GDOT INTERSECTION CONTROL EVALUATION (ICE) TOOL

VERSION 2.3 USER GUIDE

The GDOT Intersection Control Evaluation (ICE) v2.3 Tool is an open-source Excel workbook that includes eight worksheets, each containing information and data inputs to complete an ICE analysis. Note that the ICE tool computations require input on multiple worksheets that continually update analysis results; therefore, no results should be considered final until all worksheets are fully complete.

The Frequently Asked Questions **(FAQ) Worksheet** provides information on ICE updates and answers to common questions analysts have. The **Intersections Worksheet** provides illustrations and descriptions for each intersection type, as well as links to national publications that describe each intersection type in greater detail.

GDOT ICE Tool: Introduction Worksheet

Both full ICE studies and Waiver requests begin by filling out the information on the **Introduction Worksheet**. A blank Introduction worksheet requesting project info and traffic data is illustrated as **Figure 1**. The project data info, illustrated for the example project in **Figure 2**, requires the following:

- Project number and responsible person/agency
- Drop down box of the County where the project is located (GDOT District Office auto-populates)
- Major/Minor Road names & speed limits (drop down)

Note: For corridor projects, please number intersections and provide a study area map showing numbered intersections

Introduction Tab Input

Major Road:	1. Cobb Parkway
Crossing Road:	Barrett Parkway

Stage 1 Tab Format

GDOT PI #	
Project Location:	1. Cobb Parkway @ Barrett Parkway

- Major Street direction and area type (rural, suburban/ transition, or urban) -- both drop down menus
- Existing intersection control
- Name of preparing firm and analyst
- Date, internal project ID, and brief project description

Figure 3 illustrates the project example traffic data entry. The first entries (upper left) are existing and project Opening and Design years, reflecting the year improvements are expected to be complete (open to traffic) and expected design life of the improvements (typically Opening Year + 20 years).

Next, input existing AM and PM peak hour volumes, truck percentages and pedestrian crossings for each approach (if available) using the tables outside the worksheet print border. This data is automatically copied into the data entry graphic. Other inputs include the annual growth rate (historical or model based) and the daily K-factor (upper right).

The worksheet will auto-calculate daily intersection entry and approach volumes and Average Daily Traffic (ADT) volumes for existing, opening-year and design-years. If peak hour and/or ADT volumes are known from other sources, the calculated volumes can be overwritten using the table outside worksheet print border.

Figure 1: Blank Introduction Worksheet Data Input

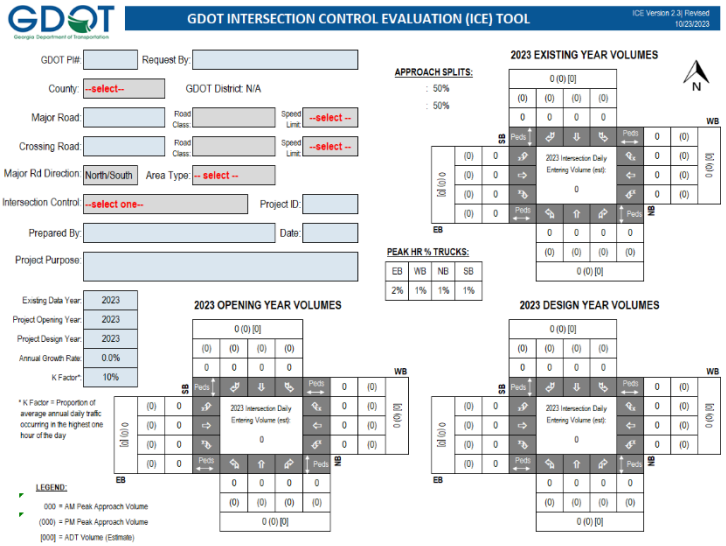
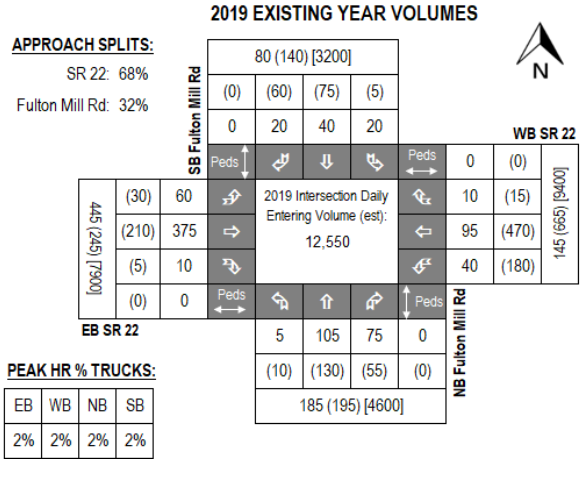


Figure 2: Project Information (Example Case)

GDOT PI#:	0013332	Request By:	District Engineer		
County:	Bibb	GDOT District: 3 - Thomaston			
Major Road:	SR 22	Road Class:	Minor Arterial	Speed Limit:	55 mph
Crossing Road:	Fulton Mill Rd	Road Class:	Minor Collector	Speed Limit:	45 mph
Major Road Direction:	East/West	Area Type:	Rural		
Intersection Control:	Conventional (Minor Stop)			Project ID:	3013
Prepared By:	Arcadis			Date:	6/4/2019
Project Purpose:	Improve intersection safety at skewed multi-lane highway intersection with stop-controlled minor street				

Figure 3: Traffic Data Entry



Existing Year Volume Inputs	EB SR 22			WB SR 22			NB Fulton Mill Rd			SB Fulton Mill Rd		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour:	60	375	10	40	95	10	5	105	75	20	40	20
PM Peak Hour:	(30)	(210)	(5)	(180)	(470)	(15)	(10)	(130)	(55)	(5)	(75)	(60)
Peak Hour Truck %:	2.0%			2.0%			2.0%			2.0%		
AM (PM) Ped Crossings:	0	(0)		0	(0)		0	(0)		0	(0)	

GDOT ICE Tool: Stage 1 Worksheet

Stage 1 serves as a screening effort meant to eliminate non-competitive options and to identify which alternatives merit further considerations in Stage 2 based on their practical feasibility. **Figure 4** illustrates the blank **Stage 1 Worksheet** where intersection screening evaluations and justifications are made.

The top left portion of the worksheet includes project information carried forward from the Introduction worksheet. It also notes that the alternative analysis requires consideration of at least two alternatives and a maximum of five alternative to be carried into the Stage 2 evaluation.

There are drop down boxes on the left side that allow the selection of alternatives consisting of one or more right and/or left turn lanes, and it is also possible to "write in" an intersection improvement type not contained in the defined list of alternatives. Write-in alternatives require additional work to calculate crash-modification factors and cost estimates described in later worksheets.

Analysts should use good engineering judgement in responding to the six evaluation questions (listed in **Figure 5**) by selecting "Yes" or "No" in the drop-down boxes:

1. Does alternative address the project need in a balanced manner and in scale with the project?
2. Does alternative improve safety performance in terms of reducing severe crashes?
3. Does alternative incorporate safety, convenience and accessibility for pedestrians and /or bicyclists?
4. Does alternative improve (or preserve) traffic operations (congestion, delay, reliability, etc.)?
5. Does alternative appear feasible given the site characteristics, constrains and location context?
6. Does alternative appear feasible with respect to other project factors?

The response to question 7, by a Yes or No response, is the determinant question for which alternatives are to be carried forward for Stage 2 analysis. Selected alternatives are highlighted in blue and the minimum 2 to maximum 5 selected alternatives are automatically carried forward into the Stage 2 worksheet. **Figure 6** illustrates the responses and justifications for a project case study.

Alternatives should not be summarily rejected without due consideration, and reasons for eliminating or advancing an alternative should be documented in the "Screening Decision Justification" column. As illustrated for the example case in Figure 6, there is not a pre-determined number of positive responses to questions 1 to 6 that automatically determines a "Yes" response to question 7. Questions 1 through 6 are only a guide to best determine alternative feasibility for any number of justifiable reasons.

Figure 4: Blank Stage 1 Worksheet

GDOT ICE STAGE 1: SCREENING DECISION RECORD

ICE Version 2.3| Revised 10/23/2023

GDOT PI #	
Project Location:	@
Existing Control:	--select one--
Prepared by:	
Date:	

Answer "Yes" or "No" to each policy question for each control type to identify which alternatives should be evaluated in the Stage 2 Decision Record; enter justification in the rightmost column

Note: Up to 5 alternatives may be selected and evaluated; Use this ICE Stage 1 to screen 5 or fewer alternatives to evaluate in Stage 2

	Intersection Alternative (see "Intersections" tab for detailed description of intersection/interchange type)	1. Does alternative address the project need in a balanced manner and in scale with the project?	2. Does alternative improve safety performance in terms of reducing severe crashes?	3. Does alternative incorporate safety, convenience and accessibility for pedestrians and /or bicyclists?	4. Does alternative improve (or preserve) traffic operations (congestion, delay, reliability, etc.)?	5. Does alternative appear feasible given the site characteristics, constrains & location context?	6. Does alternative appear feasible with respect to other project factors?	7. Overall feasible alternative (select alternative for further evaluation in Stage 2)?	**Screening Decision Justification:**
Unsignalized Intersections	Conventional (Minor Stop)	No	No	No	No	No	No	No	
	Conventional (All-Way Stop)	No	No	No	No	No	No	No	
	Mini Roundabout	No	No	No	No	No	No	No	
	Single Lane Roundabout	No	No	No	No	No	No	No	
	Multilane Roundabout	No	No	No	No	No	No	No	
	RCUT (stop control)	No	No	No	No	No	No	No	
	RIRO w/down stream U-Turn	No	No	No	No	No	No	No	
	High-T (unsignalized)	No	No	No	No	No	No	No	
	Offset-T Intersections	No	No	No	No	No	No	No	
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	
	No LT Lane Improvements No RT Lane Improvements	No	No	No	No	No	No	No	
	Other unsignalized (provide description):	No	No	No	No	No	No	No	
	Traffic Signal	No	No	No	No	No	No	No	

Figure 5: Evaluation Questions

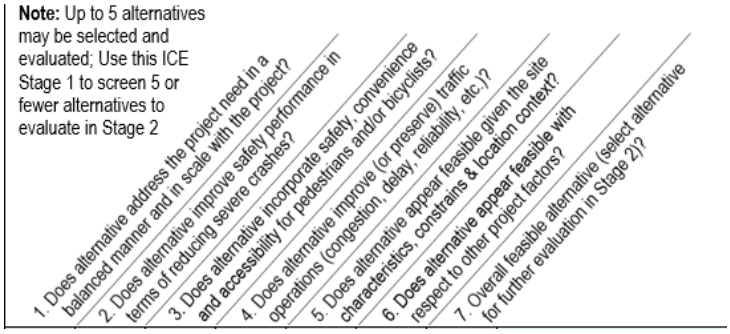


Figure 6: Example Stage 1 Selections (from Case Study)

GDOT ICE STAGE 1: SCREENING DECISION RECORD

ICE Version 2.3| Revised 10/23/2023

GDOT PI #	0013332
Project Location:	SR 22 @ Fulton Mill
Existing Control:	Conventional (Minor Stop)
Prepared by:	Arcadis
Date:	6/4/2019

Answer "Yes" or "No" to each policy question for each control type to identify which alternatives should be evaluated in the Stage 2 Decision Record; enter justification in the rightmost column

Note: Up to 5 alternatives may be selected and evaluated; Use this ICE Stage 1 to screen 5 or fewer alternatives to evaluate in Stage 2

	Intersection Alternative (see "Intersections" tab for detailed description of intersection/interchange type)	1. Does alternative address the project need in a balanced manner and in scale with the project?	2. Does alternative improve safety performance in terms of reducing severe crashes?	3. Does alternative incorporate safety, convenience and accessibility for pedestrians and /or bicyclists?	4. Does alternative improve (or preserve) traffic operations (congestion, delay, reliability, etc.)?	5. Does alternative appear feasible given the site characteristics, constrains & location context?	6. Does alternative appear feasible with respect to other project factors?	7. Overall feasible alternative (select alternative for further evaluation in Stage 2)?	**Screening Decision Justification:**
Unsignalized Intersections	Conventional (Minor Stop)	No	No	No	No	No	No	No	No-Build Condition
	Conventional (All-Way Stop)	No	No	**Yes**	No	**Yes**	No	No	AWS not viable because of multi-lane approaches and wide median
	Mini Roundabout	No	**Yes**	**Yes**	No	**Yes**	No	No	Control not appropriate for high speed multi-lane roadway
	Single Lane Roundabout	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Multilane Roundabout	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RCUT (stop control)	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	RIRO w/down stream U-Turn	No	**Yes**	**Yes**	No	**Yes**	No	No	Thru traffic too high
	High-T (unsignalized)	No	No	No	No	No	No	No	Not a T-intersection
	Offset-T Intersections	No	**Yes**	**Yes**	No	No	No	No	Significant impact to corner parcels due to skew
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	Interchange not justified at this location
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	Interchange not justified at this location
	Add LT Lanes on Fulton Mill No RT Lane Improvements	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate
	Other unsignalized (provide description):	No	No	No	No	No	No	No	N/A
	Traffic Signal	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	Potential solution to evaluate

GDOT ICE Tool: Stage 2 Worksheet

Figure 7 illustrates the top of the **Stage 2 Worksheet** contains pre-populated project info data and drop-downs for entries of both the existing traffic control and study type (safety funded project or conventional non-safety funded project). Below are drop downs to indicate if the current intersection volumes meet signal warrants and whether operational analysis will be performed using traditional delay and volume-to-capacity (v/c) measures produced in most standard static traffic analysis models or using network delay information produced in most microscopic (simulation) traffic analysis models. Both approaches require analysis using traffic analysis tools outside of the Stage 2 worksheet.

Next, input AM and PM peak hour delay and V/C operational results for both opening and design-year no-build conditions (inc. traffic growth without intersection improvements). To the right, check boxes if any complete street warrants are met. Furthest right, enter the number of intersection crashes (by K-A-B-C-O type) occurring at the intersection using the most recent available crash data and provide number of years that data covers. Provide crash data outputs when submitting the ICE worksheets.

Figure 8 illustrates the input of cost data for each of the selected alternatives (alternative names auto-populated along the top row). If cost estimates are independently generated for one or all or the selected alternatives, construction, ROW, environmental mitigation, utility and design/contingency costs can be directly entered in a table to the right. If/when these costs are not readily available, analysts can use the **Cost Estimating Worksheet** to determine planning level costs (described later in greater detail).

Figure 9 illustrates data inputs for operational analysis of the Build Conditions for each of the alternatives (including growth in the traffic volume with the intersection improvements). The AM and PM peak hour operational results are generated using traffic analysis tools outside the Stage 2 worksheet. Provide traffic analysis tool outputs when submitting the ICE worksheets.

Alternative safety analysis results are generated from Crash Modification Factors (CMF's) found in FHWA's CMF clearinghouse (http://www.cmfclearinghouse.org). Most safety CMFs from known to-and-from intersection types (i.e improvement from 2-way stop-controlled intersection to a single lane roundabout) are auto-populated from the clearinghouse data (sources are listed); however, when no clearinghouse data exist, or the analyst feels different clearinghouse data is more appropriate, analysts can use the fields below each alternative type to input CMFs for PDO and injury/fatal crash types and the source of the data.

Figure 10 illustrates inputs of potential environmental impacts for each alternative (none, minimal & significant). If there are potential impacts, the Environmental score is decreased AND a mitigation cost is added (depending on the impact type and potential severity). Stakeholder support of alternatives (both local community and GDOT support) should be determined and entered using drop-downs (strong, positive, neutral, negative, opposition or unknown).

The final ICE Stage 2 scores and rankings are provided at the bottom of the worksheet. Make sure all worksheet data has been completed, including the Cost Estimate worksheet, before relying on any results. Select the preferred alternative from the drop-down list and use Waiver Form to justify recommendation of other than highest ranked alternative. Use the data field at the bottom to provide comments or explain unique data input or results.

Figure 7: Project Type, Crash Data and No-Build Operations

GDOT ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.3| Revised 10/23/2023

Project Location: SR 22 @ Fulton Mill
Existing Intersection Control: Conventional (Minor Stop)
Type of Analysis: Conventional Non-Safety Funded Project
District: 3 - Thomaston
County: Bibb
Area: Rural
GDOT PI #: 0013332
Prepared by: Arcadis
Date: 6/4/2019

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	Meets Signal Warrants	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2022 Opening Yr No-Build Peak Hr Intersection Delay	20.6 sec	27.8 sec
2022 Opening Yr No-Build Peak Hr Intersection V/C	0.52	0.67
2042 Design Yr No-Build Peak Hr Intersection Delay	74.5 sec	80.5 sec
2042 Design Yr No-Build Peak Hr Intersection V/C	1.04	1.15

Complete Streets Warrants Met?
☐ PEDESTRIANS
☐ BICYCLES
☐ TRANSIT

Crash Type

Crash Data: Enter most recent 5 years of crash data	Crash Severity K*	A*	B*	C*	O	Years: 5
Angle	1	2	5	1	7	29%
Head-On	2	0	0	0	1	5%
Rear End	0	0	3	2	25	54%
Sideswipe - same	0	0	0	0	0	0%
Sideswipe - opposite	0	0	0	0	1	2%
Not Collision w/Motor Veh	0	0	1	2	3	11%
TOTALS:	3	2	9	5	37	56

* Number of crashes resulting in injuries / fatalities, not number of persons

Figure 8: Alternative Cost Data

Alternatives Analysis:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Proposed Control Type/Improvement:	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	Add Left Turn Lanes	Traffic Signal
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Additional description here*	*Additional description here*	*Additional description here*	*Add LT bay(s) on minor ST*
Construction Cost	$1,212,000	$2,144,000	$494,000	$325,000	$148,000
ROW Cost	$27,000	$54,000	$6,000	$0	$0
Environmental Cost	$0	$67,000	$10,000	$0	$0
Reimbursable Utility Cost	$14,000	$25,000	$7,000	$4,000	$2,000
Design & Contingency Cost	$439,000	$802,000	$162,000	$104,000	$66,000
Cost Adjustment (justification req'd)	0%	0%	0%	0%	0%
Total Cost	$1,692,000	$3,092,000	$679,000	$433,000	$216,000

Figure 9: Alternative Traffic Operations and Safety

Alternatives Analysis:	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Proposed Control Type/Improvement:	Single Lane Roundabout		Multilane Roundabout		RCUT (stop control)		Add Left Turn Lanes		Traffic Signal	
Traffic Operations:										
Traffic Analysis Software Used	GDOT RAB Tool		GDOT RAB Tool		Synchro		Synchro		Synchro	
Analysis Period	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr	AM Peak Hr	PM Peak Hr
2042 Design Yr Build Intersection Delay	16.5 sec	21.0 sec	10.8 sec	11.7 sec	32.0 sec	40.8 sec	74.0 sec	78.2 sec	27.9 sec	32.0 sec
2042 Design Yr Build Intersection V/C	0.59	0.65	0.51	0.58	0.65	0.74	1.03	1.13	0.67	0.75
Safety Analysis:										
Predefined CRF: PDO	71%		32%		31%		12%		44%	
Predefined CRF: Fatal/Inj	87%		71%		53%		11%		40%	
Predefined CRF Source:	FHWA Clearinghouse #s 229 / 230		FHWA Clearinghouse #s 236 / 237		NCHRP Table 4-7		FHWA Clearinghouse #s 270 / 274		FHWA Clearinghouse #s 325 / 7984	
User Defined CRF: PDO										
User Defined CRF: Fatal/Inj										
User Defined CRF Source (write in if applicable):										

Figure 10: Environmental/Stakeholder Data and Final Results

Proposed Control Type/Improvement:	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	Add Left Turn Lanes	Traffic Signal
Environmental Impacts:[1]					
Historic District/Property	None	None	None	None	None
Archaeology Resources	None	None	None	None	None
Graveyard	None	None	None	None	None
Stream	None	Minimal	None	None	None
Underground Tank/Hazmat	None	None	None	None	None
Park Land	None	None	None	None	None
EJ Community	None	None	None	None	None
Wooded Area	None	None	Minimal	None	None
Wetland	None	None	None	None	None
Stakeholder Posture:	*Note: if environmental impact is significant (RED), provide justification impact won't jeopardize project delivery using "Env" worksheet* [1]*Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project*				
Local Community Support	Neutral	Negative	Neutral	Supportive	Supportive
GDOT Support	Supportive	Neutral	Supportive	Neutral	Neutral
Final ICE Stage 2 Score:	7.2	5.8	6.1	3.2	6.0
Rank of Control Type Alternatives:	1	4	2	5	3
Final Intersection Control Selection:	1 - Single Lane Roundabout				

GDOT ICE Tool: Cost Estimating Tool

The **Cost Estimating Worksheet** can be used to generate planning-level cost estimates when no independent cost estimates are available. The process begins by selecting "yes" in the drop down "Cost Estimate Tool Used?" on the right side of the worksheet. This will insert the tool-generated cost estimates into the Stage 2 worksheet. **Figure 11** illustrates the case study inputs for the existing intersection footprint, including number of lanes, turn bays and length, median width, and ROW.

Figure 12 illustrates the table used to identify specific elements for each alternative. Most of the input data can be determined from a mapping program image or GIS data and by using engineering judgement. The last row is used to identify any cost (in dollars) for ROW and structural impacts above and beyond the general ROW impacts of each alternative, which is automatically calculated by existing ROW inputs and expected alternative footprint. Table 12 also includes the inputs of site context and cost multipliers for the example intersection. Begin with topography, maintenance of traffic and project size (all drop-box choices). These responses change overall factors in the cost estimates in the table below. Users enter preliminary engineering and contingency costs as a percentage. Intersection control choices include type of signal poles and design vehicle and the analyst can input anticipated diameters for each roundabout type (or leave the default parameters). The ROW cost is auto-populated based on county-generated cost data and drop-down land use type.

Figure 13 illustrates the table (located at the bottom of the CostEst worksheet) where assumptions for each alternative are entered to refine costs. The grey drop-down and blue data fields will only appear for the selected alternative. Analysts can make choices in the drop-down boxes and override fields if the default values for ROW, sqft of pavement and/or project limits (calculated based on a generic alternative concept) are significantly different from analyst calculated values (calculated or estimated based on a more refined concept).

The table illustrated in **Figure 14** will appear on the one-page printout of the CostEst worksheet. The quantities and costs cannot be changed; analysts can only review individual cost components of the cost estimates carried into the Stage 2 worksheet. If the worksheet-generated cost estimates do not seem reasonable, costs can be modified in Stage 2 by either a) overriding costs data as described earlier or b) applying a percent multiplier to the overall costs. If a cost adjustment is made, a note will appear indicating the variance, and a reason for the variance should be included at the bottom of the Stage 2 worksheet. The cost estimate worksheet is intended to generate a planning-level cost for comparative purposes and the ranking of selected ICE alternatives; a more detailed cost estimate should be prepared for the preferred alternative in the later project concept phase.

Figure 11: Existing Intersection Geometrics

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.3| Revised 10/23/2023

Project Information

Location: SR 22 @ Fulton Mill | County: Bibb | Project#: 0013332
Existing Intersection Control: Conventional (Minor Stop) | GDOT District: 3 - Thomaston | Date: 6/4/2019
Type of Analysis: Conventional Non-Safety Funded Project | Area Type: Rural | Preparer: Arcadis

Table 1: Existing Conditions

	EB SR 22			WB SR 22			NB Fulton Mill			SB Fulton Mill		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	1	2	1	1	2	1	0	1	0	0	1	0
Lane Widths*	12'	12'	12'	12'	12'	12'	0'	12'	0'	0'	12'	0'
Bay Length**	0'		0'	0'		0'	0'		0'	0'		0'
Median Width		40'			40'			0'			0'	
Right-of-Way	100'						80'					

Figure 12: Alternative Proposed Conditions

Table 2: Proposed Conditions	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	Add Left Turn Lanes	Traffic Signal
Proposed Pavement Type	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt	None
Reimbursable Utility	Minimal	Moderate	Minimal	Minimal	Minimal
# of Driveway(s) Impacted	2	2	0	0	0
Modify/Replace Traffic Signal	0	0	0	1	1
Lighting Poles (ea)	4	4	4	2	2
Flashing Beacons (ea)	0	0	0	1	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	0'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context	
Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Single Intersection

Cost Multipliers	
Grading Complete:	20%
Reimbursable Utility:	2%
Traffic Control:	20%
Project Size:	0%
Prelim Engineering:	15%
Project Contingency:	30%

Intersections	
Signal Poles	Mast Arm
Design Vehicle	WB-67
Existing Interchange?	No

Roundabouts	
Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

ROW Costs	
Prevalent ROW Type:	Agricultural
ROW Cost/Acre:	$27,860
ROW Multiplier:	1.4

Figure 13: Alternative Adjustment Factors

Table 4: Assumption Adjustments		Right of Way (acres)		Pavement, sqft		Major ST CST Limits, ft		Minor ST CST Limits, ft		
	Adjustable Assumptions:	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*	Assumption Notes:
Conventional (Minor Stop)	N/A	0.00	0.0	0	0	170	0	70	0	No design costs; completed in-house with maintenance or quick-response funds
Conventional (All-Way Stop)	--select one--	0.00	0.0	0	0	170	0	70	0	No design costs; completed in-house with maintenance or quick-response funds
Mini Roundabout	--select one--	0.00	0.0	13,906	0	200	1,000	200	0	Pavement and island/apron/median elements calculated based on diameter and circulating road width inputs
Single Lane Roundabout	High Speed Roundabout	0.71	0.0	34,624	0	500	0	500	0	Pavement and island/apron/median elements calculated based on diameter and circulating road width inputs
Multilane Roundabout	High Speed Roundabout	1.39	0.0	70,344	0	600	0	600	0	Pavement and island/apron/median elements calculated based on diameter and circulating road width inputs
RCUT (stop control)	Loons/Leftovers Only	0.17	0.0	17,042	0	1,420	0	520	0	Assumes LT lanes (4) & loons based on median width/design vehicle; 600' spacing btwn main int'n turn
RPIO w/down stream U-Turn	--select one--	0.17	0.0	9,842	0	1,420	0	520	0	Assumes LT lanes (2) & loons based on median width/design vehicle; 600' spacing btwn main int'n turn
High-T (unsignalized)	--select one--	0.25	0.0	16,000	0	800	0	270	0	Assumes additional lane and median for 800' across T-intersection (no other new pavement assumed)
Offset-T Intersections	--select one--	0.00	0.0	6,000	0	300	0	520	0	Assumes additional back-to-back LT lane (no other new pavement assumed)
Diamond Interch (Stop Control)	Tight Diamond	1.84	0.0	89,600	0	1,600	0	900	0	Assumes dual left turn lanes on crossing street (3 lanes)
Diamond Interch (RAB Control)	--select one--	6.89	0.0	141,399	0	2,000	0	1,200	0	Assumes single lane roundabouts and no turn lanes on crossing street
Add Left Turn Lanes	N/A	0.00	0.0	7,800	0	0	0	900	0	Add LT Lanes on Fulton Mill Rd; No RT Lane improvements; No Median Improvements
Other unsignalized (provide description)	N/A									
Traffic Signal	Pave/Overlay Intersection	0.00	0.0	8,000	0	50	0	1,000	0	Add LT bays (2) on Minor ST; Assumes no new ROW required; single LT lanes only

Figure 14: Alternative Cost Summary

Pay Item	Per Ln Mi Unit Cost	Unit Cost	Single Lane Roundabout		Multilane Roundabout		RCUT (stop control)		Add Left Turn Lanes		Traffic Signal	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	34,624	$442,639	70,344	$899,286	17,042	$161,385	7,800	$73,864	0	$0
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	0	$0	0	$0	0	$0	0	$0
Urban C&G/Drainage - both sides	441-6720	$22.00/LF	0	$0	0	$0	0	$0	0	$0	0	$0
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	2767	$10,611	3,431	$13,157	3,880	$11,023	1,800	$5,114	2,100	$5,966
Concrete Island (sqyd)	n/a	$75.49/syd	480	$48,918	600	$61,147	500	$37,745	0	$0	0	$0
Median Landscaping	$100K/LM	$1.89/LF	3000	$7,670	3,600	$9,205	5,820	$11,023	0	$0	0	$0
Typical Driveways Impacted (ea)	n/a	$7,500 ea	2	$20,250	2	$20,250	0	$0	0	$0	0	$0
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	1000	$46,023	1,200	$55,227	1,940	$66,136	900	$30,682	1,050	$35,795
Roundabout Truck Apron (sqft)	n/a	$23.00/sqft	2953	$91,700	4,273	$132,672	0	$0	0	$0	0	$0
Signing & Marking	$0	$22.73/LF	1,000	$30,686	1,200	$36,823	1,940	$44,096	900	$20,457	1,050	$23,867
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0	0	$0	1	$20,000	0	$0
New Traffic Signal (Wood Poles)	674-1000	$73,030	0	$0	0	$0	0	$0	1	$73,030	1	$73,030
Lighting (per pole)	n/a	$4,700 ea	4	$25,380	4	$25,380	4	$18,800	2	$9,400	2	$9,400
Signalized Ped Crossings (ea)	n/a	$5,782 ea	0	$0	0	$0	0	$0	0	$0	0	$0
6' Sidewalk (LF)	n/a	$41.95/LF	0	$0	0	$0	0	$0	0	$0	0	$0
New/replace cross drains (LF)	n/a	$56.37/LF	0	$0	0	$0	0	$0	0	$0	0	$0
Typical Guardrail (LF)	n/a	$70.00/LF	0	$0	0	$0	0	$0	0	$0	0	$0
Retaining Wall (LF)	n/a	$633.25/LF	0	$0	0	$0	0	$0	0	$0	0	$0
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0	0	$0	0	$0	0	$0
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$67,500	0	$10,000	0	$0	0	$0
Grading Complete - 20%	n/a	n/a		$293,170		$534,862		$72,042		$46,509		$0
Traffic Control - 20%	n/a	n/a		$195,446		$356,575		$72,042		$46,509		$0
Reimbursable Utility	n/a	n/a		$14,478		$25,063		$7,004		$4,651		$2,961
Preliminary Engineering - 15%	n/a	n/a		$146,585		$267,431		$54,031		$34,882		$22,209
Contigency - 30%	n/a	n/a		$293,170		$534,862		$108,062		$69,764		$44,417
ROW Cost/Acre: Agricultural	n/a	$27,860ac		$19,786		$38,605		$4,605		$0		$0
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0		$0		$0		$0
ROW Multiplier - 1.4	n/a	n/a		$7,914		$15,442		$1,842		$0		$0
Project Scale Reduction - 0.0%	n/a	n/a		$0		$0		$0		$0		$0
Grand Total Costs				**$1,694,000**		**$3,093,000**		**$680,000**		**$435,000**		**$218,000**

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
Single Lane Roundabout	High Speed Roundabout	F.D. Asphalt	0.71	0.0	34,624	0.0	500	0.0	500	0.0
Multilane Roundabout	High Speed Roundabout	F.D. Asphalt	1.39	0.0	70,344	0.0	600	0.0	600	0.0
RCUT (stop control)	Loons/Leftovers Only	F.D. Asphalt	0.17	0.0	17,042	0.0	1,420	0.0	520	0.0
Add Left Turn Lanes	N/A	F.D. Asphalt	0.00	0.0	7,800	0.0	0	0.0	900	0.0
Traffic Signal	Pave/Overlay Intersection	None	0.0	0.0	8,000	0.0	50	0.0	1,000	0.0

GDOT ICE Tool: Environmental Worksheet

The last two worksheets are optional. **Figure 15** illustrates the **Environmental Worksheet**, which is used to document any potentially significant environmental impacts in any given alternative (indicated in red as "significant" in the drop-down box in Stage 2). The goal here is to document that reasonable mitigation (or avoidance) can be achieved (that would otherwise disqualify this alternative) before that alternative is selected a preferred solution.

GDOT ICE Tool: Waiver Worksheet

Figure 16 illustrates the **Waiver Worksheet**, to be used when the analyst feels that a full ICE study is not warranted. Circumstance for a waiver are outlined in the top portion of the worksheet (and presented in the full ICE policy document). The top portion of the Waiver worksheet requires a Waiver Request Type (selected from a drop-down list), which identifies the level of waiver request and signature authority. In the remainder of the form, requests for crash data, ADT and operations data for Existing and Design Year No-Build conditions are made, determined the same way as data for the Introduction and Stage 2 tabs.

The Waiver Worksheet tab can not only be used as a waiver request from conducting a full ICE study but can also be used to waiver the highest ICE result and choose to recommend a different (lower scoring) alternative. The data entry box at the bottom is used to describe the waiver request circumstances, and the worksheet requires submittal and signature of acceptance as described in the ICE policy.

GDOT ICE Tool: Multi-File ICE Summary

A separate file, **Multi-File ICE Summary.xls** is provided to allow the summary of multiple individual ICE results, that can be useful to see alternatives and recommendations for a corridor analysis of multiple intersections. Place the summary.xlms file into a folder with all ICE case studies desired to summarize, select the "Clear data and update information" box, and the program will read and display the final score for each alternative in each ICE file. The highest recommended alternative is highlighted in green.

On a separate page in the same worksheet, users can input multiple locations where two-way stop control (TWSC) waivers are being requested and can be approved as a group. Here, additional information is requested including geometry, ADT, operations and safety data, to better understand the circumstances under which the warrant is requested. Locations that do not meet waiver requirements are highlighted in bold **RED** text, and a full ICE process is recommended for these intersections.

Figure 15: Significant Environmental Impact Worksheet

ICE ENVIRONMENTAL FACTORS

ICE Version 2.3| Revised 10/23/2023

Project Information

GDOT District: 3 - Thomaston
Requested By: District Engineer
County: Bibb
Project Location: SR 22 @ Fulton Mill
Date: 6/4/2019
Area Type: Rural
Prepared By: Arcadis

Existing Intersection Control: Conventional (Minor Stop)

Environmental Factors

In the box below, document any significant environmental factors for any alternative considered. Include a plan and costs for mitigation that retains the proposed intersection type as a viable alternative. Include in ICE documentation package only if one or more alternatives have significant impacts.

Proposed Intersection Control #1: Single Lane Roundabout

None

GDOT PDP Project
GDOT PDP Project
New or Revised Signal Permit
New Median Opening
Add/Extend Turn Lane
Quick Response Project
Special Encroachment Permit
Driveway Permit
Maintenance Work Only

Figure 16: ICE Waiver Data Form

Project Information:
Location: SR 22 @ Fulton Mill Rd
County: Bibb
GDOT District: 3 - Thomaston
Area Type: Rural
Existing Intersection Control: Conventional (Minor Stop)

GDOT PI # (or N/A): 0013332
Requested By: District Engineer
Prepared By: Arcadis
Date: 6/4/2019
Waiver Request Type: --- select one ---

Traffic and Operations Data:[1,2]

Intersection meets signal/AWS warrants?	None	
Traffic Analysis Type:	Intersection Delay	
Existing Major Street Avg Daily Traffic (ADT):	9,800	
Existing Minor Street Avg Daily Traffic (ADT):	2,900	
Analysis Period:	AM Peak	PM Peak
2022 Opening Yr Peak Hour Intersection Delay:	20.6 sec	27.6 sec
2022 Opening Yr Peak Hour Intersection V/C:	0.52	0.00
2042 Design Yr Peak Hour Intersection Delay:	74.5 sec	0.0 sec
2042 Design Yr Peak Hour Intersection V/C:	1.04	0.00

Crash Data (Required):[3]

Crash Type	Crash Data: Enter most recent 5 years of crash data	Crash Severity K*	A*	B*	C*	O	
	Angle	1	2	5	1	7	29%
	Head-On	2	0	0	0	1	5%
	Rear End	0	0	3	2	25	54%
	Sideswipe - same	0	0	0	0	0	0%
	Sideswipe - opposite	0	0	0	0	1	2%
	Not Collision w/Motor Veh	0	0	1	2	3	11%
	TOTALS:	3	2	9	5	37	56

* Number of crashes resulting in injuries / fatalities, not number of persons

Description of Work / Justification for Waiver (Required):

Proposed Intersection Control: --- select one ---

REQUESTED BY: _____ Date: _____

Title: _____

APPROVED BY: _____ Date: _____

Name: _____

District Engineer or (Approved Delegate)

Multi-File ICE Summary

GDOT ICE Tool: Summary Report for Multiple Locations

ICE Version 2.15 Revised 07/01/2019

Stage 2 Decision Document	PI# 0000000	UNSIGNALIZED											SIGNALIZED											
Clear data and update information		Conventional (Minor Stop)	Conventional (All-Way Stop)	Mini Roundabout	Single Lane Roundabout	Multilane Roundabout	RCUT (stop control)	RIRO w/Downstream U-Turn	High-T Unsignalized	Off-set T Intersections	Diamond Interch (Stop Control)	Diamond Interch (RAB Control)	Add Turn Ln/Median (Unsig)	Other Unsignalized	Traffic Signal	Median U-Turn (Indirect Left)	RCUT (Signalized)	Displaced Left Turn (DLT)	Continuous Green-T	Ljunkerdie	Quadrant Roadway	Diamond Interch (Signal Control)	Diverging Diamond	Single Point Interchange	Add Turn Ln/Median (Signal)	Other Signalized
Study Intersection	Existing Intersection Type	Waiver Request Type																							
SR 22 @ Fulton Mill	Conventional (Minor Stop)	N/A			7.2	5.4	5.9						3.2		-										

GDOT ICE Tool: Waiver Form for Multiple RIRO Intersections

ICE Version 2.15 Revised 07/01/2019

Project PI# (if applicable): 0000000

Study Intersection	Existing Intersection Type	Avg Daily Traffic (ADT) Major Rd	Minor Rd	Traffic Operations (optional):[1] Opening Year Delay	Opening Year V/C	Design Year Delay	Design Year V/C
Main Street at First Street	Conventional (Minor Stop)	5,200	2,400	9.5 sec	0.30	12.5 sec	0.36

GDOT ICE TOOL: Waiver Form for Multiple TWSC Intersections

ICE Version 2.15 Revised 07/01/2019

Project PI# (or N/A): 0000000

Study Intersection	Existing Intersection Control	Proposed # Lanes on Mainline	Design Year Avg Daily Traffic Major Rd	Minor Rd	Minor Rd Percent	Open Year Warrants Met? AWSC	Signal	Traffic Operations Data[1] Opening Year Delay	Opening Year V/C	Design Year Delay	Design Year V/C	Safety Data Crash Severity PDO	Injury	Fatal	Total
Main Street at Second Street	Conventional (Minor Stop)	2	5400	500	8.5%	No	No	8.5	0.28	11.5	0.33	9	1	0	10
Main Street at Third Street	Conventional (Minor Stop)	2	5600	800	12.5%	No	No	12.5	0.34	15.3	0.4	16	3	0	19
	--- select one ---				0.0%	No	No					0	0	0	0