

DEPARTMENT OF TRANSPORTATION

DIVISION OF PLANNING

Statutory Authority: 17 Delaware Code, Sections 132(e), 507, 508 and 29 Delaware Code, Section 8404(8) (17 Del.C. §§132(e), 507 & 508; 29 Del.C. §8404(8))
2 DE Admin. Code 2309

FINAL

ORDER

2309 Development Coordination Manual

Pursuant to the authority provided by 17 Del.C. §132(e), 507, and 508, as well as 21 Del.C. §8404(8), the Delaware Department of Transportation (DelDOT), adopted the Development Coordination Manual. The Department issues this Order adopting revisions to regulations regarding development coordination.

The Department published the proposed revisions in the September 1, 2019, Delaware *Register of Regulations*.

The Department took written comments on these proposed revisions from September 1, 2019, through October 1, 2019.

Public comment and DelDOT responses are as follows:

D.J. Hughes, P.E., Associate, Davis Bowen & Friedel, Inc

Comment #1:

Regulatory Transparency and Accountability Acts of 2015: The requirements per the laws of the State of Delaware do not appear to be satisfied with respect to the impacts to small businesses based on revisions to the regulations since the law went into effect on January 1, 2016. The February 2016 proposed regulations that took effect in April 2016 and were further revised in part in May 2016 with respect to left-turn treatment at site access points clearly were subject to the Regulatory Transparency and Accountability Acts of 2015 yet have never been evaluated with respect to revisions to the October 2015 regulations (most recent regulations prior to January 1, 2016) as required by State law with respect to impacts to small businesses. The current left-turn treatment requirements need to be compared to the October 2015 regulations since no comparison or evaluation of any of the revisions to left-turn treatment requirements has occurred since January 1, 2016. Letter of No Contention (LONC) procedures have also been revised prohibiting site leveling without evaluating and noting the potential impacts to small businesses. A Regulatory Flexibility Analysis (RFA) and a Regulatory Impact Statement (RIS) was not submitted to the Register as required for the April 2016. The March 1, 2018 RFA/RIS improperly claimed the regulations were exempt because they were not “substantially likely to impose additional costs or burdens upon individuals and/or small businesses”. Any revisions that have occurred to the October 2015 regulations were required to be evaluated consistent with the law and respecting the spirit of the law. The impacts to small business and small projects are potentially very significant (potentially \$250,000 or more) in some cases with respect to costs of the design and construction of left-turn treatments for a low to moderate volume site access along moderate to high-volume, two-lane roads. That is in addition to impacts associated with the time for approvals. Prohibiting site leveling for potential LONC projects can add the time and expense of the formal DelDOT process as well as any potential additional requirements resulting from the process;

Comment Response #1:

Comments given were not comments on the proposed changes to the DCM, as published on September 1, 2019. The Department will review them and respond to Mr. Hughes in due course, but the Department does not intend to make any changes to the Regulation at this time.

Comment #2:

Chapter 1: Figure 1.3a: Thank you for increasing the eligibility for the LONC from 200 ADT to 500 ADT in Section P.6.1. However, Figure 1.3a does not reflect the change. The figure suggests 200 ADT is still the threshold for a LONC without indicating sites with 200 ADT to 499 ADT are eligible.

Comment Response #2:

The Department will update Figure 1.3a to reflect the change that was made in the Regulations. This is a typographical change.

Comment #3:

Section 1.5: For the 1st sentence, suggest deleting “existing commercial uses/” and adding “commercial” between “existing” and “entrance facility”. Suggest “A.” be deleted. The determination should be about the design and function of the access and not the age. An access constructed 5 or even 10 years ago but not used for the last 3 years is likely better designed than an access constructed 30 years ago but continuously used. Delaware Code Title 17 Subsection 146(d) does not place a timeframe on the use of an existing access. The code references “significant alteration in the character, flow or volume of traffic.”

Comment Response #3:

The Department does not think this will make a substantive change to the Regulation, therefore we will leave the language as is.

Comment #4:

For "B.", suggest adding "building demolition" after "building expansions", and also suggest the last sentence of "B." is deleted due to potentially significant impacts on small businesses that may choose to level an existing building that is not suitable for their purposes. ACEC made similar comments to DelDOT in August 2017 regarding the LONC process. DelDOT is supposed to consider less stringent requirements on small businesses yet added a more stringent requirement without evaluating the impacts to small businesses as required by State law. DelDOT regulates traffic not building construction. DelDOT's focus should be on the traffic using the access and not the building demolition, revisions, or construction.

Comment Response #4:

Item B is clear as written. Thank you for your suggestion but we do not plan to implement it at this time.

Comment #5:

Section 1.8: For the definition of Travel Demand Model, "tolls" should be "tools".

Comment Response #5:

The Department will correct the typographical error.

Comment #6:

Suggest at the end of the last sentence after "DelDOT Planning" adding "and that is required for site trip distribution for purposes of determining site access design, and when applicable, Area of Influence for a TIS."

Comment Response #6:

Thank you for your suggestion but we do not plan to implement it at this time. Per Section 2.2.4.2.2 of the DCM, use of the Travel Demand Model is required in the determination of the area of Influence for Traffic Impact Studies. While the Model can be a helpful tool in determining the site trip distribution for site access design its use for this purpose is not required.

Comment #7:

Chapter 5: Figures 5.2.5.4-b & c: While the regulations did not necessarily change, the implementation of them did. Previously, DelDOT did not require bike lanes on 50 mph and 55 mph divided highways (see enclosed e-mail from DelDOT), presumably for safety reasons along a high-speed facility. Add Notes "6." and "7.", respectively, to each figure "On roads with a speed limit exceeding 45 mph, bike lanes shall not be provided without vertical (includes rumble strips) or horizontal separation (such as a shared-use path in lieu of a bike lane adjacent to the travel lane). For 50 mph roads, 15 feet of separation is the recommended horizontal separation and 20 feet is preferred. For roads with 85th Percentile Speeds of 62 mph or higher, 33 feet is the preferred separation. Shared-use paths can accomplish the horizontal separation."

The suggestion is referenced from the Maryland Department of Transportation State Highway Administration (SHA) research report called "SAFE ACCOMMODATION OF BICYCLISTS ON HIGH-SPEED ROADWAYS IN MARYLAND" that was completed in December 2016 in conjunction with the University of Maryland. The Study Findings and Recommendations include the statement: "Bicycle advocacy groups contacted in 16 states (see Appendix 3.1) as part of this study were unanimous in their concerns about cycling along roadways with speed limits above 45 mph. They agreed that the method used for separating bicyclists from motor-vehicle traffic, whether a buffer, physical barrier or separated path, is very important. Some groups recommended cycle tracks with complete separation. Others suggested separated trails or side paths."

The referenced bicycle advocacy groups included Delaware. Shared-use path (SUP) facilities are required by DelDOT providing separate facilities for cyclists that should be used by cyclists in lieu of bike lanes adjacent to a travel lane on roads with speeds exceeding 45 mph. That is especially true on high-volume roadways and truck traffic is significant. If mixing of different types of SUP users is a safety concern, perhaps a wider SUP (13 feet?) with a dedicated (marked) lane for cyclists in the same direction of travel as motor vehicles on that side of the roadway centerline could be considered in lieu of a bike lane adjacent to travel lanes with speeds exceeding 45 mph and high volumes.

The conclusions of the SHA research report noted: "main conclusion of this study is that bicyclists on high-speed roads (above 45 mph) face serious risks unless sufficiently separated from the motor-vehicle traffic. The treatments presented in the project report, if prudently implemented, can help mitigate such risks where separated facilities are not an option." When SUPs are provided, separate facilities are an option cyclists should use and perhaps be required to use.

After a recent "Walkable Bikeable Delaware Summit", I had the opportunity to speak to one of the presenters, Mr. Bill Schultheiss. He expressed that as a cyclist if he were traveling along the shoulder approach an access he prefers no bike lane between the thru and right-turn lane forcing any right-turn vehicles to yield to the cyclist in lieu of potentially sandwiching the cyclist between two vehicles, perhaps trucks, traveling at high speeds.

Comment Response #7:

The Department will not remove the requirement for bike lanes on high speed roads. Bicycles are legally allowed to use any non-interstate/limited access highway/roadway within the state of Delaware.

Comment #8:

Figures 5.2.5.5-c: Move figure heading to be on same page as figure.

Comment Response #8:

Formatting will be addressed during the Final posting.

Comment #9:

Add same note as above: "On roads with a speed limit exceeding 45 mph, bike lanes shall not be provided without vertical (includes rumble strips) or horizontal separation (such as a shared-use path in lieu of a bike lane adjacent to the travel lane). For 50 mph roads, 15 feet of separation is the recommended horizontal separation and 20 feet is preferred. For roads with 85th Percentile Speeds of 62 mph or higher, 33 feet is the preferred separation. Shared-use paths can accomplish the horizontal separation." The figure should also illustrate how SUPs and sidewalks should safely cross the minor street ensuring good visibility of the crossing and good sight lines for drivers turning from the major street.

Comment Response #9:

The Department will not remove the requirement for bike lanes on high speed roads. Bicycles are legally allowed to use any non-interstate/limited access highway/roadway within the state of Delaware.

Comment #10:

Section 5.2.9: 1. The left-turn treatment requirements that have been implemented by the online DelDOT auxiliary lane worksheet for years that has changed numerous times do not appear to be based on any recent data from Delaware or based on any data from this century; The continued reference to an online DelDOT Auxiliary Lane Worksheet (similar to the DNREC Technical Documents) should be removed or at least referenced as an option only while making it clear the regulations required to be followed are published in the DCM, which is required to go to the Register any time revisions to it are proposed. Delaware law and precedent are very clear for that situation (see DNREC regulations). Suggest removing the Auxiliary Lane Worksheet from the DelDOT website.

Comment Response #10:

The Auxiliary Lane Worksheet is a tool that was developed to be helpful for engineers that are submitting to the Department. The Department will not be removing the Auxiliary Lane Worksheet from the DelDOT website.

Comment #11:

DelDOT has implemented an online regulation that has frequently changed over the years without review of the changes as is required for State policies and regulations. Require the DCM users to implement the figures and text within the DCM in lieu of DelDOT having to maintain a worksheet and provide quality control to make sure the worksheet replicates the DCM. The costs to the State and potential confusion when the Auxiliary Lane Worksheet and DCM do not result in the same required design are unnecessary. Errors have been found on multiple occasions in previous versions where the DCM was not being replicated, or the online worksheet (implemented as regulation) was revised without revisions to the DCM.

Irrespective of what the Auxiliary Lane Worksheet is implementing, the concern is it is an online worksheet that dictates site access design requirements/standards as a regulation, similar to the former and infamous DNREC Technical Document that was only available online. Why not do away with the Auxiliary Lane Worksheet and make the DCM users implement the DCM without a worksheet to do so for them?

Comment Response #11:

The Department will not remove the requirement for bike lanes on high speed roads. Bicycles are legally allowed to use any non-interstate/limited access highway/roadway within the state of Delaware.

Comment #12:

Any changes to the worksheet that implement different requirements from the DCM are subject to the Administrative Procedures Act (APA) the same as DCM revisions. DelDOT has not been following the APA requirements with at least 20 versions of the online worksheet dating back to 2012 and at least 14 versions of the online worksheet dating back to 2015. Not removing the online worksheet in conjunction with implementation of the new regulations leads to concerns that the online worksheet will continuously be changed outside the required APA process as has occurred averaging over three (3) times per year dating back to 2012 and averaging over four (4) times per year dating back to 2015.

Comment Response #12:

Comments given were not comments on the proposed changes to the DCM, as published on September 1, 2019. The Department will review them and respond to Mr. Hughes in due course, but the Department does not intend to make any changes to the Regulation at this time.

Comment #13:

Thank you for adding "or provided by DelDOT if a TOA/TIS is preformed" after "1.5% annual growth...". A 1.5% annual growth factor is generic, not specific to a roadway, and often different from DelDOT growth factors provided for a subject roadway.

Comment Response #13:

You are welcome.

Comment #14:

The Delaware Vehicle Volume Summary referenced link is in incorrect. The correct link and other suggested minor revisions are enclosed on DCM page 5-44.

Comment Response #14:

The hyperlink works, but the link verbiage is incorrect. The Department will correct this typographical error. DCM page

5-44 was not enclosed.

Comment #15:

Thank you for adding "If traffic counts are collected or a TOA/TIS is performed, those traffic volumes can be utilized instead of applying the associated K and D factors." We have been using the volumes collected as part of a TIS/TOA for years with DelDOT approval.

Comment Response #15:

You are welcome.

Comment #16:

Section 5.2.9.1: To the end of the sentence beginning "A five foot bike lane", add: ", except on divided highways with posted speed limit exceeding 45 mph and a shared-use path (SUP) available for use by cyclists." If a SUP is available, it is much safer for cyclists on high-speed, high-volume roadways that often serve significant truck traffic. While this is only suggested along divided highways, the same could be considered for all roads with speeds exceeding 45 mph based on the previously referenced SHA study.

Comment Response #16:

The Department will not remove the requirement for bike lanes on high speed roads. Bicycles are legally allowed to use any non-interstate/limited access highway/roadway within the state of Delaware.

Comment #17:

Section 5.2.9.2.A.1 & 4: Thank you for raising the ADT upper limit for bypass lanes to 8,000 and removing the functional classification as a determining factor in a previous round of DCM revisions.

Comment Response #17:

You are welcome.

Comment #18:

While that is much more reasonable, it is suggested the determination of when to install a left-turn lane treatment be based on the Benefit/Cost (B/C) ratio as discussed later, rather than generic one size fits all volumes, that do not appear to be based on any actual data, and certainly not data collected in Delaware.

DelDOT installed numerous bypass lanes along US Route 9 where the AADT exceeds 16,000 in eastern Sussex County and they have functioned safely and efficiently. Sheffield Drive is a good example where a bypass lane eliminated potential delays and functions safely with an AADT of 16,593 trips per day based on April and May 2017 traffic counts. Left-turn lanes for low volume access points add unnecessary costs to small projects including small businesses and add unnecessary impervious surface, sometimes in environmentally sensitive areas. Bypass lanes can function safely serving more volumes than DelDOT requirements currently allow. There are also small business access points that function safely with no left-turn treatment and lefts occurring from the thru lane.

Comment Response #18:

Comments given were not comments on the proposed changes to the DCM, as published on September 1, 2019. The Department will review them and respond to Mr. Hughes in due course, but the Department does not intend to make any changes to the Regulation at this time.

Comment #19:

Section 5.2.9.2.A.2: Requiring separate worksheets for each intersection approach (existing and proposed) is understandable from a design and warrants perspective. This may have even previously been implemented by practice if not regulation. Regardless of the merits of doing so, it undoubtedly has the potential to add significant costs to a small business/small project. If a proposed project does not meet the requirements for any left- turn treatment, yet an existing project does meet the requirements regardless of whether any left-turn treatment currently exists, the potential additional costs to the new project (including small businesses and small projects) could be approximately \$250,000. Suggest revising Figure 5.2.9.2-a as detailed later in these comments and/or creating a limit for when separate worksheets are required based on the traffic projected to use the proposed 4th intersection leg to be created. Regardless, the potential impacts are required to be acknowledged and documented due to the regulation change.

Comment Response #19:

The Regulation requires the computations to be completed. Completing the computations does not correlate to constructing all turn lanes that might show on the computations.

Comment #20:

Section 5.2.9.2.A.5: Regardless of the merits of requiring a left-turn lane due to lack of sight distance, it undoubtedly has the potential to add significant costs to a small business/small project that does not warrant a left-turn lane based on traffic. The potential additional costs to the new project (including small businesses and small projects) could be approximately \$250,000 minus the costs of a bypass lane. If a bypass lane is assumed to cost only \$100,000, the potential impacts are an increased cost of \$150,000. While it is understood the addition of the new requirement is for safety, the potential impacts are required to be acknowledged and documented due to the regulation change.

Comment Response #20:

Comments given were not comments on the proposed changes to the DCM, as published on September 1, 2019. The Department will review them and respond to Mr. Hughes in due course, but the Department does not intend to make any changes to the Regulation at this time.

Comment #21:

Section 5.2.9.2.D: Suggest defining “very low opposing volumes” to remove the subjectivity and give the DCM user an idea of when a bypass lane may be waived. For example, 120 vph could be defined considering that is only 2 vehicles per minute with an average gap of 30 seconds between vehicles, which is sufficient time to allow multiple entering left turns to occur without significant delays for following vehicles. Additionally, it is suggested “very low advancing volumes” be added and similarly defined. If the following vehicles are very low in volume, there is no need for a separate lane. AASHTO and DelDOT off-site intersection warrants for left-turn lanes compare advancing and opposing volumes.

Comment Response #21:

At this time, the Department does not see the need to define “very low opposing volumes.” This allows the Department to analyze project based on site specific needs.

Comment #22:

Figure 5.2.9.2-a: Suggest removing this figure in its entirety and requiring the developer’s engineer to provide Benefit/Cost (B/C) Ratio calculations in lieu of following a chart. If not removed, a discrepancy for 25 mph speed zones needs to be addressed. Currently, Figure 5.2.9.2-a indicates bypass lanes are not warranted in a 25 mph zone. However, Figure 5.2.9.3-a indicates a left-turn lane can be required in a 25 mph zone, which seems to be an inconsistent approach. Suggest considering advancing volumes and opposing volumes like AASHTO warrants for left-turn treatments and NCHRP report calculations.

Based on previous DelDOT responses regarding the left-turn lane warrants when providing comments on the DelDOT Development Coordination Manual (DelDOT comments from November 14, 2014, and February 11, 2015), DelDOT appears to be using data not intended to be used unless locally calibrated. For example, NCHRP 745 references the Highway Safety Manual (HSM) for predicting crash reductions for left-turn lanes. The HSM also references FHWA-RD-99-207, Prediction of the Expected Safety Performance of Rural Two-Lane Highways, which uses data from Minnesota and Michigan from over 20 years ago. Each state is supposed to calibrate their own local data and DelDOT has never done so for the HSM or to predict local crash frequencies as well as types and severity of collisions. The data from the FHWA report referenced in the HSM is not recommended for use without local calibration. The report states: “It is strongly recommended that the models NOT be used without calibration.”

DBF reviewed the following publications to determine the need for a left-turn lane:

- DelDOT referenced document National Cooperative Highway Research Program Report 745: Left-Turn Accommodations at Unsignalized Intersections (NCHRP 745);
- DelDOT referenced Transportation Research Record 1500 Lengths of Left-Turn Lanes at Unsignalized Intersections (TRR 1500);
- Transportation Research Record 1327 Analysis of Left-Turn Lane Warrants at Unsignalized T-Intersections on Two-Lane Roadways (TRR 1327);
- National Cooperative Highway Research Program Report Web-Only Document 193: Development of Left-Turn Lane Warrants for Unsignalized Intersections (NCHRP 193);
- Highway Safety Manual (HSM); and
- Prediction of the Expected Safety Performance of Rural Two-Lane Highways PUBLICATION NO. FHWA-RD-99-207 (FHWA-RD-99-207).

After reviewing publications and determining DelDOT has not been properly using the documents as they are intended to be used, DBF researched 55 3-leg intersections (minimum of 50 suggested) in Delaware and calculated a calibration factor (as DelDOT is supposed to do based on the direction of the HSM and FHWA-RD-99-207) to predict the amount of future crashes at intersections (including site access points for new developments). As suggested by the HSM, DBF also calculated the local percentage of personal injury versus property damage only crashes and evaluated the need for a left-turn lane based on the procedures detailed in the documents. The HSM predictive method for 3-leg unsignalized intersections is based on data from 30 to 34 years ago (1985 to 1989) in Minnesota used in FHWA-RD-99-207 and is not truly relevant to intersections in Delaware. The HSM provides a “calibration factor for intersections of a specific type developed for use for a particular jurisdiction of geographical area.” On multiple occasions, DBF has requested a calibration factor from DelDOT and DelDOT responded that none was derived and to use 1.00 even though the HSM devotes Part C, Appendix A.1.1 to document the procedure to calculate calibration factors. Obviously, the intent of the HSM was for local agencies like DelDOT to use the data available to them to calculate calibration factors. Since the release of the HSM, DelDOT has possessed all the necessary data to calculate calibration factors yet has neglected to do so. A meeting with DelDOT occurred in September 2019, and DelDOT indicated they were beginning the process of determining how best to determine calibration factors for Delaware.

The Auxiliary Lane Worksheet and DCM implement left-turn lane warrants that unnecessarily require left-turn lanes for lower volume intersections in conflict with the Benefit-to-Cost (B/C) Ratio recommendations for left-turn lane warrants in the DelDOT referenced NCHRP 745. The left-turn lane warrants in the DCM are not based on any known, and certainly not any local, data. The HSM notes on page 10-9: “The SPFs used in the predictive method have each been developed from specific jurisdictions and time periods. Calibration of the SPFs to local conditions will account for differences.” With respect to the default distributions of crash severity and collision types (Table 10-5), the HSM states: “These default distributions can benefit from being updated based on local data as part of the calibration process presented in Part C, Appendix A.1.1.”

Appendix A.1 states: "general level of crash frequencies may vary substantially from one jurisdiction to another...for the Part C predictive models to provide results that are meaningful and accurate for each jurisdiction, it is important that the SPFs be calibrated for application in each jurisdiction." Additionally, it states: "distribution of crashes by collision type...are known to vary substantially from jurisdiction to jurisdiction. Where appropriate local data are available, users are encouraged to replace these default values with locally derived values." Appendix A.1.1 states: "purpose of the Part C calibration procedure is to adjust predictive models which were developed with data from one jurisdiction for application in another jurisdiction. Calibration provides a method to account for the differences between jurisdictions in factors such as climate, driver populations, animal populations, crash reporting thresholds, and crash reporting system procedures." With respect to how often calibration factors should be updated, HSM A.1.1 states: "recommended the new values of the calibration factors be derived at least every two to three years...The calibration factor for the most recent available period is to be used for all assessment of proposed future projects." Table A-1 is provided for facility types: "for which calibration factors need to be derived." In Table A-1, "Three-leg intersections with minor-road stop control" is listed with references to Ci and Equation 10-3.

The "desirable minimum sample size" is listed as 30 to 50 sites. While it also notes the sites should represent a total of 100 crashes per year, DBF evaluated 55 intersections (50 Sussex County, 3 New Castle County, and 2 Kent County) and the total crashes per year is only approximately 42. Evaluating additional intersections is well beyond the efforts of a small business and the HSM also notes: "If a jurisdiction has fewer than 30 sites...it is desirable to use all of those available sites for calibration." Similar logic is applied to using all 55 sites even though less than 100 crashes per year occurred. DBF created a spreadsheet replicating the HSM calculations in Table Ex-1. Example of Calibration Factor Computation.

Local data in Delaware has needed to be evaluated since the HSM was released to assess intersections with various volumes along the major street, along the minor street, and making left turns from the major street. Considering DelDOT has neglected to do so, DBF took the initiative to initially evaluate 25 intersections (submitted to DelDOT along with the July 3, 2018 comments) and has since expanded the evaluation to include 55 three- leg intersections.

To determine a calibration factor to be used for three-leg intersections in Delaware, the predicted crash frequency based on the HSM Predictive Method was calculated for each of the 55 three-leg intersections. Printouts with the predicted crash frequency calculations per the HSM are provided. The predicted crash frequency was compared to the existing crash data to determine the calibration factor, consistent with the methods in the HSM. Based on the DBF calculations, a calibration factor of 0.46 should be used for three-leg unsignalized intersections with stop control on the minor street approach in Delaware. The data suggests less than half the amount of HSM predicted crashes (based on data from 1985 to 1989 in Minnesota) occur in Delaware. All the data evaluated by DBF includes data within the range of 2010 to 2018.

The severity of the existing crashes was also reviewed as suggested by the HSM. The results show 23.39% of crashes at three-leg intersections in Delaware are personal injury crashes (PI), and 76.61% are Property Damage Only (PDO). None of the intersections evaluated had a fatal crash. The HSM indicates that approximately 41.5% of all crashes are PI and 1.7% of all crashes are fatal. When considering the calculated Delaware Calibration Factor (Ci) and the amount of PI versus PDO crashes occurring in Delaware, PI crashes in Delaware occur about $\frac{1}{4}$ ($0.46 \times 23.39 / 41.50 = 0.2593$) of the amount projected by the HSM. In other words, for every four (4) PI crashes projected by the HSM, only 1 PI crash is occurring in Delaware. When uncalibrated data is used, it can significantly skew results for a given area, which is why local calibration is recommended. NCHRP 193 indicates that the average mid-range crash costs approximately \$214,000, which is an average of all crash types (fatality, personal injury, PDO). When using the Delaware calibrated data with a lower percentage of PI crashes, an average crash costs of \$125,314.10 is calculated (\$117,116.83 per PI crash and \$8,197.27 per PDO crash). That is a significant difference when weighing benefits versus costs. The existing counts data and last year counted for the 55 intersections is also provided. The most recent counted annual volume data was used.

The NCHRP Reports recommend using the Benefit/Cost (B/C) ratio to determine if a left- turn treatment is warranted. For rural roads a B/C ratio greater than 2.0 indicates a left- turn lane should be installed, a B/C ratio greater than or equal to 1.0 but less than 2.0 indicates a bypass lane should be installed, and a B/C ratio less than 1.0 indicates left- turn treatment does not need to be installed. The B/C ratio is a function of the crash reduction costs savings and the delay reduction costs savings that is expected when a left- turn lane is installed versus the costs to construct a left-turn lane (assumed as \$250,000 per NCHRP 193).

Based on November 14, 2014, and February 11, 2015, DelDOT responses regarding DBF comments (enclosed) on the left-turn lane warrants, DelDOT is basing their warrants on procedures not intended to be used without locally calibrated. For example, NCHRP 745 references the HSM for predicting crash reductions for left-turn lanes. The HSM references FHWA-RD-99-207 that uses data from Minnesota from 1985 to 1989 for stop- controlled intersections. The data is 30 to 34 years old. Each state is supposed to calibrate their own local data and DelDOT has never done so for the HSM equations or to predict local crash frequencies as well as types and severity of collisions. The data from the FHWA report referenced in the HSM is not recommended for use without local calibration. The FHWA report states:

"States also differ markedly in climate, animal population, driver populations, accident reporting threshold, and accident reporting practices. These variations may result in some States experiencing substantially more reported traffic accidents on rural two-lane highways than others. Such variations cannot be directly accounted for by the accident prediction algorithm. Therefore, a calibration procedure has been developed to allow highway agencies to adjust the accident prediction algorithm to suit the safety conditions present in their State."

For the Calibration Procedure, the FHWA report notes: "It is generally expected that the calibration factors (Cr and Ci) would be determined by highway agencies based on statewide data... In addition to estimates of accident frequency, the accident prediction algorithm includes default distributions of accident severity and accident type for rural two-lane highway roadway sections and intersections... The calibration procedure presented in appendix C includes a capability for highway agencies who use the accident prediction algorithm to modify the default distributions of accident severity and accident type to match their own experience on rural two-lane highways."

Appendix C of the FHWA documents is dedicated to the calibration procedure and states: "It is possible for a highway agency to use the accident prediction algorithm without calibration, but this is not recommended. Using the accident prediction algorithm without calibration requires the user to accept the assumption that for their agency $C_r = 1.0$, $C_i = 1.0$, and the accident severity and accident type distributions for two-lane highways are those shown in tables 1 and 2, respectively. These assumptions are unlikely to be correct for any highway agency and are unlikely to remain correct over time. Even a minimal calibration effort (referred to later in this appendix as level 1 calibration) is likely to produce far more satisfactory results than using the algorithm without calibration." It is very clear that calibration using local data needs to occur or the assumptions in the procedures DelDOT is basing their warrants on are "unlikely to be correct" and "even a minimal calibration effort...likely to produce far more satisfactory results".

Per DelDOT, NCHRP 745 is the basis of the DCM and Auxiliary Lane Worksheet left-turn treatment warrants. While DelDOT also referenced TRR 1500, the reference is incorrect and the publication is from 1995, almost 25 years ago. The title speaks for itself, Lengths of Left-Turn Lanes at Unsignalized Intersections. TRR 1500 notes two questions: "Is a separate left-turn lane warranted?" and "If it is warranted, what should be the length of the lane?" It then states: "The work presented addresses the second question." TRR 1500 also references TRR 1327, a 1991 publication that is almost 30 years old. No references to Delaware crash data were found.

Comment Response #22:

Comments given were not comments on the proposed changes to the DCM, as published on September 1, 2019. The Department will review them and respond to Mr. Hughes in due course, but the Department does not intend to make any changes to the Regulation at this time.

Comment #23:

Section 5.2.9.3.J: Delete in lieu of revised Figure 5.2.9.2-a. It is much more user friendly to review the figure in lieu of the written criteria that seemed repetitive with the figure.

Comment Response #23:

The Department prefers to keep the written version in the text and in the Table. This is more useful to our end users.

Comment #24:

Section 5.4: The online link to the Intersection Sight Distance worksheet needs updating.

Comment Response #24:

The hyperlink works, but the link verbiage is incorrect. The Department will correct this typographical error.

Comment #25:

Section 5.13: Suggest referencing Figure 5.13-a for External Design.

Comment Response #25:

At this time, the Figure is clear as written. Thank you for your suggestion but we do not plan to implement it at this time.

Summary of the Evidence and Information Submitted

The current regulations were enacted in April of 2016, with several updates. The proposed revisions to the Development Coordination Manual address procedural changes, add or modify technical requirements and clarify and amend design criteria. These collective changes are both technical and administrative in nature and serve in part to clarify the intent of the Department as enacted through these regulations.

Findings of Fact and Conclusions of Law

1. The public was given notice and the opportunity to provide comments in writing concerning the proposed revisions.
2. The proposed revisions are useful and proper and the Department believes that the adoption of these revisions is appropriate.

Decision and Order Concerning the Regulations

NOW THEREFORE, under the above-described statutory authority, and for the reasons set forth above, the Secretary of the Delaware Department of Transportation does hereby ORDER that these revisions to the Development Coordination Manual be adopted and promulgated effective November 11, 2019.

It is so ordered on this 15th day of October, 2019.

Jennifer Cohan, Secretary
Delaware Department of Transportation

***Please Note:** Due to the size of the proposed regulation it is not being published here. The following links to the proposed regulation are provided below:

Preface (<http://regulations.delaware.gov/register/november2019/final/Preface.pdf>)
Chapter 1: (<http://regulations.delaware.gov/register/november2019/final/Chap1.pdf>)
Chapter 3: (<http://regulations.delaware.gov/register/november2019/final/Chap3.pdf>)
Chapter 5: (<http://regulations.delaware.gov/register/november2019/final/Chap5.pdf>)
Chapter 8: (<http://regulations.delaware.gov/register/november2019/final/Chap8.pdf>)
23 DE Reg. 392 (11/01/19) (Final)