EROSION CONTROL

Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	6	AC	$2,000.00	TEMPORARY GRASSING	$12,000.00
163-0240	180	TN	$300.00	MULCH	$54,000.00
163-0300	6	EA	$1,500.00	CONSTRUCTION EXIT	$9,000.00
163-0524	50	EA	$265.00	CONSTRUCT AND REMOVE TEMPORARY DITCH CHECKS - STONE PLAIN RIP RAP/SAND BAGS	$13,250.00
163-0525	10	EA	$500.00	CONSTRUCT AND REMOVE TEMPORARY LEVEL SPREADER	$5,000.00
163-0530	1000	LF	$4.00	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	$4,000.00
163-0531	4	EA	$15,000.00	CONSTRUCT AND REMOVE SEDIMENT BASIN COMPLETE (GA CONST DET-22)	$60,000.00
165-0010	25000	LF	$1.00	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	$25,000.00
163-0550	115	EA	$200.00	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	$23,000.00
165-0041	50	LF	$7.00	MAINTENANCE OF EROSION CONTROL CHECK DAMS ALL TYPES	$350.00
165-0060	4	EA	$2,500.00	MAINTENANCE OF TEMPORARY SEDIMENT BASIN	$10,000.00
165-0070	1000	LF	$1.00	MAINTENANCE OF BALED STRAW EROSION CHECK	$1,000.00
165-0101	6	EA	$550.00	MAINTENANCE OF CONSTRUCTION EXIT	$3,300.00
165-0105	115	EA	$50.00	MAINTENANCE OF INLET SEDIMENT TRAP	$5,750.00
167-1000	10	EA	$400.00	WATER QUALITY MONITORING AND SAMPLING	$4,000.00
167-1500	24	MO	$1,200.00	WATER QUALITY INSPECTIONS	$28,800.00
171-0010	25000	LF	$3.00	TEMPORARY SILT FENCE, TYPE A	$75,000.00
				Section Sub Total	**$333,450.00**

Section 5 - TRAFFIC SIGNS AND MARKINGS

Item Number	Quantity	Units	Unit Price	Item Description	Cost
636-1020	540	SF	$14.00	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	$7,560.00
636-1033	450	SF	$17.00	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 9	$7,650.00
636-2070	1970	LF	$7.00	GALV STEEL POSTS, TP 7	$13,790.00
636-2090	320	LF	$50.00	GALV STEEL POSTS, TP 9	$16,000.00
652-0094	27	EA	$50.00	PVMT MARKING SYMBOL, TP 4	$1,350.00
652-0110	53	EA	$50.00	PVMT MARKING, ARROW, TP 1	$2,650.00
652-5301	14650	LF	$1.00	SOLID TRAFFIC STRIPE, 6 IN, WHITE	$14,650.00
652-5451	24930	LF	$1.00	SOLID TRAFFIC STRIPE, 5 IN, WHITE	$24,930.00
652-6301	1865	GLF	$1.00	SKIP TRAF STRIPE, 6 IN, WHITE	$1,865.00
652-6501	2100	GLF	$1.00	SKIP TRAF STRIPE, 5 IN, WHITE	$2,100.00
653-0120	105	EA	$90.00	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	$9,450.00
653-0130	6	EA	$135.00	THERMOPLASTIC PVMT MARKING, ARROW, TP 3	$810.00
653-0160	6	EA	$100.00	THERMOPLASTIC PVMT MARKING, ARROW, TP 6	$600.00
653-0210	49	EA	$130.00	THERMOPLASTIC PAVEMENT MARKING, WORD, TP 1	$6,370.00
653-1501	6705	LF	$1.00	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	$6,705.00
653-1502	21845	LF	$1.00	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	$21,845.00
653-1704	830	LF	$6.00	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	$4,980.00
653-1804	10110	LF	$3.00	THERMOPLASTIC SOLID TRAF STRIPE, 8 IN, WHITE	$30,330.00
653-3501	9175	GLF	$1.00	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	$9,175.00
653-6004	1800	SY	$6.00	THERMOPLASTIC TRAF STRIPING, WHITE	$10,800.00
653-6006	800	SY	$5.00	THERMOPLASTIC TRAF STRIPING, YELLOW	$4,000.00
654-1001	300	EA	$4.00	RAISED PVMT MARKERS TP 1	$1,200.00
654-1003	370	EA	$5.00	RAISED PVMT MARKERS TP 3	$1,850.00
				Section Sub Total	**$200,660.00**

Section 6 - UTILITY - WATER AND SEWER

Item Number	Quantity	Units	Unit Price	Item Description	Cost
660-0004	200	LF	$45.00	SAN SEWER PIPE, 4 IN, PVC	$9,000.00
660-0006	200	LF	$55.00	SAN SEWER PIPE, 6 IN, PVC	$11,000.00
660-0808	240	LF	$110.00	SAN SEWER PIPE, 8 IN, DUCTILE	$26,400.00
668-3300	8	EA	$2,500.00	SAN SEWER MANHOLE, TP 1	$20,000.00
670-1080	5960	LF	$35.00	WATER MAIN, 8 IN	$208,600.00
670-1100	400	LF	$40.00	WATER MAIN, 10 IN	$16,000.00
670-2080	28	EA	$1,800.00	GATE VALVE, 8 IN	$50,400.00
670-2010	4	EA	$2,200.00	GATE VALVE, 10 IN	$8,800.00
670-4000	6	EA	$4,500.00	FIRE HYDRANT	$27,000.00
670-5000	2600	LF	$30.00	WATER SERVICE LINE - 1.25 IN	$78,000.00
670-9730	62	EA	$600.00	RELOCATE WATER METER, INCL BOX	$37,200.00
	1	LS	$500,000.00	RELOCATE FIBEROPTICS	$500,000.00
	1	LS	$500,000.00	RELOCATE GEORGIA POWER	$500,000.00
				Section Sub Total	**$1,492,400.00**

Section 7 - SIGNAL AND LIGHTING

Item Number	Quantity	Units	Unit Price	Item Description	Cost
639-3004	8	EA	$17,000.00	STEEL STRAIN POLE, TP IV (INCLUDING TANDEM MAST ARMS)	$136,000.00
647-1000	4	LS	$150,000.00	TRAFFIC SIGNAL INSTALLATION NO - 1	$600,000.00
	1	LS	$120,000.00	PEDESTRIAN SIGNAL (HAWK SYSTEM)	$120,000.00
				Section Sub Total	**$856,000.00**

Summary

Estimated Cost	**$12,402,289.00**
10% CONTINGENCY	**$1,240,229.00**
TOTAL ESTIMATED CONSTRUCTION COST	**$13,642,518.00**

Summary of Costs
DATE: February 16, 2016

	Phase / Service	Summary of Costs
	Construction Cost Estimate (Includes 10% Contingency)	**$13,642,518.00**
	PE (Engineering - Surveying - Environmental)	**$966,017.00**
	ROW (Including Acquisition Services)	**$5,091,465.00**
	Risk	**$300,000.00**
	Total Project Cost	**$20,000,000.00**

Preliminary ROW Cost Estimate

TRANSPORTATION INVESTMENT ACT
TIA PROGRAM MANAGEMENT

PI No. 250600
Project Name: Flowing Wells
Date: Enter Date of Estimate (D 2/15/2016

Land and Improvements	Agriculture	Residential	Commercial	Industrial	Notes
Estimate ($/ac)	$0	$27,000	$450,000	$0	Enter Cost / Acre
Fee Simple Area (ac)	0.00	3.46	1.89	0.00	Enter Acreage
Fee Simple Estimate	$0	$93,420	$850,500	$0	CALCULATED FIELD
Perm Easement Area (ac)	0.00	1.02	0.73	0.00	Enter Acreage
Perm Easement Factor	0%	50%	50%	0%	Adjust Percentage as Appropriate
Perm Easement Estimate	$0	$13,770	$164,250	$0	CALCULATED FIELD
Temp Easement Area (ac)	0.00	3.00	1.20	0.00	Enter Acreage
Temp Easement Factor	0%	25%	25%	0%	Adjust Percentage as Appropriate
Temp Easement Estimate	$0	$20,250	$135,000	$0	CALCULATED FIELD
City Land Available for Swap (ac)	0.00	0.00	0.00	0.00	Enter Acreage (If required)
City Land Available for Swap Estimate	$0	$0	$0	$0	Enter Estimated Value (If required)
Proximity Damages	$0	$0	$0	$0	Enter Fees and Provide Notes as Appropriate
Consequential Damages	$0	$0	$0	$0	Enter Fees and Provide Notes as Appropriate
Cost to Cures	$0	$0	$500,000	$0	Enter Fees and Provide Notes as Appropriate
Improvements	$0	$594,139	$0	$0	Enter Fees and Provide Notes as Appropriate
Trade Fixtures	$0	$0	$50,000	$0	Enter Fees and Provide Notes as Appropriate
PROPERTY TYPE TOTALS	**$0**	**$721,579**	**$1,699,750**	**$0**	CALCULATED FIELD
	Land and Improvements Sub Total		**$2,421,329**		CALCULATED FIELD

Relocation	Quantity	Estimated Cost		Totals	
Residential Tenant (Qty of Tenants)	3	$30,000		$90,000	Adjust Qty / Costs as required
Residential Owner	6	$50,000		$300,000	Adjust Qty / Costs as required
Business Displacement (Qty)	0	$45,000		$0	Adjust Qty / Costs as required
Pro Rata Taxes	44	$1,000		$44,000	Adjust Qty / Costs as required
Prop Pin Replacement	58	$1,250		$72,500	Adjust Qty / Costs as required
PROPERTY TYPE TOTALS	**111**			**$506,500**	CALCULATED FIELD
	Relocation Sub Total		**$506,500**		CALCULATED FIELD

Valuation Services	Agriculture	Residential	Commercial	Industrial	
Appraisals (# of Parcels)	0	45	20	0	Adjust Parcels as required
Estimated Fee (per Parcel)	$0	$1,500	$2,500	$0	Enter Estimated Fee per Parcel
Total Appraisals	$0	$67,500	$50,000	$0	CALCULATED FIELD
Specialty Reports	$0	$0	$50,000	$0	Enter Estimated Costs and Provide Notes
Estimated Fees	$0	$0		$0	Enter Estimated Fees and Provide Notes
PROPERTY TYPE TOTALS	**$0**	**$67,500**	**$100,000**	**$0**	CALCULATED FIELD
	Valuation Services Sub Total		**$167,500**		CALCULATED FIELD

Legal Services	Parcels	Estimated Fees		Totals	
Meeting with Attorney	97	$125		$12,125	Adjust Parcels / Fees as required (using best judgement)
Preliminary Titles	97	$200		$19,400	Adjust Parcels / Fees as required
Closing and Final Title	97	$300		$29,100	Adjust Parcels / Fees as required
Recording Fees	97	$50		$4,850	Adjust Parcels / Fees as required
Condemnation	15	$30,000		$450,000	Adjust Parcels / Fees as required
	Legal Services Sub Total		**$515,475**		CALCULATED FIELD

Administrative	Parcels	Man Hours/Parcel		Totals	
Pre-Acquisition	97	40		$194,000	Adjust Parcels / Fees as required
Acquisition	97	100		$485,000	Adjust Parcels / Fees as required
Administrative Appeals	15	50		$37,500	Calculates as 15% of Acq Parcel Count (Adjust if Necessary)
	Administrative Sub Total		**$716,500**		CALCULATED FIELD

Contingency					
Overall Contingency	20%	$764,161			Enter Percentage for Contingency (Default = 20%)

Total Estimated Costs **$5,091,465** CALCULATED FIELD

Updated 23Jan2015

PI 250600 - Flowing Wells Road-Preliminary Utility Estimate (Reimbursable)

POWER

ITEM NO	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL COST
1	4	EA	Power poles located off right of way	$20,000.00	$80,000.00
				TOTAL COST	**$80,000.00**

BELL SOUTH

ITEM NO	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL COST
1	6300	LF	3x4 Multi tile duct		
2	6300	LF	24 Fiber Optic Cable		
3	6300	LF	36 Fiber Optic Cable		
4	6300	LF	216 Fiber Optic Cable		
5	6300	LF	25 PR/ 19		
6	6300	LF	300 PR/26G		
7	6300	LF	900 PR/22G		
8	6300	LF	1100 PR/22G		
9	6300	LF	1200 PR/22G		
10	6300	LF	1800 PR/22G		
11	6300	LF	2100 PR/26G		
				TOTAL COST	**$500,000.00**

TOTAL PRELIMINARY REIMBURSABLE UTILITY COSTS FOR PI 250600-	$580,000.00

NOT INCLUDED: GEORGIA TRANSMISSION CORP

ITEM NO	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL COST
1	8	EA	WOOD TRANSMISSION POLES WITHIN R/W	$75,000.00	$600,000.00
				TOTAL COST	**$600,000.00**

Meeting Minutes – Flowing Wells Road

Project: Flowing Wells Road (SR1017) Widening and Improvements Project
PI No.: 250600
TIA Project #: RC07-000019
WRTE Project No.: 15-025
Date: 08/19/2015
Time: 1:30 Pm
Purpose: Professional Services Contract – Kick-Off Meeting

Attendance: (Sign-In Sheet Attached)

NAME	FIRM	TELEPHONE	E-Mail
Erik Hammarlund	WR Toole Engineers	706-722-4114	ehammarlund@wrtoole.com
Bob Baisden	WR Toole Engineers	706-722-4114	rbaisden@wrtoole.com
George Brewer	GDOT – TIA	706-832-0917	gbrewer@dot.ga.gov
Kenneth Franks	GDOT – TIA	404-631-1568	kfranks@dot.ga.gov
Kevin Skinner	Pond	678-336-7740	skinnerk@pondco.com
Tim Matthews	Pond	404-272-1455	matthewst@pondco.com
Richard Fangmann	Pond	678-336-7740	fangmann@pondco.com
Matt Schlachter	Columbia County	706-868-3356	mschlachter@columbiacountyga.gov
Steve Exley	Columbia County	706-447-7602	sexley@columbiacountyga.gov
Josh Earhart	Edwards-Pitman	770-333-9484	jearhart@edwards-pitman.com

Introduction/Project History/Background Information: Hammarlund, Baisden, and Schlachter provided a brief project history on the previous 5-lane design and the current 3-lane concept. Baisden noted that the concept layout shown represented a minimum width 3-lane typical section and we would be adding 4' wide bike lanes.

WRTE noted that Toole Survey Company (TSC) has initiated surveying tasks. Property Entry Letters will be prepared by WRTE and mailed out via certified mail to all property owners. TSC is almost complete with control work and will submit control package.

WRTE led the project team through a discussion of the corridor improvements utilizing a roll plot of the Concept Layout. The following issues were discussed:

The team discussed the typical section and agreed that is shall consist of two travel lanes (11'), a center left-turn lane (14'), bicycle lanes (4'), concrete curb and gutter (24"), grassed shoulders (variable width), and sidewalks (5'). County noted they would like to use header curb around any medians or islands.

The team discussed improvements to the I-20 Interchange and Wheeler Road/McKnight Parkway intersection. WRTE and Columbia County have already met with the Developer (McKnight) of the property adjacent to the McKnight Parkway intersection and discussed ingress/egress from the new development. Baisden noted that the right-turn lane from Wheeler Road to McKnight Parkway would be extended as far back as GDOT would allow but it would most likely begin at the limited access R/W for the I-20 off-

ramp. Schlachter requested that the Design Team consider lane geometry for Flowing Wells Road that provides for two (2) travel lanes northbound through the McKnight Parkway intersection before tapering to one northbound travel lane.

The team discussed improvements to the Pleasant Home Road intersection. Pond will prepare a traffic study to include a roundabout alternative at this intersection.

The team discussed improvements to the signalized intersection of Augusta Prep Day School and Old Trail Road. Pond will prepare a traffic study to include both a signal and roundabout alternative at this intersection. WRTE noted that they met with the school previously to discuss ingress/egress. There is currently a secondary gravel drive that is used occasionally. WRTE noted that it would be safer to design this driveway as a right-in/right-out.

The team discussed the recently completed improvements to Martinez Elementary School. Pond will prepare a traffic study to include a signal alternative at this intersection. Columbia County noted the heavy pedestrian (student) crossing movements from the east side of Flowing Wells Road to the school. Brockwood Drive is utilized by parents to drop-off students who then cross Flowing Wells Road. The team will develop alternatives for pedestrian crossings at the intersection of Brockwood and at the proposed signalized main entrance road to the school. Consideration will also be given to student movements on the Campus to minimize conflicts with vehicles. The Design Team and County will meet with Martinez Elementary to discuss alternatives.

The team discussed the transition from a three-lane typical section to a five-lane typical section on the approach to Columbia Road (SR 232) and continuing through to Washington Road (SR104). Lane geometry and storage lengths will be confirmed by the traffic study but WRTE noted that Concept Layout includes turn lane storage lengths that have already been maximized based on the geometry of the existing intersections. WRTE will develop alternatives for ingress/egress to both sides of Flowing Wells Road between Columbia Road and Washington Road as well as implementing retaining walls to minimize impacts. WRTE will coordinate with Columbia County to request a meeting with property owner to discuss alternatives.

Pond discussed traffic study and team identified the design year as 2039. Pond will schedule traffic counts for week of 9/14/15 and requested any available traffic studies that have been prepared for the McKnight Development, Martinez Elementary School, or Augusta Prep Day School.

WRTE noted that retaining walls will be considered in several location to minimize impacts to properties. However, there are several properties where acquisition may be more for economical for implementing green space or stormwater management. These properties will be identified and alternatives reviewed with the County.

Meeting Minutes – Flowing Wells Road

WRTE noted that a pavement evaluation was prepared in 2001 but would be updated with new pavement cores in locations where the road has been overlaid or improved such as the roadway improvements in front of the schools.

WRTE noted that a Final Soil Survey Report had been completed in 2006 and would be utilized for design. No updates should be required.

WRTE noted that the previous design had identified two (2) parcels as potentially hazardous sites. The following parcels may require further testing and assessment: The former gas station located at the corner of Flowing Wells Road and Columbia Road and the former dry cleaners located across Flowing Wells Road from the car dealership.

The project team discussed the parcels that are potential displacements and the possibility of using them for both stormwater management (underground detention) and greenspace (pocket parks). Specifically, the parcels identified area located near the intersections of Pleasant Home Road, Old Trail Road, Martinez Elementary, and between Brockwood Drive and Columbia Road.

The project team discussed implementation of medians in several locations for traffic calming, to improve safety, provide pedestrian refuge areas, and to provide transition for roundabout alternatives.

The project team discussed alternatives to include landscaping of medians, roundabouts, shoulders, and pocket parks.

The project team discussed stormwater management and the outfall locations at Augusta Prep School and Martinez Elementary School. WRTE will mitigate stormwater release through detention ponds or underground detention systems. MS4 (water quality) requirements will be addressed through vegetative or structural BMPs.

The project team identified the following utilities: GA Power, Atlanta Gas, AT&T, Comcast, WOW Cable, Level 3 Communications, Charter Communications, Columbia County Broadband, and Columbia County Water/Sewer. County requested that the Surveyor call in a “design-locate” prior to field surveying tasks.

Edwards-Pitman will prepare the following studies in support of a GEPA document: Historic Resources, Archaeological Resources, Cultural Resources, Ecology Resources, Air Quality. EPEI noted that historic resources were previously identified during the “5-Lane Project” and the potential for more properties to now be eligible.

WRTE noted that Public Involvement would include a PIOH following Preliminary Plans and Stakeholder Meetings would be scheduled following Concept.

Meeting Minutes – Flowing Wells Road

WRTE noted that Concept Development would include identification of parcels for R/W acquisition and easements. WRTE will coordinate with Columbia County Property Acquisition Department for developing R/W Cost Estimates.

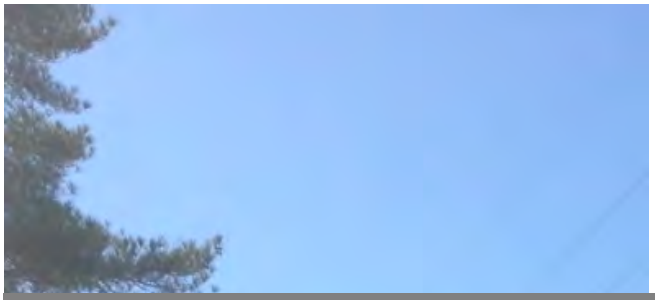
WRTE discussed the proposed schedule and GDOT TIA noted that Concept Report could be submitted prior to completion of the Traffic Study as the current concept layout meets the intended benefit of the TIA Project.

KICK-OFF MEETING
SIGN-IN SHEET

Date:	08/19/2015	**Time:**	1:30 p.m.
Location:	Columbia County, 630 Ronald Reagan Drive, Building A, East Wing, Evans GA 30809		
Project No.:	PI 250600 (TE 15-025)	**Project Name:**	Flowing Wells Road from I-20 to SR 104 Washington Road TIA Project

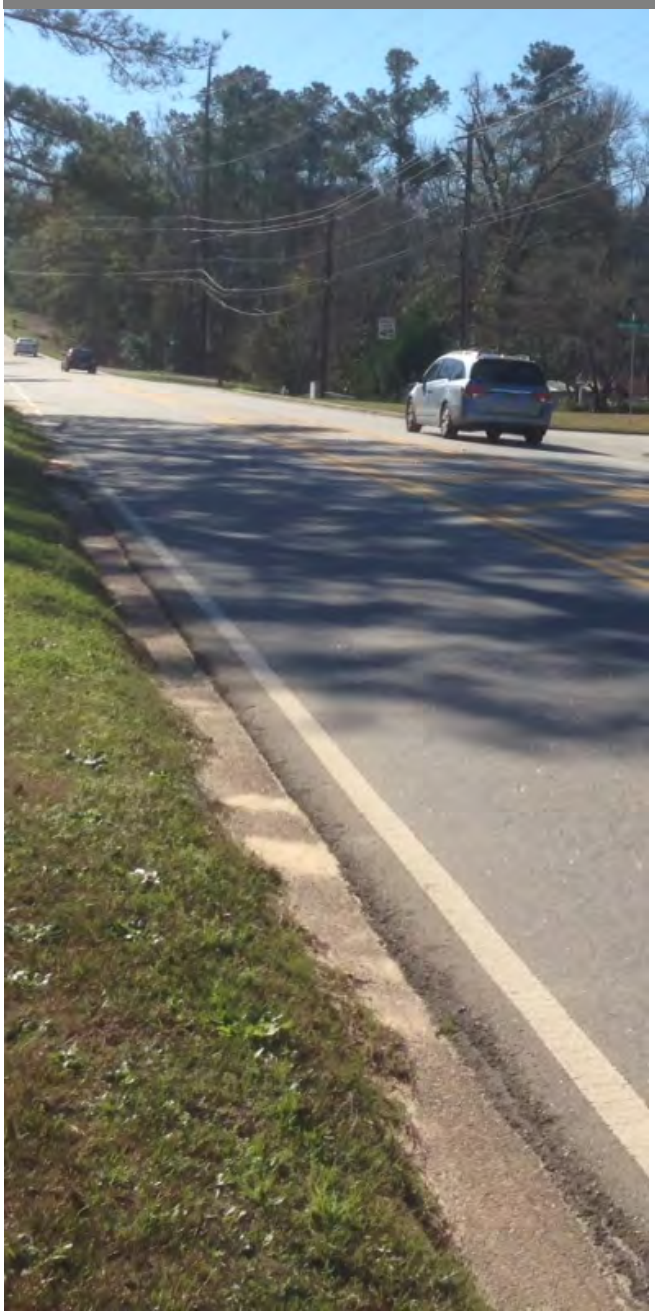
ATTENDING

Name	*Organization*	*Phone*	*Email*
Erik Hammarlund	WRTE	706 722-4114	ehammarlund@wrtoole.com
GEORGE BREWER	GDOT-TIA	706-832-0917	gbrewer@dot.ga.gov
Kenneth Franks	GDOT-TIA	404-631-1568	kfranks@dot.ga.gov
Bob Baisden	WRTE	706 722-4114	RBAISDEN@WRTOOLE.COM
KEVIN SKINNER	POND	678 336 7740	Skinnerk@pondco.com
Tim Matthews	POND	404-272-1455	matthewst@pondco.com
Matt Schlachter	Col. Co.	706-868-3356	mschlachter@columbiacountyga.gov
Richard Fangmann	POND	678-336-7740	FangmannR@Pondco.com
JOSH EARHART	Edwards-Pitman	770-333-9484	jearhart@edwards-pitman.com
Steve Exley	Col Co	706 447 7602	sexley@columbiacountyga.gov



FLOWING WELLS ROAD

TRAFFIC OPERATIONS ANALYSIS



DRAFT | JANUARY 2016

POND

Architects ▪ Engineers ▪ Planners

FLOWING WELLS ROAD

TRAFFIC OPERATIONS ANALYSIS

DRAFT | JANUARY 2016

Pond Project # 1160098

PREPARED BY:

Pond & Company
3500 Parkway Lane, Suite 600
Peachtree Corners, GA 30092
www.pondco.com
678.336.7740

PREPARED FOR:

W.R. Toole Engineers &
Columbia County

INTRODUCTION

Flowing Wells Road is a minor arterial two-lane road in Columbia County that provides north-south connectivity between Exit 195 on I-20 and SRs 232/Columbia Road and 104/Washington Road. The corridor is targeted for widening to incorporate additional auxiliary lanes and raised medians for access management. **Figure 1** illustrates the project and its limits.

Existing traffic signals within the study area are found at intersections of:

- Mason McKnight Jr. Parkway/Wheeler Road
- Old Trail Road/Augusta Preparatory Day School
- SR 232/Columbia Road
- SR 104/Washington Road

FLOWING WELLS ROAD AT WHEELER ROAD

Several constraints and additional considerations are accounted for in this study. Bike lanes are to be incorporated into this widening project, and will connect with other planned bike facilities to the south to expand the County's bicycle connections. Additionally, two schools (Augusta Preparatory Day School and Martinez Elementary School) are located on the west side of Flowing Wells Road and generate pedestrian traffic that consists of children and parents at pick-up and drop-off times. This study investigates operations at each school driveway and analyzes potential intersection treatments that may be necessary to improve traffic operations and to improve pedestrian accommodations.

Lastly, this study considers corridor volumes to investigate the feasibility of potential treatments such as roundabouts and signalization of currently unsignalized intersections using the HCM 2010 Roundabout analysis methodology and Federal Highway Administration (FWHA) signal warrants.

FIGURE 1
PROJECT LOCATION MAP

STUDY DATA

As a traffic operations review, this study focused on traffic counts, development of potential future traffic demand, crashes along the corridor, and field observations.

TRAFFIC COUNTS

Based on coordination with Columbia County, the following ten (10) intersections were identified for weekday peak period turning movement counts:

1. Flowing Wells Road at Washington Road (SR 104)
2. Flowing Wells Road at Columbia Road (SR 232)
3. Flowing Wells Road at Martinez Elementary School southern driveway
4. Flowing Wells Road at Quail Springs Circle
5. Flowing Wells Road at Braddock Street
6. Flowing Wells Road at Old Trail Road
7. Flowing Wells Road at Pleasant Home Road
8. Flowing Wells Road at Day Road
9. Flowing Wells Road at Old Anderson Road
10. Flowing Wells Road at Wheeler Road/Mason McKnight Jr. Parkway

These counts were conducted on Wednesday, September 16, 2015 during a typical week when nearby schools were in session. **Figure 2** shows the observed peak hour turning movement volumes.

Additionally, daily vehicle counts were conducted at twenty-five (25) locations along the corridor:

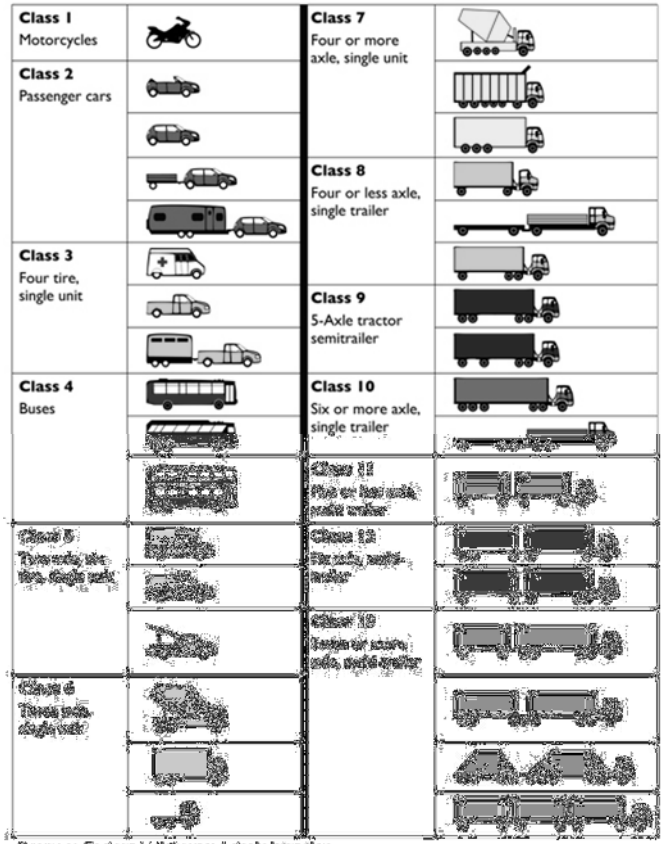
1. Wheeler Road west of Flowing Wells Road
2. Mason McKnight Jr. Parkway east of Flowing Wells Road
3. Flowing Wells Road between Wheeler Road/Mason McKnight Jr. Parkway and Old Anderson Road
4. Old Anderson Road east of Flowing Wells Road
5. Windridge Drive east of Flowing Wells Road
6. Day Road west of Flowing Wells Road
7. Birchtree Drive west of Flowing Wells Road
8. Pleasant Home Road east of Flowing Wells Road
9. Fair Oaks Road west of Flowing Wells Road
10. Fitzgerald Drive east of Flowing Wells Road
11. Flintrock Way east of Flowing Wells Road
12. Old Trail Road east of Flowing Wells Road
13. Old Trail Road west of Flowing Wells Road (Augusta Preparatory Day School driveway)
14. Braddock Street east of Flowing Wells Road
15. Flowing Wells Road between Braddock Street and Quail Springs Circle
16. Quail Springs Circle west of Flowing Wells Road
17. Tallman Drive east of Flowing Wells Road
18. Martinez Elementary School southern driveway east of Flowing Wells Road
19. Flowing Wells Road south of Brockwood Drive
20. Brockwood Drive east of Flowing Wells Road
21. Columbia Road (SR 232) west of Flowing Wells Road
22. Columbia Road (SR 232) east of Flowing Wells Road
23. Flowing Wells Road between Columbia Road (SR 232) and Washington Road (SR 104)
24. Washington Road (SR 104) west of Flowing Wells Road
25. Washington Road (SR 104) east of Flowing Wells Road

These counts were also conducted on Wednesday, September 16, 2015. The raw count volumes are provided in **Appendix A**. These volumes were then balanced to create the design hour volumes for all scenarios. The 2015 design hour volumes are shown in **Figure 3**.

In addition to measuring the amount of traffic volume, vehicle classification data was also collected at count locations 3, 15, and 23. Results from these counts are shown in **Table 1**. Average daily traffic composition for single unit trucks is 6% and is 2% for multi-unit trucks.

TABLE 1
VEHICLE CLASSIFICATION BY LOCATION

CLASSES	CATEGORY	LOCATION #3	LOCATION #15	LOCATION #23
1-3	Passenger Vehicles	93%	90%	93%
4-7	Single Unit Trucks	5.5%	8.0%	5.0%
8-13	Combination Trucks	1.5%	2.0%	2.0%



Source: Federal Highway Administration

STUDY DATA

TRAFFIC FORECASTING

In order to accommodate traffic levels anticipated in the future, volumes were forecasted based on counts taken, historic traffic counts along the roadway, and model growth rates. The growth rate determined from these sources was then used to create a set of balanced design hour volumes.

Historic Counts

The Georgia Department of Transportation (GDOT) maintains a single count station along this corridor, station #0730269. This station is on Flowing Wells Road south of Columbia Road (SR 232). Count data for the last twenty-five years (1990-2014) is shown in **Table 2**. While significant growth was observed from 2000 to 2005, counts that are more recent suggest a declining trend in vehicular volumes along the road. Over the last twenty-five years, these observations indicate an annual compound growth rate of 1.99%, while over the last ten years they show an annual declining compound growth rate of -2.74%. Neither of these rates is strongly supported by the data, which is indicated by the correlation coefficients (R^2 values). This coefficient has a range from 0-1 and typically, a higher correlation coefficient indicates that the trend line offers a more accurate approximation of growth. The 10-year data fits its trend line more adequately than the 25-year data, with correlation coefficients of 0.6 and 0.491, respectively.

Model Growth

The regional traffic demand model used by the Augusta Regional Transportation Study (ARTS) was also examined. Modeled volumes in the existing (2010) model were compared to predicted volumes in the 2040 Existing plus Committed (E+C) projects model. Flowing Wells Road segments grew between 0.4% and 1.1% per year. The median annual compound growth rate was 0.7% per year.

Forecast Growth Rate

While recent GDOT ADT data suggest a decline in daily traffic, the ARTS model expects continued growth to occur, resulting in less than 1% growth in traffic per year. Therefore, a conservative annual compound growth rate of 1% per year was applied to all existing volumes to forecast the base (2020) and design year (2040) turning movements. The tube count that was recently recorded in proximity to the GDOT count location registered a daily volume of approximately 15,500, suggesting that the 2014 GDOT count may be somewhat low, and may be attributed to seasonal differences in traffic patterns. Applying a 1% per year compound annual growth rate to the 2015 ADT yields a 2040 design year ADT of approximately 19,900 vpd.

Balanced traffic volumes based on traffic counts and a 1% per year growth rate are shown in **Figures 2-4**, for years 2015, 2020, and 2040, respectively.

PEAK HOUR OF GENERATOR SCENARIOS

Peak hour turning movement counts typically were taken between 7-9 AM and 4-6 PM, with the assumption that the highest hourly volume occurs at some point within the 2-hour observation period. Each schools' AM peak traffic occurred approximately 15 minutes before or after the peak on Flowing Wells Road, but still within the same 2-hour block as the mainline (7-9 AM); however, each schools' PM peak traffic occurred much earlier (3 PM at the Augusta Preparatory Day School and at 3:15 PM at Martinez Elementary), resulting in a need to adjust the data collection time period. The PM peak hour counts at the two schools on Flowing Wells Road were taken during the 2-hour block from 3-5 PM to capture the peak hour of the school traffic, i.e., the generator.

With the expectation that during pick-up and drop-off times, extensive queuing may form on Flowing Wells Road, these "peak hour of generator" scenarios for each school were analyzed independently of the other intersections. Design hour volumes used for the school peaks are shown in **Figure 5**.

TABLE 2
HISTORIC GROWTH TRENDS ON FLOWING WELLS ROAD

YEAR	COUNT ID: 0730269 BETWEEN BROCKWOOD ST AND TALLMAN DR
1990	8,927
1991	9,392
1992	9,553
1993	10,100
1994	11,000
1995	9,700
1996	9,600
1997	11,200
1998	9,200
1999	9,400
2000	9,300
2001	12,700
2002	14,064
2003	16,090
2004	15,510
2005	16,250
2006	15,120
2007	14,360
2008	14,310
2009	14,340
2010	14,210
2011	13,870
2012	14,010
2013	13,920
2014	10,400
R^2	49.1%
AVERAGE ANNUAL GROWTH RATE	1.99%

FIGURE 2
2015 EXISTING PEAK HOUR TRAFFIC VOLUMES - AM (PM)

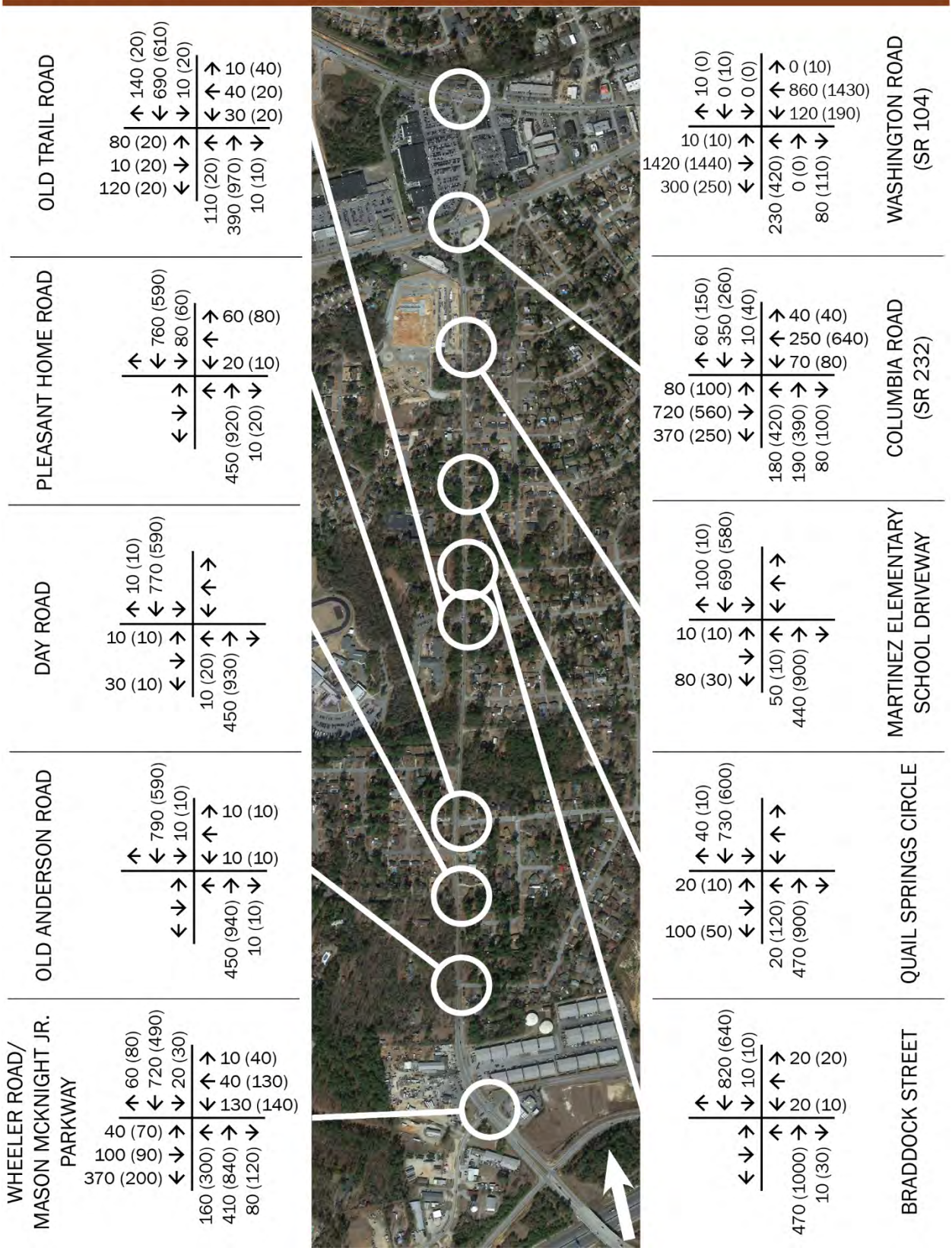


FIGURE 3
2020 OPENING YEAR PEAK HOUR TRAFFIC VOLUMES - AM (PM)

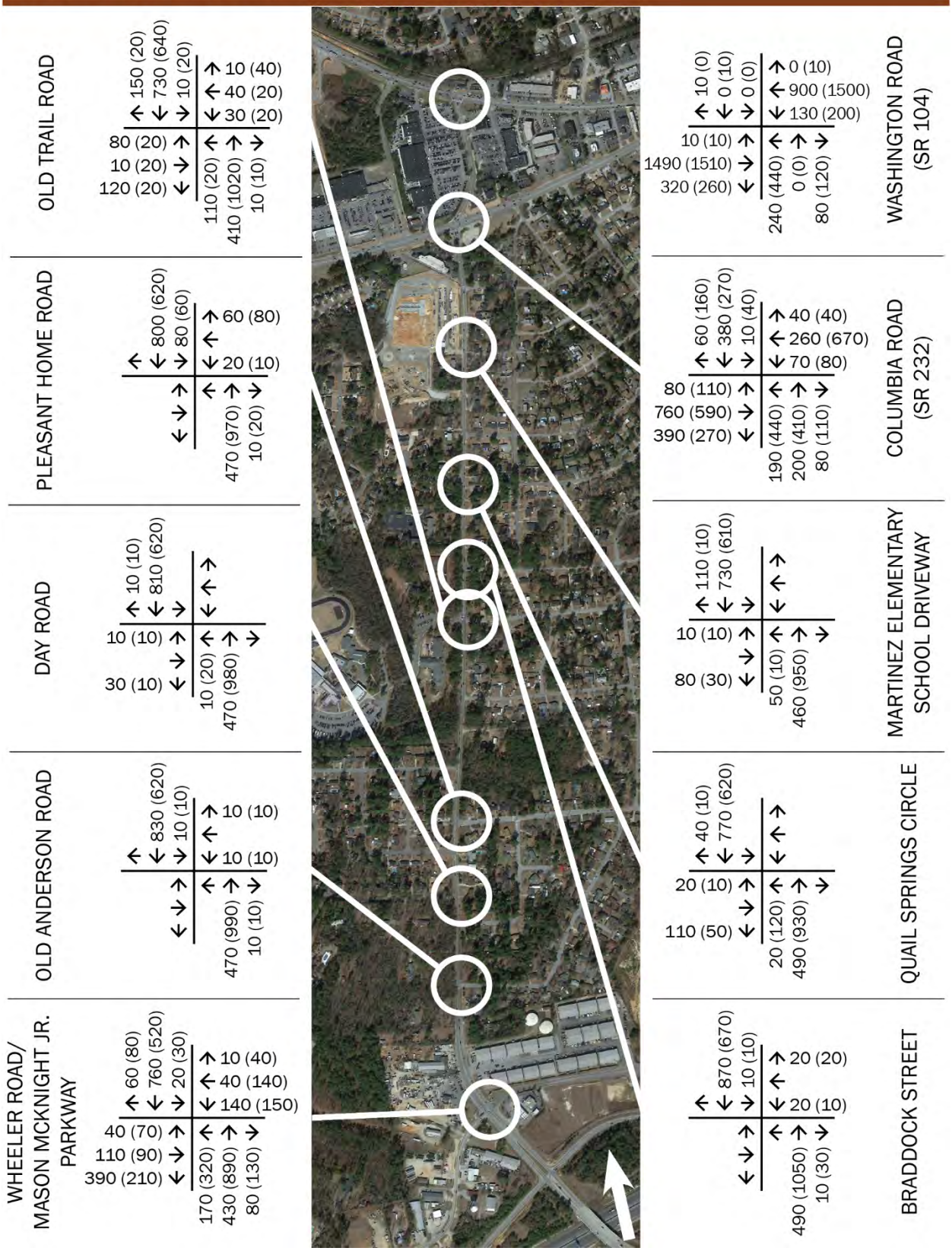


FIGURE 4
2040 DESIGN YEAR PEAK HOUR TRAFFIC VOLUMES - AM (PM)

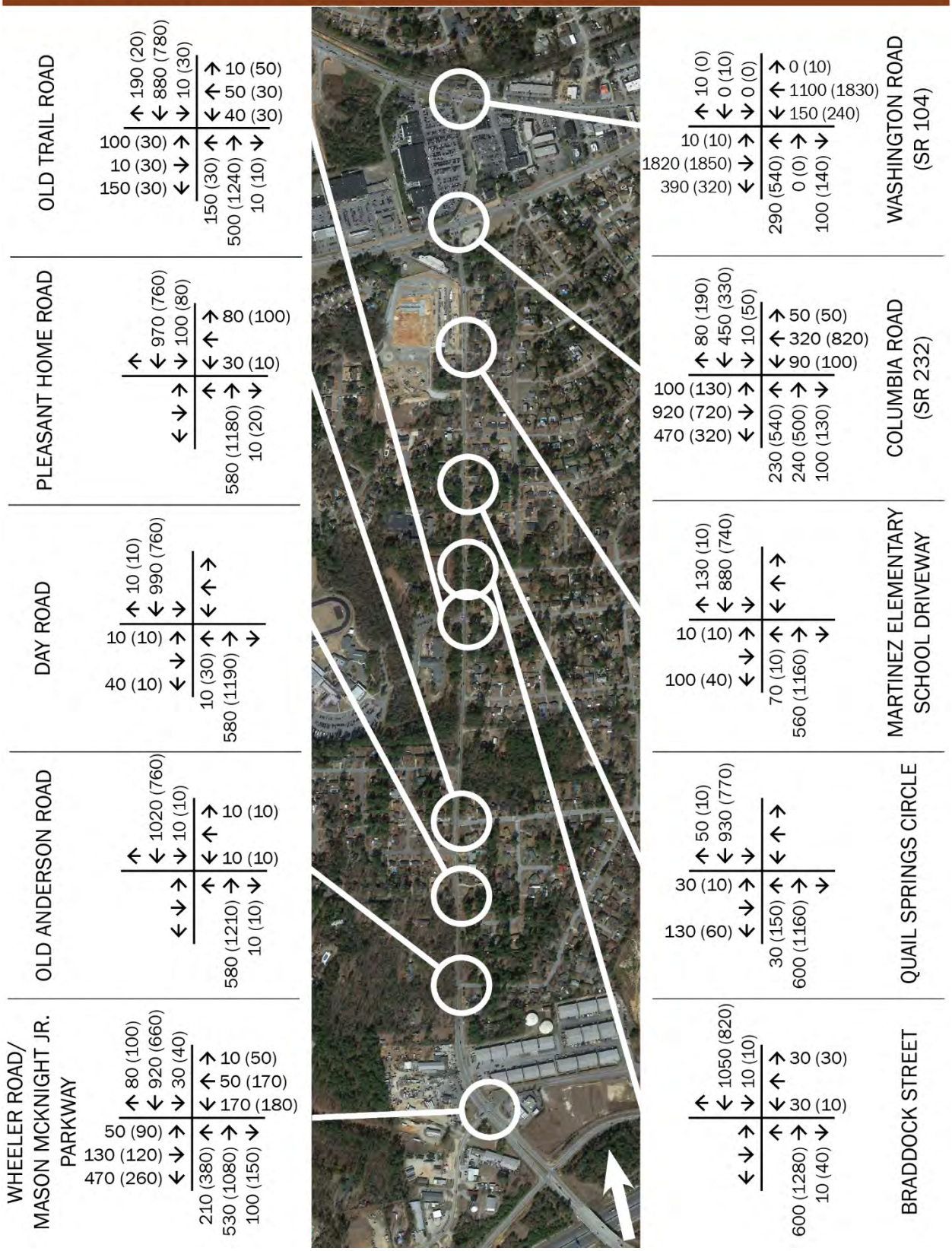
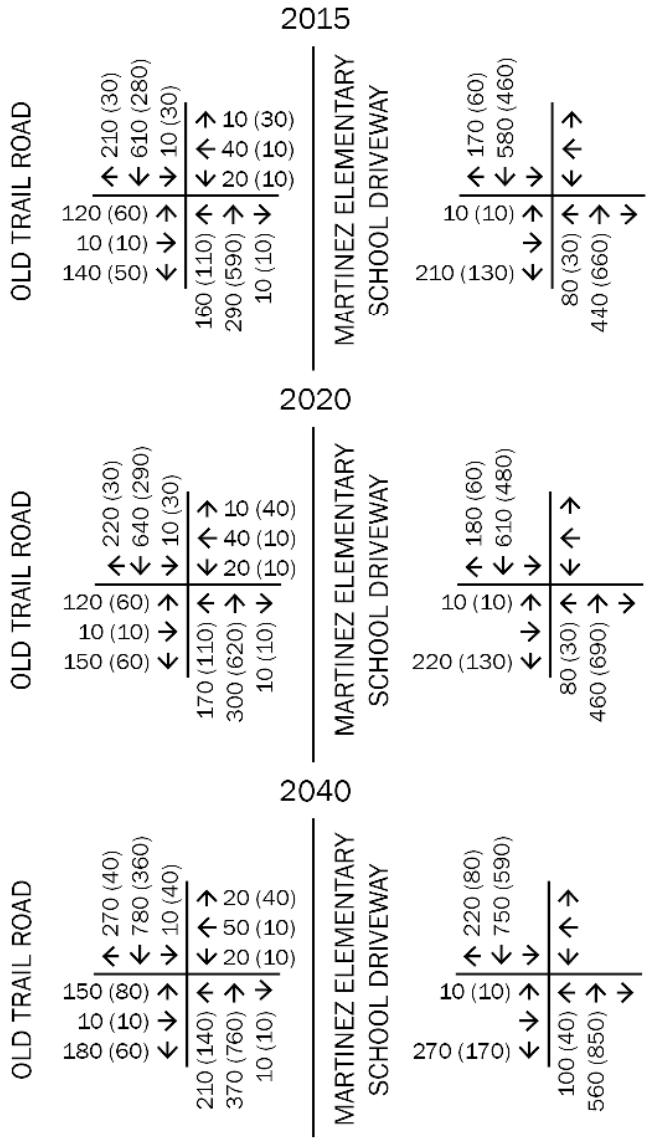


FIGURE 5
PEAK HOUR OF GENERATOR TRAFFIC VOLUMES - AM (PM)



2040 Build U-Turn Volumes

Access management is incorporated into the concept design for Flowing Wells Road and includes the addition of a raised concrete median to limit access at the side-street intersections shown below:

- Windridge Drive
- Birchtree Drive
- Fitzgerald Drive
- Brockwood Drive

As a result, the design considers the need to make U-turns at designated intersections. These locations are based on right-of-way constraints and other factors. For the purposes of analyzing the Build scenario, adjustments to peak hour turning movements were made at the designated U-turn locations, and are documented in **Table 3**. Final build volumes were rounded up to the nearest 10 vehicles.

TABLE 3
PEAK HOUR LEFT TURN VOLUMES WITH U-TURNS

LOCATION	AM PEAK HOUR			PM PEAK HOUR		
	NO-BUILD 2040 LTV	U-TURNS	TOTAL 2040 LTV	NO-BUILD 2040 LTV	U-TURNS	TOTAL 2040 LTV
MASON MCKNIGHT PKWY./ WHEELER RD. - SBLT	30	7	**37**	40	3	**44**
FLINTROCK WAY - NBLT	0	10	**10**	0	12	**16**
BRADDOCK ST. - SBLT	10	0	**10**	10	0	**11**
MARTINEZ ELEM. SCHOOL - NBLT	70	2	**72**	10	0	**12**

CRASH DATA

Crash data along the corridor for calendar years 2011 through 2014 were collected from GDOT via use of their GeoTraqs web interface. A summary of the crash data is provided in **Table 4**. Most notable is the high proportion of rear ends to total crashes.

TABLE 4
FLOWING WELLS ROAD CRASH SUMMARY (2011-2014)

CRASH TYPE	2011	2012*	2013	2014	TOTAL
ANGLED	9	0	8	31	48
HEAD ON	1	0	1	0	2
REAR END	32	2	26	72	132
SIDESWIPE	1	0	2	9	12
OTHER	6	1	1	6	14
TOTAL	49	3	38	118	208
OTHER CRASH CHARACTERISTICS					
PROPERTY DAMAGE ONLY	78%	100%	66%	76%	75%
INJURY CRASHES	22%	0%	34%	24%	25%
FATALITY CRASHES	0%	0%	0%	0%	0%

* Low crash total suggests that this year is a data outlier, or that the crash record for this year is not comprehensive.

The Columbia County Sherriff's Office was also able to provide a more thorough description of the corridor's crash history over the same time period, which was used to determine a crash rate for the roadway as a whole. As shown in **Table 5**, the crash rate observed along the corridor is substantially higher than the average statewide rate for similar roadways.

Additionally, through discussions with the Columbia County Sherriff's Office, the following four intersections with higher crash rates than normal were identified:

- Flowing Wells Road at Quail Springs Circle
- Flowing Wells Road at Old Trail Road
- Flowing Wells Road at Day Road
- Flowing Wells Road at Wheeler Road/Mason McKnight Jr. Parkway

TABLE 5
FLOWING WELLS ROAD CRASH RATE

AVERAGE DAILY TRAFFIC (1)	LENGTH (MILES)	2011-14 CRASHES	CRASH RATE (2)	STATEWIDE AVERAGE CRASH (3)
14,400	1.5	342	1084	610

(1) Average Daily Traffic based on 24-hour vehicle counts was utilized
(2) Per 100 Million Vehicle Miles
(3) Per 100 Million Vehicle Miles Traveled on Urban Minor Arterials (Source: GDOT Statewide Mileage, Travel & Accident Data – 2013)

ANALYSIS

ANALYSIS METHODOLOGY

The standard approach to defining traffic congestion is the use of Level of Service (LOS), a quantifiable measure of congestion that is correlated to the delay experienced by the average vehicle. LOS is measured on a letter grade scale from A to F, with LOS A indicating free-flow conditions and LOS F indicating severe congestion as shown in the graphic below. Typically, LOS D or better is considered satisfactory, with LOS E or F considered failing.

The *Highway Capacity Manual* (HCM) defines LOS at signalized intersections in terms of average control delay per vehicle, which is composed of initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Unsignalized intersection LOS is defined in similar terms, but with lower delay thresholds.

The HCM 2010 states that unsignalized intersections are associated with more uncertainty for users, as delays are less predictable than they are at signals, which can reduce a user's tolerance to delay. Unfortunately, limitations in the methodology also assume uniform gaps in traffic on major streets which often results in the analysis showing a significantly more conservative delay result for side street stop approaches.

Roundabouts share similar basic control delay formulation with two-way and all-way stop-controlled intersections, and as a result they share the same LOS thresholds as unsignalized intersections. **Table 6** presents LOS thresholds for all three intersection types.

TABLE 6
LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	SIGNALIZED AVERAGE DELAY (SEC/VEH)	UNSIGNALIZED/ ROUNDABOUT AVERAGE DELAY (SEC/VEH)
A	≤10.0	≤10.0
B	>10.0 AND ≤20.0	>10.0 AND ≤15.0
C	>20.0 AND ≤35.0	>15.0 AND ≤25.0
D	>35.0 AND ≤55.0	>25.0 AND ≤35.0
E	>55.0 AND ≤80.0	>35.0 AND ≤50.0
F	>80.0	>50.0

Analysis of the signalized and unsignalized intersections along the corridor was conducted with Synchro 9.0, utilizing HCM 2010 methodology, with the exception of the intersection with Washington Road. Due to limitations within HCM 2010 methodology, this intersection was analyzed using HCM 2000 methodology. Roundabout analysis was conducting utilizing the GDOT Roundabout Analysis Tool v2.1 which makes use of a modified HCM 2010 methodology that is calibrated to reflect a relative familiarity for roundabouts among road users.

CAPACITY ANALYSIS RESULTS

Tables 7 through 9 present the Level of Service and Control Delay (average delay in seconds per vehicle) for the 2015 existing traffic, 2020 build year traffic, and for 2040 design year traffic, respectively, under no-build conditions (if no improvements are made). Synchro output from the analysis is provided in **Appendix B**.

TABLE 7
2015 EXISTING LEVEL OF SERVICE AND DELAY SEC/VEH)

INTERSECTION ON FLOWING WELLS ROAD	TRAFFIC CONTROL	AM PEAK		PM PEAK	
		LOS	DELAY	LOS	DELAY
WASHINGTON ROAD (SR 104)	SIGNAL	F	149	F	92
COLUMBIA ROAD (SR 232)	SIGNAL	D	36	E	67
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	11	A	9
	EB STOP	C	24	C	20
QUAIL SPRINGS CIRCLE	NBL YIELD	A	10	A	9
	EB STOP	C	24	C	25
BRADDOCK STREET	SBL YIELD	A	9	B	11
	WB STOP	D	26	D	32
OLD TRAIL ROAD	SIGNAL	B	15	B	14
PLEASANT HOME ROAD	SBL YIELD	A	9	B	11
	WB STOP	C	23	D	28
DAY ROAD	NBL YIELD	A	10	A	9
	EB STOP	C	21	D	28

TABLE 7 CONT.
2015 EXISTING LEVEL OF SERVICE AND DELAY SEC/VEH)

INTERSECTION ON FLOWING WELLS ROAD	TRAFFIC CONTROL	AM PEAK		PM PEAK	
		LOS	DELAY	LOS	DELAY
OLD ANDERSON ROAD	SBL YIELD	A	9	B	10
	WB STOP	C	22	D	31
WHEELER ROAD/MASON MCKNIGHT JR. PARKWAY	SIGNAL	F	97	C	33
SCHOOL PEAKS					
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	11	A	9
	EB STOP	E	37	C	18
OLD TRAIL ROAD	SIGNAL	B	18	B	12

TABLE 8
2020 NO BUILD LEVEL OF SERVICE AND DELAY (SEC/VEH)

INTERSECTION ON FLOWING WELLS ROAD	TRAFFIC CONTROL	AM PEAK		PM PEAK	
		LOS	DELAY	LOS	DELAY
WASHINGTON ROAD (SR 104)	SIGNAL	F	153	F	107
COLUMBIA ROAD (SR 232)	SIGNAL	D	40	E	73
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	11	A	9
	EB STOP	D	26	C	21
QUAIL SPRINGS CIRCLE	NBL YIELD	A	10	A	10
	EB STOP	D	27	D	28
BRADDOCK STREET	SBL YIELD	A	9	B	11
	WB STOP	D	29	E	36
OLD TRAIL ROAD	SIGNAL	B	16	B	15
PLEASANT HOME ROAD	SBL YIELD	A	9	B	11
	WB STOP	D	25	D	31
DAY ROAD	NBL YIELD	A	10	A	9
	EB STOP	C	22	D	31
OLD ANDERSON ROAD	SBL YIELD	A	9	B	11
	WB STOP	C	23	D	34
WHEELER ROAD/MASON MCKNIGHT JR. PARKWAY	SIGNAL	F	111	D	35
SCHOOL PEAKS					
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	11	A	9
	EB STOP	E	47	C	19
OLD TRAIL ROAD	SIGNAL	B	18	B	12

TABLE 9
2040 NO BUILD LEVEL OF SERVICE AND DELAY (IN SEC/VEH)

INTERSECTION ON FLOWING WELLS ROAD	TRAFFIC CONTROL	AM PEAK		PM PEAK	
		LOS	DELAY	LOS	DELAY
WASHINGTON ROAD (SR 104)	SIGNAL	F	253	F	196
COLUMBIA ROAD (SR 232)	SIGNAL	E	60	F	112
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	13	A	10
	EB STOP	E	46	D	30
QUAIL SPRINGS CIRCLE	NBL YIELD	B	11	B	10
	EB STOP	F	69	F	82
BRADDOCK STREET	SBL YIELD	A	9	B	13
	WB STOP	F	62	F	64
OLD TRAIL ROAD	SIGNAL	C	30	D	41
PLEASANT HOME ROAD	SBL YIELD	A	10	B	13
	WB STOP	F	71	F	69
DAY ROAD	NBL YIELD	B	11	A	10
	EB STOP	D	31	F	58
OLD ANDERSON ROAD	SBL YIELD	A	9	B	12
	WB STOP	D	35	F	60
WHEELER ROAD/MASON MCKNIGHT JR. PARKWAY	SIGNAL	F	152	E	59
SCHOOL PEAKS					
MARTINEZ ELEMENTARY SCHOOL SOUTHERN DRIVEWAY	NBL YIELD	B	13	A	10
	EB STOP	F	190	D	29
OLD TRAIL ROAD	SIGNAL	D	43	B	16

The capacity analysis of the intersections along the corridor under "no-build" conditions suggests that the intersections with Wheeler Road/Mason McKnight Jr. Parkway and Washington Road are already failing. It also suggests that the approaches of all stop-controlled approaches except for Martinez Elementary School will be failing during at least one peak of Flowing Wells Road by 2040. In addition, it suggests that the approach from the Martinez Elementary School driveway will be failing during the school's morning peak period.

INTERSECTION IMPROVEMENT ANALYSIS

In order to maintain an acceptable LOS along Flowing Wells Road, potential improvements were analyzed in order to assess their potential impacts to delay. The following sections investigate existing or potential signalized locations and other minor stop-controlled intersections for opportunities to improve efficiency and safety.

Existing or Potentially Signalized Intersections

Washington Road (SR 104) at Flowing Wells Road

Washington Road is a principal arterial and a primary travel route for the northwest Augusta region. It serves as the primary connection from Evans through Martinez and into Augusta itself. As such, it is a heavily travelled corridor, which is reflected in the performance of this intersection. Current signal timing currently prioritizes vehicles moving along Washington Road over all others. As traffic volumes change, Columbia County and GDOT should work together to ensure that optimal timings are being used at this intersection, as well as others.

The northbound approach of Flowing Wells Road currently experiences substantial delay. In order to help relieve some of this delay, additionally auxiliary lanes should be added. Traffic volumes are sufficient to necessitate dual left turn lanes at this intersection. In addition, a yield-controlled, channelized right turn lane (RTL) could be added to this approach. The existing driveway that makes up the fourth leg of the signal, creates additional phasing needs and ideally should be relocated, closed, or connected to an adjacent driveway through an inter-parcel connection. The intersection-level LOS and delay (in seconds per vehicle) for the intersection with and without this improvement are shown in **Table 10**.

TABLE 10
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT WASHINGTON ROAD 9SR 104)

SCENARIO	AM PEAK		PM PEAK	
	LOS	DELAY	LOS	DELAY
2015 NO BUILD	F	149	F	92
2020 NO BUILD	F	153	F	107
2020 WITH IMPROVEMENTS	B	15	C	25
2040 NO BUILD	F	253	F	196
2040 WITH IMPROVEMENTS	C	24	D	49

Columbia Road (SR 232) at Flowing Wells Road

The intersection of Flowing Wells Road and SR 232/Columbia Road is approaching an overcapacity condition, with PM LOS in the "E" range currently. Notably, the northbound approach leg of Flowing Wells Road offers an opportunity to improve capacity by adding a second left turn lane in the northbound direction. The southbound right turn volume also supports the addition of a right turn lane, if the necessary right-of-way is available. Intersection-level LOS and delay (in seconds per vehicle) for this intersection as it currently exists and with geometric modifications and signal timing adjustments are shown in **Table 11**.

TABLE 11
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT COLUMBIA ROAD (SR 232)

SCENARIO	AM PEAK		PM PEAK	
	LOS	DELAY	LOS	DELAY
2015 NO BUILD	D	36	E	67
2020 NO BUILD	D	40	E	73
2020 WITH IMPROVEMENTS	C	32	C	31
2040 NO BUILD	E	60	F	112
2040 WITH IMPROVEMENTS	D	40	D	37

Martinez Elementary School Driveway

To identify the appropriate treatment for the main driveway to the Martinez Elementary School, several alternatives were considered, including signalization and conversion to a roundabout.

In order to assess the need to signalize the intersection, daily traffic counts were used to perform a signal warrant analysis, based on warrants provided in the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). This analysis reveals that volumes to and from the school are not substantial enough to warrant use of a signal as traffic control. Complete signal warrant analysis results are included in **Appendix C**.

GDOT provides guidance on the selection of suitable roundabout locations that is based on the daily entering volume at the proposed location and the distribution of that traffic between the major and minor roads. Ideally, the total ADT in a single-lane roundabout should not exceed 25,000 vehicles per day (vpd) and less than 90% of the total traffic should come from the major road. While the total daily volume expected to travel through the intersection does not exceed 25,000 vpd, over 95% of the traffic is expected on Flowing Wells Road. With a condition such as this, the major road will be delayed unnecessarily and the minor road traffic will have very limited gaps in traffic to enter the roundabout. In addition to this volume analysis, a roundabout in this location may present a difficulty to schoolchildren who would be asked to navigate an intersection with high volumes, potential free-flow movements, and no method to control traffic either through the red phase of a signal or through supplemental use of a crossing guard. A roundabout at this location is not recommended.

Geometric improvements that can be made to the intersection include the construction of a southbound right turn lane to store queued vehicles and to potentially

provide a secondary pick-up and drop-off for parents and children. A northbound left turn lane in the median is also necessary to provide storage for left turning vehicles. Lastly, to take two southbound lanes on Flowing Wells Road through the intersection with the school's driveway before tapering to one will make the EB right turn easier. With the assumption that traffic at this intersection peaks with the pick-up and drop-off of children, **Table 12** provides the LOS and delay (in seconds per vehicle) for the peak hour of the generator, approximately 7:30 AM and 3:00 PM.

TABLE 12
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT MARTINEZ ELEMENTARY; PEAK HOUR OF GENERATOR

SCENARIO	APPROACH	AM PEAK		PM PEAK	
		LOS	DELAY	LOS	DELAY
2015 NO BUILD	EB	E	37	C	18
	NBL	B	11	A	9
2020 NO BUILD	EB	E	47	C	19
	NBL	B	11	A	9
2020 WITH IMPROVMENTS	EB	C	17	B	14
	NBL	B	10	A	9
2040 NO BUILD	EB	F	190	D	29
	NBL	B	13	A	10
2040 WITH IMPROVEMENTS	EB	C	25	C	17
	NBL	B	11	A	10

Quail Springs Circle at Flowing Wells Road
To identify if there is an alternative treatment that would improve operations at Quail Springs Circle, conversion to a roundabout was considered.

GDOT provides guidance on the selection of suitable roundabout locations that is based on the daily entering volume at the proposed location and the distribution of that traffic between the major and minor roads. Ideally, the total ADT in a single-lane roundabout should not exceed 25,000 vehicles per day (vpd) and less than 90% of the total traffic should come from the major road. While the total daily volume expected to travel through the intersection does not exceed 25,000 vpd, over 94% of the traffic is expected on Flowing Wells Road. With a condition such as this, the major road will be delayed unnecessarily and the minor road traffic will have very limited gaps in traffic to enter the roundabout. A roundabout at this location is not recommended.

A northbound left turn lane in the median is recommended. This will have an effect on the potential for rear end collisions.

Old Trail Road at Flowing Wells Road
A roundabout can offer an improvement to a traffic signal in certain instances, and as such, a roundabout was studied at this location to determine, if any, the benefits to delay when compared to traditional signalized control. With the assumption that traffic at this intersection peaks with the pick-up and drop-off of children at Augusta Preparatory Day School, **Table 13** provides the LOS and delay (in seconds per vehicle) for the peak hour of the generator, approximately 7:30 AM and 3:00 PM.

TABLE 13
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT OLD TRAIL ROAD; PEAK HOUR OF GENERATOR

SCENARIO	AM PEAK		PM PEAK	
	LOS	DELAY	LOS	DELAY
2015 NO BUILD	B	18	B	12
2020 NO BUILD	B	18	B	12
2020 ROUNDABOUT	D	34	C	17
2040 NO BUILD	D	43	B	16
2040 ROUNDABOUT	E	42	C	21

The findings seen in **Table 13** above suggest that a roundabout at this location would only increase delay, particularly during the AM peak drop-off, which occurs during the general peak hour of traffic on Flowing Wells Road. The southbound traffic on Flowing Wells Road would exceed the capacity of a single lane roundabout, and the eastbound traffic from the Augusta Preparatory Day School would also suffer from lack of vehicle gaps in circulating traffic.

Overall, the intersection is operating efficiently as a traffic signal. The addition of a northbound right turn deceleration lane could improve that movement and reduce rear-end collision risk.

FLOWING WELLS ROAD AT MARTINEZ ELEM.

Pleasant Home Road at Flowing Wells Road
The existing side-street stop controlled "T" intersection at Pleasant Home Road does not experience excessive delays, currently. A proposed conversion to a roundabout could offer some improvement to traffic flow, in certain instances. A roundabout analysis was conducted at this location to identify the benefits, if any, that converting the "T" intersection would provide. The results are presented in **Table 14**.

TABLE 14
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT PLEASANT HOME ROAD

SCENARIO	AM PEAK		PM PEAK	
	LOS	DELAY	LOS	DELAY
2015 NO BUILD WB STOP	C	23	D	28
2020 NO BUILD WB STOP	D	25	D	31
2020 ROUNDABOUT WB LEG	A	7	B	14
2020 ROUNDABOUT SB LEG	D	33	B	13
2020 ROUNDABOUT NB LEG	B	11	F	52
2020 L/R TURN LANES	B	14	D	25
2040 NO BUILD WB STOP	F	71	F	69
2040 ROUNDABOUT WB LEG	A	7	B	12
2040 ROUNDABOUT SB LEG	E	47	B	14
2040 ROUNDABOUT NB LEG	B	11	F	78
2040 L/R TURN LANES	C	18	E	42

The results in **Table 14** show that while a roundabout would improve the side-street delay, the major street operations would worsen from a free-flowing condition to potential failure by the 2020 PM peak. In this instance, it is likely that the roundabout fails because a high percentage of the entering traffic is coming from the major street.

Constructing left and right turn lanes for the side street will improve some operations, as seen in **Table 14**.

Mason McKnight Jr. Parkway at Flowing Wells Road
The delay experienced at this intersection is disproportionately caused by the heavy eastbound right turns. Currently, right-turning vehicles use a shared through-right lane, which severely limits their ability to make turns during red lights. The addition of a dedicated right turn lane to this approach could dramatically reduce delay at this intersection. A heavy northbound left turn movement also supports the addition of a second left turn lane to improve capacity. With development plans east of the intersection, a WB right turn lane is also recommended if traffic growth is expected to increase. **Table 15** presents delay estimations for the no-build scenario and a scenario with a dedicated right turn lane (RTL) on the eastbound approach, a dual NB left turn lane, and a dedicated WB RTL.

TABLE 15
LEVEL OF SERVICE AND DELAY (SEC/VEH) AT FLOWING WELLS ROAD AT MASON MCKNIGHT JR. PKWY/WHEELER ROAD

SCENARIO	AM PEAK		PM PEAK	
	LOS	DELAY	LOS	DELAY
2015 NO BUILD	F	97	C	33
2020 NO BUILD	F	111	D	35
2020 WITH IMPROVEMENTS	C	23	C	25
2040 NO BUILD	F	152	E	59
2040 WITH IMPROVEMENTS	C	26	C	31

Other Minor Unsignalized Intersections
In addition to the major intersections described in the previous section, there are several unsignalized "T" intersections, with minor street approaches controlled by side-street stop signs. Those intersections are with:

- Old Anderson Road
- Wind Ridge Road
- Day Road
- Birchtree Drive
- Fair Oaks Road
- Fitzgerald Drive
- Flintrock Way
- Braddock Street
- Tallman Drive
- Brockwood Drive

At these locations, the recommended treatment depends on ADT, crash history, and other constraints (right-of-way, i.e.). The intersection at Day Road was identified by the Columbia County Police Department as having an elevated crash rate, and as such, left and right turn lanes are recommended to reduce the potential for rear-end collisions. Turning movement volumes at Braddock Street and Tallman Drive support the use of auxiliary left and right turn lanes. Daily traffic on the remaining minor streets are very low and access management through a raised median could be incorporated to reduce conflict points along the Flowing Wells Road corridor. If access to these minor streets is not restricted, the use of a left turn lane within the median is recommended.

Recommended Turn Lane Lengths

Three methods are used to estimate appropriate turn lane length for auxiliary turn lanes. The calculated 95th percentile queue length from Synchro and the estimated queue length based on the anticipated number of arrivals at the intersection within 1.5 cycles of a signal, or within 2 minutes at an unsignalized approach, are compared to GDOT minimums and the most conservative value of the three is used as the design length. It is understood that constraints on the corridor may preclude the use of GDOT minimums, and in these instances, the maximum value of the other two methods should be used. For design speeds of 45 miles per hour (mph) on the corridor, the GDOT minimum right turn lane length is 175' and minimum left turn lane length is 235'. For design speeds of 35 mph, the GDOT minimum right turn lane length is 100' and minimum left turn lane length is 160'. Design recommendations for turn lane lengths based on Synchro and on the calculated value derived from assumed arrival patterns are found in **Table 16**.

TABLE 16
RECOMMENDED MINIMUM STORAGE LENGTH OF TURN LANES

CROSS-STREET	LANE	SYNCHRO Q (FT)	CALC. Q (FT)	MIN. STORAGE (FT)
WASHINGTON ROAD	Dual NBL	316	242	320
	NBR	56	251	260
COLUMBIA ROAD	Dual NBL	272	211	300
	NBR	53	203	210
	SBL	45	78	80*
	SBR	115	297	300
MARTINEZ ELEMENTARY SCHOOL DRIVEWAY	NBL	16	84	90*
	SBR	0	184	190
	EBL	22	9	30
	EBR	110	225	230
QUAIL SPRINGS CIRCLE	NBL	17	125	125*
	SBR	0	42	50*
	EBR	49	109	110
BRADDOCK STREET	SBL	9	9	50*
	NBR	0	34	50*
OLD TRAIL ROAD	NBL	323	295	330
	NBR	0	14	50*
	SBL	18	56	80*
	SBR	140	380	380
	WBR	26	70	70
	EBR	59	253	260
PLEASANT HOME ROAD	SBL	13	84	90*
	NBR	0	17	50*
	WBR	57	84	90
DAY ROAD	NBL	3	25	50*
	SBR	0	9	50*
OLD ANDERSON ROAD	SBL	2	9	50*
	NBR	-	-	lane drop
WHEELER ROAD/ MASON MCKNIGHT JR. PARKWAY (35MPH)	Dual NBL	92	188	190*
	NBR	8	148	150*
	SBL	38	40	160*
	SBR	8	99	100*
	WBL	143	178	180
	WBR	0	49	50*
	EBL	77	89	90*
	EBR	341	465	470

* Denotes when GDOT minimum exceeds estimated actual queue length

CONCLUSIONS

The Conclusions chapter outlines the recommended improvements at each intersection and provides some general recommendations related to the signing of U-turn prohibition, crosswalk treatment and bike lane features.

INTERSECTION IMPROVEMENT RECOMMENDATIONS

Washington Road (SR 104) at Flowing Wells Road

- Remove or relocate the northern leg of this intersection to reduce the number of movements requiring signalized traffic control
- Construct an EB and a NB right turn lane
- Construct dual NB left turn lanes

Columbia Road (SR 232) at Flowing Wells Road

- Construct dual NB left turn lanes
- Lengthen NB right turn lane

Brockwood Drive at Flowing Wells Road

- Relocate the existing crosswalk to the south leg of this "T" intersection, and as an option, create a raised concrete median to serve as a pedestrian refuge island to help with crossings.

Martinez Elementary School Main Driveway at Flowing Wells Road

- Construct a SB right turn lane that can double as a pick-up and drop-off point if queues within the school's parking lot are long.
- Construct a NB left turn lane in the median

Quail Springs Circle at Flowing Wells Road

- Retain full access with Flowing Wells Road and construct NB and SB left and right turn lanes

Braddock Street at Flowing Wells Road

- Retain full access with Flowing Wells Road and construct NB and SB left and right turn lanes
- Potential U-turn point for SB U-turns; construct adequate eye-brows for turning radii

Old Trail Road at Flowing Wells Road

- Construct a NB right turn lane

Flintrock Way at Flowing Wells Road

- Retain full access with Flowing Wells Road and construct SB left turn lane in the median
- Potential U-turn point for NB U-turns; construct adequate eye-brows for turning radii

Pleasant Home Road at Flowing Wells Road

- Widen WB approach to include dedicated left and right turn lanes
- Construct NB right turn deceleration lane

Day Road at Flowing Wells Road

- Retain full access with Flowing Wells Road and construct NB and SB left and right turn lanes

Old Anderson Road at Flowing Wells Road

- Potential U-turn point for SB U-turns; construct SB left/U-turn lane and adequate eye-brows for turning radii

Wheeler/Mason McKnight Jr. Pkwy. at Flowing Wells Rd.

- Construct EB and WB right turn lane
- Construct dual NB left turn lanes

Recommended turn lane lengths, based on estimates of required storage, are located in **Table 16** in the previous section. As noted, reported values in this table are intended to reflect the length of full width storage space required for each turning movement based on Synchro estimations as well as an expected queue length derived from assumed arrival rates. It is understood that constraints on this corridor may limit the number and length for auxiliary lanes and these constraints may preclude the use of GDOT minimum turn lane lengths in some instances. At a minimum, if GDOT recommended lengths are not feasible, the turn lanes should be designed using values in **Table 16**.

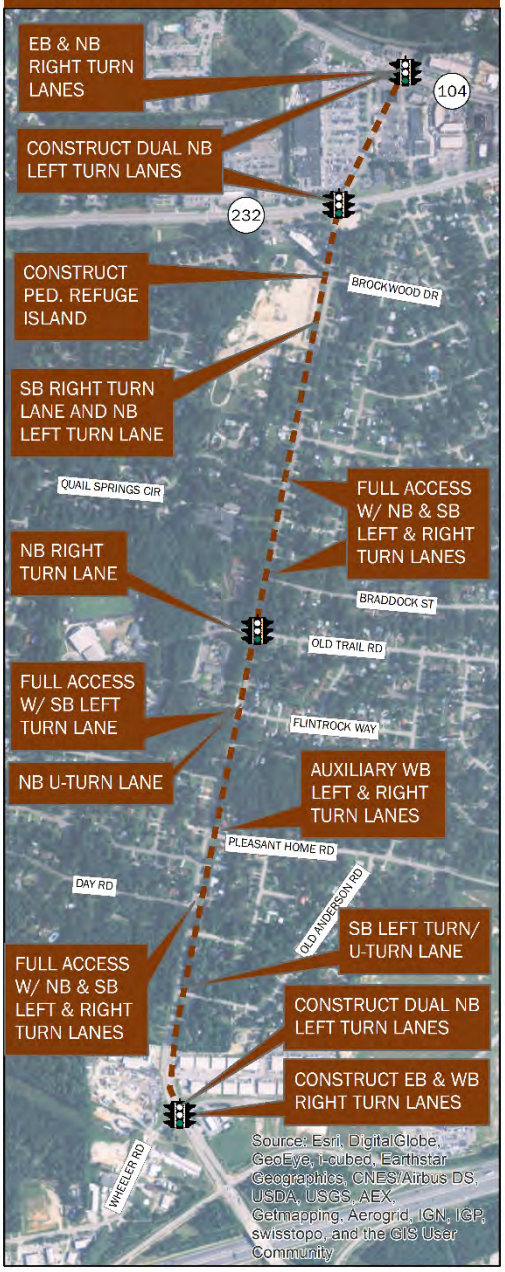



FIGURE 6
RECOMMENDED IMPROVEMENTS