North Carolina Conservation Network

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TO: Durham-Chapel Hill-Carrboro MPO Board
c/o Doug Plachcinski, AICP, Executive Director
doug.plachcinski@dchcmpo.org

FROM: Dale McKeel, NC Conservation Network
dale@ncconservationnetwork.org

RE: Comments on Amendment #3 to the FY2024-2033 Transportation Improvement Program (TIP)

DATE: June 20, 2024

Dear DCHC MPO Board,

Thank you for the opportunity to offer comments on DCHC MPO's Amendment #3 to the FY2024-2033 Transportation Improvement Program (TIP). These comments are for project HE-0007D to add turn lanes and a traffic signal at the intersection of Old Oxford Road and Snow Hill Road in Durham County.

The agenda item does not provide background information on the need for project HE-0007D and rationale for the recommendation to add turn lanes and a traffic signal at the intersection. The following comments are based on background information provided by staff at NCDOT Division 5 and the Mobility and Safety Division. We thank them for sharing information and answering questions about the project.

As discussed below, before project HE-0007D is added to the TIP, we recommend that the DCHC MPO and NCDOT (1) align the intersection design screening process with the NC Strategic Highway Safety Plan (SHSP) and other guidance documents; (2) revise the intersection alternatives analysis; and (3) investigate cost-saving approaches from other state DOTs. We also recommend that DCHC MPO (4) adopt an Intersection Control Evaluation (ICE) process.

NC Strategic Highway Safety Plan and Screening of Alternatives

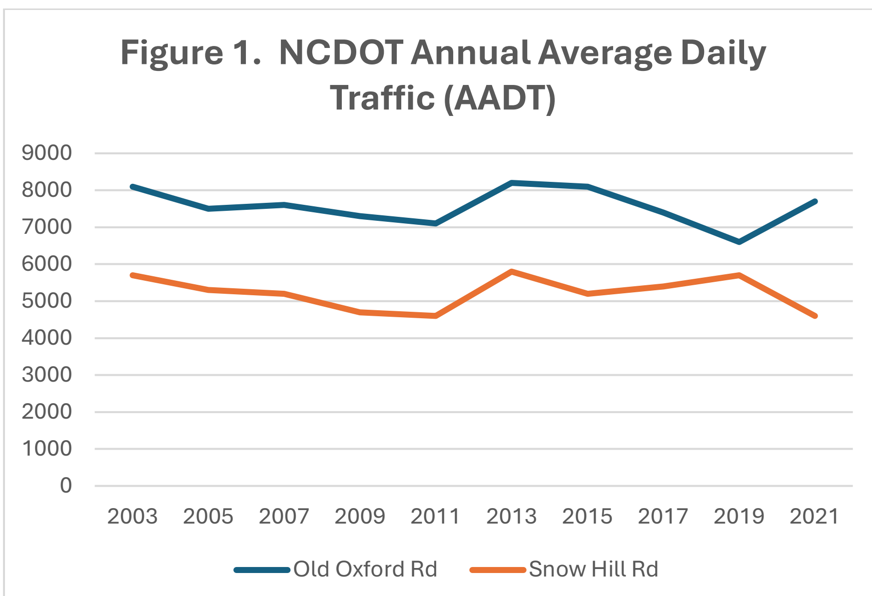
The 2024 NC Strategic Highway Safety Plan (SHSP), released in May 2024, is an update to the 2019 SHSP and provides strategies and action steps to address traffic safety in several emphasis areas, including intersections. NCDOT developed the SHSP collaboratively with seventy-five safety partners, including city and county governments, MPOs, RPOs, public health agencies, and advocacy groups. The SHSP has a goal of reducing fatalities and serious injuries by half by 2035, moving towards zero by 2050.

The SHSP notes that from 2017 to 2023, intersections accounted for 23 percent of crashes, 20 percent of fatalities, and 23 percent of serious injuries on North Carolina's streets and highways. The SHSP recommends that roadway designers and planners proactively design safer intersections that reduce speed and reroute or eliminate higher-risk opportunities for conflict.

A recommended action from the SHSP is to inform new and existing intersection project decisions using the latest research as gathered in NCDOT's Safest Feasible Intersection Design (SaFID) charts. The 2019 SHSP also recommended that SaFID be used as the default choice for new and existing intersection projects.

For project HE-0007D, NCDOT staff considered and analyzed four different alternatives: (1) no-build, (2) traffic signal plus a 125-foot left turn lane on Snow Hill Road, (3) single-lane roundabout, and (4) single-lane roundabout with right-turn bypass lane on Snow Hill Road.

Current traffic volumes at the intersection are about 8000 AADT on Old Oxford and 6000 AADT on Snow Hill Rd (see figure 1). Based on NCDOT SaFID charts, the safest feasible intersection at current traffic volumes is an all-way stop. If traffic volumes increase a bit, the safest feasible intersection is a single lane roundabout.



Source: NCDOT Annual Average Daily Traffic (AADT) Mapping Application

Federal guidance also recommends intersection designs that reduce speeds and minimize conflict points. For at least 15 years, the Federal Highway Administration has recognized the roundabout as a proven safety countermeasure, stating in a guidance memorandum that "Roundabouts are the **preferred safety alternative** for a wide range of intersections" and "Roundabouts should be considered for all existing intersections that have been identified as needing major safety or operational improvements . . . including rural intersections [emphasis added]."

NCDOT's SAFID presentation notes that conventional traffic signal control is almost never the safest feasible intersection design. NCDOT needs to explain why a traffic signal with turn lane is being recommended for HE-007D, since it is not clear how safety of the alternatives was considered relative to other factors, such as capacity, or how the SaFID tables factored into the recommendation.

To meet the goal of reducing fatalities and serious injuries by half by 2035, moving towards zero by 2050, NCDOT and DCHC MPO should make safety a key factor in selecting intersection control, not a design afterthought. In alignment with the NC Clean Transportation Plan, NCDOT and the MPO should also consider the air quality benefits of a roundabout at this location due to less delay for motorists especially during non-peak hours.

Alternatives Analysis Revision

The analysis of alternatives is a key step in screening intersection alternatives and identifying an optimal solution. The following paragraphs discuss reasons for revising the analysis of alternatives for project HE-0007D.

In preparing the alternatives analysis (see Attachment A), NCDOT staff used an intersection traffic count from February 2019. NCDOT Capacity Analysis Guidelines state on page 7 that "When submitting a traffic analysis document for review, the traffic counts used for capacity analysis purposes should have been taken no more than **one year prior** to the submittal date of the document [emphasis added]." Therefore, based on NCDOT guidelines a new traffic count should be obtained prior to analyzing alternatives at the intersection.

For the analysis, NCDOT staff applied a 3 percent growth rate to the 2019 traffic counts to get to 2024 base year, and applied a 2 percent growth rate beyond base year to consider life expectancy with future growth. Based on these traffic growth rates, NCDOT estimated that a single lane roundabout would fail in 13 years, but a single lane roundabout with bypass lane would have adequate capacity for at least 20 years.

NCDOT Capacity Analysis Guidelines state on page 7 that "When using traffic count data to predict future year volumes an appropriate growth rate should be applied. Growth rates should be consistent with historical growth rates in the study area." A review of historical traffic growth rates shows virtually no change over the past 20 years (see Figure 1 above). Therefore, applying 3 percent and 2 percent growth rates appears to be inconsistent with recommended practice.

Based on a back of the envelope analysis, if 1 percent traffic growth were assumed for the 25 years between 2019 and 2044, a single lane roundabout would have adequate capacity in the year 2044. If NCDOT has concerns about the roundabout failing in the future, the design could accommodate future expansion, as discussed on page 10-73 of the NCHRP Guide for Roundabouts. For example, for HE-0007D NCDOT staff could first construct a single-lane roundabout but incorporate a plan for adding a bypass lane in the future if warranted by increased traffic.

The properties adjacent to the intersection are owned by government agencies, which may complicate design and construction approvals. As discussed on page 6-5 of the NCHRP Guide for Roundabouts, "Roundabouts can often reduce spatial requirements on approaches compared with non-roundabout intersections. This effect of providing capacity at the intersection while reducing lane requirements between intersections is known as the *wide nodes, narrow roads* concept." Therefore, another benefit of a roundabout in this location may be the opportunity to focus all of the changes at the node of the intersection rather than needing to do linear widening along Snow Hill Road.

The Georgia DOT Roundabout Design Guide lists four common pitfalls in an initial roundabout analysis that can lead to impractical and more expensive designs. We suggest that NCDOT consider these pitfalls when preparing a revised alternatives analysis.

> **2.1.2. Common Pitfalls**
>
> The following are four common pitfalls stemming from the initial roundabout analysis that can lead to impractical and more expensive designs:
>
> - Traffic forecasts that overestimate traffic growth and indicate more lanes will be needed too soon.
> - Capacity models that are very "conservative" and indicate failure of a single-lane design sooner than actual Design Life.
> - Design horizons that are inappropriately long for the project or site context.
> - Operational analysis based solely on Peak Hour traffic.
>
> Being overly "conservative" in some or all these areas can lead to a roundabout that is more complex and expensive. To ensure a practical design, do a thorough operational analysis, as described in Section 2.1, to streamline the design process, prior to beginning the geometric design.

Application of Cost-Saving Approaches Used by Other State DOTs

One concern that has been expressed in North Carolina is the cost of roundabouts compared to conventional signalized intersections. The Georgia DOT has had success at reducing the cost of roundabouts through what they call "practical design."

Practical design is discussed in the Georgia DOT Roundabout Design Guide in Section 3.2 and Appendix A (see Attachment B). Georgia DOT has also reduced costs through a well-planned construction staging process, as discussed in Chapter 10 of the guide.

We ask that the MPO and NCDOT investigate whether the use of Georgia DOT's practical design principles could help reduce the cost of a roundabout at the intersection of Snow Hill and Old Oxford roads and at other locations in North Carolina. Scott Zehngraff with WSP in Atlanta would be good contact on the Georgia DOT roundabout program (scott.zehngraff@wsp.com). He was previously the Assistant State Traffic Engineer with Georgia DOT and was a leader of the GDOT roundabout program.

Adoption of an Intersection Control Evaluation (ICE) process by DCHC MPO

As discussed previously, there is little formal documentation on project HE-0007D. It would be helpful to have documentation that summarizes the project context, project scope, alternatives considered, analyses conducted, and conclusions from those analyses. Documentation has been lacking at other intersections where changes have been proposed in the DCHC area, such as the intersection of Cornwallis and Erwin roads.

We encourage DCHC MPO to adopt an Intersection Control Evaluation (ICE) process to put into place a data-driven, performance-based framework to screen intersection alternatives and identify an optimal solution. According to FHWA, adopting an ICE policy offers transportation agencies the following benefits:

- Implementation of safer, more balanced, and more cost-effective solutions

- Consistent documentation to support transparency of decisions
- Increased awareness of innovative solutions
- Objective performance metrics for decision-making

A lot of information is currently available on ICE processes. Earlier this year, NCHRP Report 1087, Guide for Intersection Control Evaluation was released. About a quarter of the states have adopted an ICE process. In North Carolina, a draft ICE process was proposed in 2021 but has not been adopted by NCDOT. The draft NCDOT policy (see Attachment C) could serve as a starting point for an ICE process for all proposed intersection projects in the DCHC MPO area.

Thank you for your time and consideration of these comments.

Attachment A - Old Oxford Road & Snow Hill Road 2024 Capacity Analysis Results
Attachment B - Practical Design Excerpts from the Georgia DOT Roundabout Design Guide
Attachment C - Draft NCDOT Intersection Control Evaluation (ICE) Policy, 2021

cc: Daniel Collins, NCDOT Congestion Management
Mark Gallo, NCDOT Division 5
Nicholas Lineberger, PE, NCDOT Congestion Management
Filmon Fishastion, Durham-Chapel Hill-Carrboro MPO

Old Oxford Road & Snow Hill Road 2024 Capacity Analysis Results

			No Build							
			AM				PM			
			Control Delay	Lane LOS	Queueing	v/c	Control Delay	Lane LOS	Queueing	v/c
Old Oxford Road	North Bound	L	8.75	A	20	0.22	9.5	A	35	0.32
Snow Hill Road	East Bound	L/R	182.5	F	695	1.32	267	F	425	1.44

analyzed in Synchro

			Signal + 125' Left Turn Lane on Snow Hill Road							
			AM				PM			
			Control Delay	Lane LOS	Queueing	v/c	Control Delay	Lane LOS	Queueing	v/c
Old Oxford Road	North Bound	L/T	14.6	B	62	0.64	10.6	B	292	0.65
	South Bound	T/R	6.6	A	111	0.29	3.6	A	68	0.24
Snow Hill Road	East Bound	L	20.9	C	62	0.32	28.6	C	67	0.31
		R	7.7	A	57	0.70	8.5	A	43	0.41
Overall LOS			10.8	B			9.7	A		
Expectancy (Years)*			20+				20+			

analyzed in Synchro

**assumed 2% annual growth*

			Roundabout (Single Lane)							
			AM				PM			
			Control Delay	Lane LOS	Queueing	V/C	Control Delay	Lane LOS	Queueing	V/C
Old Oxford Road	North Bound	L/T	6.8	A	65	0.40	15.4	C	280	0.78
	South Bound	T/R	6.7	A	43.7	0.32	12.6	B	125.3	0.57
Snow Hill Road	East Bound	L	11.8	B	172.6	0.62	7.4	A	48.8	0.36
		R	11.8	B	172.6	0.62	7.4	A	48.8	0.36
Expectancy (Years)*			13				20+			

analyzed in SIDRA

**assumed 2% annual growth*

			Roundabout + Right Turn Lane on Snow Hill Road							
			AM				PM			
			Control Delay	Lane LOS	Queueing	V/C	Control Delay	Lane LOS	Queueing	V/C
Old Oxford Road	North Bound	L/T	6.8	A	65	0.40	7.8	A	96.2	0.50
	South Bound	T/R	6.7	A	43.7	0.32	6.9	A	43.2	0.33
Snow Hill Road	East Bound	L	4.2	A	11	0.11	3.7	A	7.3	0.07
		R	8.5	A	71.2	0.47	4.2	A	14	0.13
Expectancy (Years)*			20+				20+			

analyzed in SIDRA

**assumed 2% annual growth*

3.2 Practical Design Considerations

All roundabout designs should address the capacity and safety needs of an intersection, but designers should take a practical approach to reduce project costs. **Practical design** does not compromise safety nor eliminate standards and good practice. It does focus on context, need and purpose, and emphasizes engineering judgement.

Designers should optimize circle size, location, and alignment of legs that promotes balanced speed control from opposing approaches and ensure efficient movements for a practical design.

Practical design is essentially design optimization with a greater emphasis on balancing cost with capacity and safety benefits. This requires careful consideration of design trade-offs. Designers should consult with the Office of Design Policy and the Office of Traffic Operations when considering possible design variances implied by the list of cost saving ideas below.

Eliminating lower priority project design elements can result in lower cost and improved value without adverse effects on safety and capacity benefits. Depending on site context, designers should consider the following examples for a practical design:

- Remove excess curb – use curb to only confine trucks and to reduce speeds near the entries and exits rather than along the entire project length
- Reduce splitter island length – use shorter medians (splitter islands) with added visibility elements on the approach
- Reduce excess lighting – use pavement marking reflectors and illuminated bollards instead, see Section 7)
- Remove excess drainage structures – construct rural shoulders and ditches instead
- Avoid multiple construction stages and temporary pavement – employ road closures and off-site detours
- Pavement preservation – reduce the amount of pavement reconstruction by using milling & inlay or overlay instead of full depth construction

Practical design doesn't change the requirements to meet basic design criteria and the variances/exceptions needed for not meeting them. However, designers can achieve cost savings by utilizing flexibility that exists in current design guidance and standards. Practical design considerations include but are not limited to:

- Minimizing required Right-Of-Way (ROW) by:
  - using a smaller circle size
  - employing ellipses to mitigate intersection skew angle or avoiding adding right turn bypass channelization
  - shifting roundabouts to avoid parking, storage tanks or other property impacts that might cause full displacements and increase ROW costs.
- Rightsizing for traffic demands – staged expandability from single lane to multilane.
- Utilize context sensitivity by encompassing existing features such as: important trees and landscaping
- Setting the roadway and circle to blend with the existing roadway profiles

Appendix A provides a diagram of this list (Figure A-1) and an expanded discussion of practical design and examples of how it can be applied.

Appendix A. Practical Design

A.1 Principles

Practical design is an approach to investigate the lowest cost of construction that produces the optimal functional, constructible, and serviceable installation. It can involve staged expansion of a roundabout or reduction of physical elements to improve the benefit/cost ratio of a roundabout. This principle should be accompanied with an assessment of the tradeoffs of the practical design: capacity, safety and serviceability.

Figure A-1 shows an example of a real project, through the course of practical design considerations, the red-line layout was reduced to the black-line layout. Cost savings on this roundabout are in the range of about 20%.

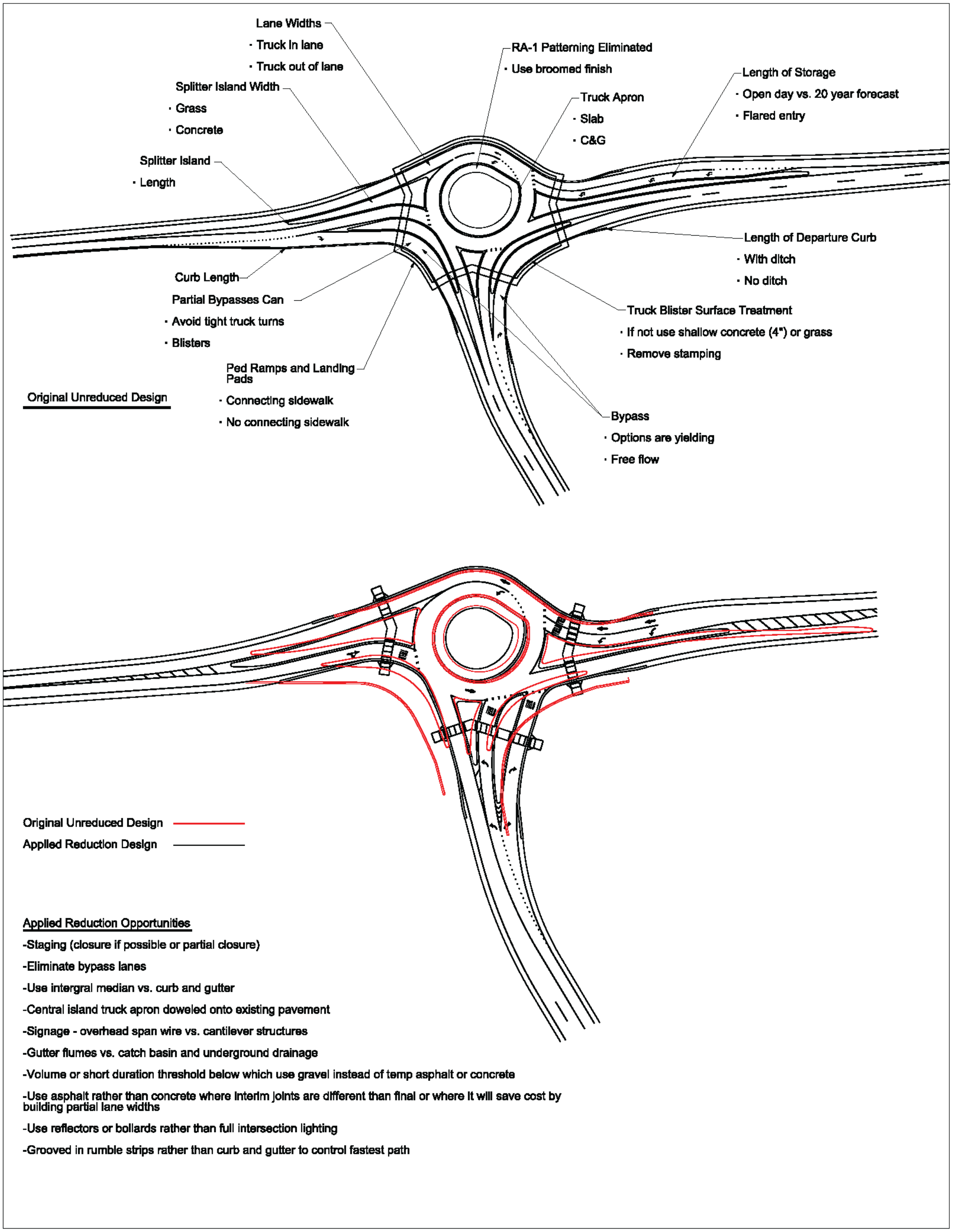


Figure A-1. Cost Reduction Opportunities

Division of Highways, North Carolina Department of Transportation
Intersection and Interchange Control Evaluation (IICE) Policy
Draft by Hummer, Mobility and Safety, updated 8/9/2021

Background

Intersections and interchanges are very important places on the highway system. They account for a large share of the crashes and delays motorists experience, and a large portion of the costs and impacts associated with improvement projects.

To try to reduce the toll intersections and interchanges impose, in recent years many alternative intersection and interchange designs have been published, tested, refined, and implemented. There are at least twenty distinct at-grade intersection designs in use in the US, at least ten grade-separated intersection (intersections with bridges) designs have been published, and over sixty plausible interchange designs are available. At such important spots, project teams should not settle on conventional stop sign or signal intersections or on conventional diamond or cloverleaf interchanges just because those are familiar. Sometimes a conventional improvement will not resolve the issue occurring at the location and it is best to try something more creative.

The NCDOT has had success over the past twenty years or so in considering diverse intersection and interchange alternatives during TIP and other projects. This is evident by the fact that, as of 2021, North Carolina was in the top three states in terms of roundabouts installed on public roadways, led the world in the number of reduced conflict intersections (RCIs) installed, and was second among the states in terms of diverging diamond interchanges installed. However, it is possible that as time goes on that the Department will see an erosion of that tradition and will make more arbitrary or expeditious intersection and interchange control decisions that could lead to more crashes, more delay, higher costs, more impacts, and other suboptimal outcomes than would have occurred if all reasonable alternatives had been examined. Intersection and interchange control evaluation (IICE) is a process that could help the Department continue and enhance its tradition of vigorous intersection and interchange alternative consideration. IICE has developed since the late-2000s, has been implemented by at least 12 state DOTs as of 2021, and is supported by FHWA.

Goal

The goal of this IICE policy is to ensure that the Department always appropriately considers all reasonable alternatives when deciding on the form of control at every intersection and interchange in every applicable project. IICE aims for a consistent, objective, and defensible assessment of alternative forms of control and geometry. IICE also guides the Department to justify and document intersection and interchange design decisions.

Applicability

This IICE policy applies to all TIP, HSIP, Hazard Elimination, Spot Safety, Spot Mobility, and School projects conducted by the Division of Highways. IICE shall be conducted on all junctions between two public roadways in each of those projects. An IICE is suggested, but not required, at junctions between a public roadway and a higher-demand private roadway or driveway during those projects. An IICE is also suggested, but not required, during other types of projects conducted by the Division of Highways. This IICE policy does not apply to junctions between roadways and railroads or junctions between roadways and paths that serve non-motorized users.

Reasonable Alternatives

This IICE policy mandates that at the appropriate stage or stages of project development, the Department shall explicitly consider all reasonable intersection and interchange control alternatives. The project manager shall exercise judgment in deciding which alternatives are reasonable for any particular circumstance. Not all of the 20 or so forms of at-grade intersection control used in the US as of 2021 are reasonable at every future intersection, nor is each of the 60 or more known interchange concepts reasonable at every future interchange. For example, continuous flow intersections are likely not reasonable at the junction of two two-lane low-volume secondary roads, and all-way stop control is likely not reasonable at the junction of two six-lane arterials. If in doubt, project managers should err on the side of giving an alternative a try in a quick analysis rather than rejecting the alternative without analysis. If the Department conducts IICE well, it should always have an answer to the following question in the latter stages of project development: "Why didn't you consider XYZ type of design?"

Guidance on the available alternative intersection and interchange designs is provided by the Congestion Management Section in "Selecting Optimum Intersection or Interchange Alternatives." The latest version of that document is posted on the Traffic Engineering Policies, Procedures, and Legal Authority website (Topic C-62).

Every at-grade intersection control evaluation should include the safest feasible intersection design (SAFID) among the candidates. The SAFID for a four-legged junction can be identified from a table in the Congestion Management Section's document "Selecting Optimum Intersection or Interchange Alternatives" based on the number of through lanes and the forecast numbers of vehicles per day expected on each roadway. All else being equal, since safety is the foremost value of the Department, the SAFID alternative should be the choice of every project team.

As of 2021 the Department does not have sufficient safety information on hand to identify a SAFID for a three-legged junction, a safest feasible grade-separated intersection design, or a safest feasible interchange design. Someday when the research has been done and the safest such designs can be reasonably identified those safest designs should always be included in the field of alternatives as well.

This IICE policy encourages continued innovation in intersection and interchange design and traffic control. Project managers should not be limited to any particular menu of control types but should be free to consider new and hybrid forms of control, with due consideration of course to the reactions of drivers and construction companies to new and hybrid designs. A new design always raises questions about whether drivers will understand how to use it and construction companies will understand how to build it. However, all alternative designs were new and untested at some point so being new is never a sufficient reason to not consider a design or adopt a design it if it looks otherwise superior.

Reasonable Analyses

The consideration given to each reasonable alternative during IICE shall be as quantitative as possible and shall be appropriate for the project budget and context. Purely qualitative analysis—based only on opinion or experience—shall normally not be sufficient to disqualify alternatives that may be reasonable. On the other hand, the analyses conducted during IICE need not be long, detailed, or expensive. A suite of tools exists for early in project development that analysts can use to quickly and quantitatively examine a wide range of intersection and interchange alternatives. As of 2021 these early-stage tools included:

- Crash modification factors for safety (as assembled in the FHWA Countermeasure Clearinghouse website or in the crash reduction factors maintained by the Traffic Safety Unit at https://connect.ncdot.gov/resources/safety/TrafficSafetyResources/NCDOT%20CRF%20Update.pdf, for example);
- Critical lane analysis for vehicular capacity (as implemented in the CAP-X software package from FHWA or the VJUST software package from the Virginia DOT, for example);
- Signal spacing tables for progression through signals (as shown in the Congestion Management Section's "Selecting Optimum Intersection or Interchange Alternatives" document for example);
- The *NCHRP Report 948* "20-flag method" for evaluating pedestrian and bicyclist quality of service; and
- The life cycle impacts tool from NCDOT Research Project 2014-11 for evaluating the conversion of two-way stop control to a signal, roundabout, or all-way stop control.

The Congestion Management Section's "Selecting Optimum Intersection or Interchange Alternatives" document describes how project teams can use those quantitative yet relatively quick tools in the early stages of projects.

Only later in project development, when only a few alternatives remain viable, should the project team typically devote the money and time to detailed analysis tools like microscopic traffic simulation. A vigorous IICE early in project development should mean fewer resources need to be spent on detailed analyses at a later stage.

At all stages of project development, and in concert with the NCDOT Complete Streets Policy, IICE analyses shall appropriately consider all transportation modes expected to use an intersection or interchange. As mentioned earlier, the "20-flag method" from *NCHRP Report 948* is available to allow project teams to quickly and quantitatively examine the pedestrian and bicyclist quality of service on any number of intersection or interchange alternatives at any stage of project development. In fact, application of the 20-flag method on many intersections to date have shown that alternative designs often provide a better pedestrian and bicyclist quality of service than conventional stop sign or signalized intersections. More detailed analyses of pedestrian and bicyclist quality of service at an intersection or interchange alternative may be conducted using microscopic simulation. Oversized vehicles, farm vehicles, and emergency vehicles are among the other types of road users that should be considered by project teams during IICE for some projects.

Documentation

Project managers must document the results of their IICE for each intersection and interchange in each applicable project and be able to produce that documentation when asked. IICE documentation should include discussions of the project context, project scope, alternatives considered, analyses conducted, and conclusions from those analyses. IICE documentation can prove beneficial in the event NCDOT faces public or legal challenges to its designs.

IICE in NCDOT does not require a particular type of formal report. However, an attachment to this policy (on page 5) contains a form that project teams can use to document their fulfillment of the IICE policy and contains an example of a completed form (on page 6). A completed form should be considered sufficient documentation to satisfy this policy. Project teams should complete and file a form for each intersection or interchange within the project scope. A form should not take long to complete by the project manager or another team member familiar with the project. The form should be completed and filed with other project documents at a stage of project development when the intersection or interchange control decisions have been decided and are unlikely to change at later stages. For a TIP project, this would typically be at the end of Project Delivery Network (PDN) Stage 1; for Spot Safety and Spot Mobility projects this would typically be at the stage when projects are submitted to the committee for funding approval; and for a School project this would typically at the stage when a draft funding letter is sent to the State Traffic Engineer or their designee for a signature. The IICE form and the files or documents to which it refers do not have to be stored in a place that is accessible to the public but should be stored in a place where responsible staff members will be able to retrieve them easily in the future when asked.

Enacted

It shall henceforth be the policy of the Division of Highways of the North Carolina Department of Transportation to conduct an appropriate intersection and interchange control evaluation for every intersection and interchange between two public roadways in every TIP, Spot Safety, Spot Mobility, and School project that the Division conducts.

Signed: ______________________________________

Title: ____

Date Enacted: _________________________________

Intersection and Interchange Control Evaluation (IICE) Documentation
Division of Highways, North Carolina Department of Transportation

Name of person completing form: __________________________ Date form completed: ______________
Division and Unit of person completing form: ____

Project name:

Project number:

Type of project (check one): TIP __ Spot Safety __ Spot Mobility __ School __

Name of project manager: __________________________________ Unit: ___________________________

Brief summary of project purpose and need:

Brief summary of project scope:

Intersection or interchange for this form (road names):

Intersection or interchange design prior to this project (no-build):

Safest feasible intersection design (SAFID) for this spot (for four-legged intersection only):

Besides the no-build and the SAFID alternatives, other alternatives considered:

Stage of project development at which alternatives were considered:

Methods by which alternatives were analyzed:
- Capacity/delay/travel time:
- Safety:
- Cost/impacts:
- Pedestrian/bicyclist/other modes:
- Signal progression:
- Other:

Recommended form of intersection or interchange control:

Brief summary of reason(s) for the choice of the recommended form of intersection or interchange control:

Name(s) of document(s) produced that shows the alternative analyses conducted:

Website(s) where document(s) that show the alternative analyses are stored:

Intersection and Interchange Control Evaluation (IICE) Documentation
Division of Highways, North Carolina Department of Transportation
Example of completed form—example answers in red

Name of person completing form: _Joseph Hummer___________ Date form completed: _07/01/2021__
Division and Unit of person completing form: Mobility and Safety, Traffic Management______________

Project name, city, county, division: R. Brown McAlister Elementary School expansion, Concord, Mecklenburg, Division 10
Project number: None

Type of project (check one): TIP __ Spot Safety __ Spot Mobility __ School X_

Name of project manager: _Tammy Germiller_________________ Unit: _Traffic Management________

Brief summary of project purpose and need: Safely and efficiently accommodate traffic being generated by the new elementary school being built behind the existing school.
Brief summary of project scope: The focus is the intersection of SR-1157 (Wilshire Ave.) at Union St. and McAllister Ave. for traffic on the way into the school in the a.m. peak hour in the year the school opens.
Intersection or interchange for this form (road names): SR-1157 (Wilshire Ave.) at Union St. and McAllister Ave.
Intersection or interchange design prior to this project (no-build): Offset intersection with stop control for Wilshire Ave. and one-way inbound to school for McAlister Ave.
Safest feasible intersection design (SAFID) for this spot (for four-legged intersection only): One-lane roundabout (assuming that the CMFs for four-legged sites apply to this site).
Besides the no-build and the SAFID alternatives, other alternatives considered: All-way stop and signal control.

Stage of project development at which alternatives were considered: Prior to signing funding commitment letter.
Methods by which alternatives were analyzed:
- Capacity/delay/travel time: Synchro
- Safety: SAFID table
- Cost/impacts: Qualitative assessment
- Pedestrian/bicyclist/other modes: Qualitative assessment
- Signal progression: Not relevant, would not be part of signal system
- Other: None

Recommended form of intersection or interchange control: Signal control; in particular, five-phase control with lead/lag left turns made from newly restriped left turn lanes on Union Ave.
Brief summary of reason(s) for the choice of the recommended form of intersection or interchange control: Current one-way stop control and all-way stop control did not provide sufficient capacity; roundabout would be too costly and impactful.

Name(s) of file(s), folder(s), or document(s) produced that shows the alternative analyses conducted: 2024 Build AM.syn and 2024 Build AM IMP.syn.
Website(s) where document(s) that show the alternative analyses are stored:
S:\TMU\MSTA\PROJECTS\Div10\Cabarrus\R Brown McAllister ES 2020.