April 2019 Release:
1. Create Summary Report:
   a. Added check to make sure summary report is created prior to importing the results into the proposed analysis workbook
2. Updated Expected Crash Frequency calculations in all worksheets
   a. The calculations were revised to calculate the expected crash frequency prior to disaggregating it into crash types
   b. Impacts:
      i. For specific site types and AADT volumes, it will change your expected crash frequencies
      ii. The expected crash frequencies are derived from proportional tables rather than weighting of predicted and observed crash frequencies by crash type directly.

August 2017 Release:
3. Project Information Worksheet:
   a. Update: Removed the design exception report option
   b. Enhancement: The first question has been expanded to provide better clarity
   c. Update: “Traffic Volume Growth Rate Calculation” table name revised to “Traffic Volume Growth Rate Calculation For Benefit Cost Analysis”
   d. Enhancement: Traffic Volume Growth Rate Calculation For Benefit Cost Analysis table will be hidden until users selects to include a Benefit cost analysis.
   e. Enhancement: “Select Other Non-Site Characteristic Based Countermeasures For Entire Project” Table will be hidden until users selects to include proposed analysis (Either with a change in the fundamental site type or without a change in fundamental site type).
   f. Enhancement: Added Button on sheet near the “Go to Crash Data Worksheet” to offer the option to generate the analysis worksheets if no crash data will be provided.
   g. Enhancement: The generated ID will now accept Non-Cardinal NLFIDs.

4. General Update to all Analysis Worksheets:
   a. Enhancement: If no observed/historical crash data is provided, the Expected and Excess Expected (Potential for Safety Improvement) will not be calculated.

5. Ramp Terminal Worksheet:
   a. Enhancement: Reorganized the data entry form to group items by approach.
   b. Enhancement: The date entry form will only display movements (left, through, right) by approach that are appropriate for that interchange ramp terminal configuration.
   c. Error: Corrected error in proposed analysis calculations that made the tool assume everything was unsignalized.

6. Freeway Worksheet:
   a. Enhancement: Freeway analysis is now only one side of the highway. This has positive and negative effects.
      i. First, it simplifies the segmentation efforts. It does continue to limit the analysis to one entrance ramp and one exit ramp
      ii. Now ECAT can accept freeway segments where the number of lanes in opposing directions is different.
iii. Observed/historical crashes need to be assigned to the direction of travel (additional crash clean-up)

iv. Calibration factors will be revised later this year to improve the analysis quality results

b. Enhancement: Reorganized the data entry form to group items by approach.

c. Enhancement: Simplified the Barrier and Curve entry forms.

d. Enhancement: In the Barrier and Curve entry forms, allow the ability to enter appropriate variables in either feet or miles.

e. Enhancement: In the Barrier and Curve entry forms, allow the ability to enter calculations
   i. i.e. 10031-10000 for stationing 100+31 – 100+00
   ii. i.e. 0.61-.32 for logpoint ranges

g. Calculation Error: The calculation for overdispersion parameters was missing (,) in the numerator. This only impacts sites where the expected and potential for safety improvements were calculated.

    g. Bug Fix: Unable to add barrier in the proposed analysis area of the worksheet.

7. Ramp Worksheet:

    a. Enhancement: In the Barrier and Curve entry forms, allow the ability to enter appropriate variables in either feet or miles.

    b. Enhancement: In the Barrier and Curve entry forms, allow the ability to enter calculations
       i. i.e. 10031-10000 for stationing 100+31 – 100+00
       ii. i.e. 0.61-.32 for logpoint ranges
July 2015 Release:

8. Toolbox:
   a. Updated and simplified
   b. Focused on core processes. All other functionality is still included. It has been embedded in other processes.
      i. Example: Verify analysis is ran at the end on “Add or Remove Analysis Worksheets” and at the beginning of “Create Project Summary Reports and Benefit Cost”

9. Instructions Worksheet:
   a. Updated based on changes to tool

10. Project Information Worksheet:
    a. Moved “Add and Remove” column to end of Project Elements chart. Users only need to indicate when sheets need removed. Sheets will be created if they do not already exist. No existing sheets will be overridden.
    b. Traffic growth rate is limited values between 0 and 0.99
    c. Updated list of valid site types to include freeway and ramp segments

11. Crash Data Worksheet:
    a. Updated the import functionality to allow the import of multiple Crash Analysis Modules (CAM) Tools without deleting existing data. The option to delete existing data is still available
    b. Special coding is required for freeway segments with speed change lanes
       i. Column E needs to be filled out to identify where the crash occurred (Freeway, Entrance, Exit).
       This is required to properly weight the predicted number of crashes to the observed crashes to calculate the expected crash frequency.
       ii. This has impacted processing time because additional calculations have been added to automate this. The tool assumes no crashes are associated with speed change lanes until the user updates this.

12. Rural 2 Lane Intersection Worksheet:
    a. Updated Calculations: The display of the existing site information on the Rural 2 Lane Intersection worksheet has been updated to reference the existing site conditions (Cells L266-L270). This was incorrectly referencing the base conditions. This information was for display only so no predictive calculations were modified.
    b. Added Skew Angle Help pop-up

13. Rural Multilane Segment Worksheets:
    a. Previously, there were two worksheets (one divided and one undivided). In order to perform alternatives analysis, it was important to combine these into one worksheet. This allows users to compare undivided alternatives to divided alternatives easily.

14. Rural Multilane Intersection Worksheet:
    a. Added Skew Angle Help pop-up

15. Ramp Terminal Intersection Worksheets:
    a. Previously, there were two worksheets (one signalized and one unsignalized). In order to perform alternatives analysis, it was important to combine these into one worksheet. This allows users to compare unsignalized alternatives to signalized alternatives easily.
    b. Updated the allowable values for inside and outside through lanes to be between one (1) and five (5). These are summed to identify which SPF to use.

16. Freeway Segment Worksheet:
    a. Added analysis worksheet
b. When speed change lanes are included, results will vary from ISATe.

17. Ramp Segment Worksheet:
   a. Added analysis worksheet
   b. When speed change lanes are included, results will vary from ISATe.

18. Observed Crash Report Worksheet:
   a. Changed the formula for the proposed conditions to reference row 569 and not 568.

19. Report worksheet:
   a. Updated to count number of elements for every table. This is important when the number of elements between the existing and proposed changes.

20. Benefit cost worksheet:
   a. Updated severity costs to estimate future safety benefits

21. CMF Worksheet:
   a. Updated bad hyperlinks to reports or CMF Clearinghouse

22. Calibration Factors Worksheet:
   a. Updated calibration factors by individual safety performance functions (SPFs)

23. Coding:
   a. Performance enhancements made.
   b. Changes were made because of the simplified toolbox

April 2014 Release:
24. Label Update: Updated the units on all of the analysis sheets. Units should be in crashes per year for all tables except the Design Exception Summary Table. The Design Exception Summary Table is in Crashes per Mile per Year for segments and Crashes per Year for Intersections.

25. Updated the Design Exception Summary Table to show length at the top of the table and the crash total parameters below the table in each analysis sheet.

26. Updated the Design Exception Report to include length and area type. Also, the message displayed summarizing the results has been updated.

27. Added conditional formatting to the Design Exception Report to indicate the sites that exceeded the allowable thresholds.

28. Added a message box reminding users to import existing data into the proposed conditions analysis report.

29. Updated the AIS calculations in the cost benefit analysis based on the 2014 Tiger Application requirements.

30. Updated the CMF Title formula in the “Project Summary of Crash Modifications by Project Element (Without Animal Crashes)” Table in the Benefit Cost Analysis Worksheet.

31. In the No Valid HSM Site Type Worksheets, updated the table headings. They were backwards (meaning table headings for the Proposed condition were showing for the Existing condition.

32. Changed the calculations in the “Proposed Conditions: Modification of Observed Crashes by Other CMF / Severity Level / Collision Type” Table to allow zero (0) values for a severity level. There would be a calculation error in the current tool if any severity totals were zero for a specific site.

33. Changed code to allow numeric Project Element IDs.

34. Modified the Add/Delete functionality of the tool. Errors existed not allowing the process to complete. The progress meter will still be 100% a few times as the coding updates the reports and other features all at once.

35. Errors existed in the Report Worksheet when users switched from Proposed to any other scenario. This has been corrected. Please notify me if you run into any new issues.

36. In the Crash Data worksheet, allowed users to adjust the column widths.
March 2014 Release:
1. Calculation Change: The calculation for the Design Exception requires a per mile value. This has been updated in the table starting in cell Y563 (Existing Segment: Design Exception Summary Results). The previous calculation was modified to divide by segment length. This will then be carried to the Design Exception Summary Report.

January 2014 Release:
2. All calculation cells have been locked to prevent modification. If users find errors, please contact derek.troyer@dot.state.oh.us to have tool modified for future releases. All calculations remain visible so users can determine possible errors prior to forwarding them to ODOT Central Office.
3. Terminology Change: Previously, crash modification factors (CMFs) derived with the creation of the safety performance functions were called “Part C CMFs.” This has led to some confusion on when to use Part C and Part D CMFs. Therefore, the tool has been modified to reference these as “Site CMFs.”
4. Terminology Change: Previously, crash modification factors (CMFs) NOT derived with the creation of the safety performance functions were called “Part D CMFs.” This has led to some confusion on when to use Part C and Part D CMFs as well. Therefore, the tool has been modified to reference these as “Other CMFs.”
5. Calculation Change: For rural multi-lane intersections, change L291 & 292 from 4ST to 4SG. This was an error. Site CMFs (formerly called Part C CMFs) for rural multi-lane intersection only apply to unsignalized intersections. For signalized intersections, the site CMF adjustment is assumed to be 1.
6. Calculation Change: For urban and suburban intersections, the references to the crash proportions for Wet and Night-Related crashes were calculated incorrectly in the Predicted Crash Frequency Table. This error will only impact analysis results if an Other CMF (formerly called Part D CMFs) that referenced wet or night-related crash frequencies.
7. Calculation Change: When applying Other CMFs (formerly called Part D CMFs), it was possible to obtain a negative proposed expected crash frequency. This could occur when users would use a combination of CMFs (crash type, wet-related, and night-related). The calculation was corrected to force the following order when applying other CMFs, (1) application of general or crash type CMFs, (1) application of wet-related CMFs, and (3) application of wet-related CMFs.
8. Traffic Growth Rate Calculation Table was moved to the Project Information worksheet allowing the elimination of the CMF Summary worksheet.
9. The look and feel of the tool has been modified to hide table details as default and allow users to examine details as desired. This reduced the number of rows visible on the individual calculations worksheets. No calculation changes (other than those listed above) have been made to these analysis worksheets.
10. On the Benefit-Cost Worksheet, the Countermeasure Service Lives, Costs, and Safety Benefits table has been modified to include the crash modification value by countermeasure. The order of the columns has been modified to accommodate this change.
11. The cost by severity level have been recalculated and updated based on 2012 crash data.
12. For reporting, blank rows have been hidden to reduce the number of summary pages. Users will be required to adjust page breaks manually.
13. A summary by crash type has been added to the report. This will be used in calculating the Relative Severity Index for the Highway Safety Improvement Program scoring. If the user selects an “Other CMF” that includes either a night or wet-related countermeasure, the proposed expected crash frequency by crash type cannot be calculated, and therefore, will remain blank. This will not affect the scoring criteria by leaving this blank.
14. Ohio specific Urban Segment calibration factors have been added to the tool.
15. Table names throughout the tool have been reviewed and changed to improve the flow of the analysis and to ensure consistency between different analysis worksheets.

16. The Toolbox has been modified to remove the step numbering from the analysis operations. There was confusion generated by listing Step 1 in the toolbox when items were required prior to running Step 1. All the analysis items still exist within the toolbox. They will just be labeled slightly different.

October 2013 Release:
1. Added Ramp Terminal Intersection Calculation sheets
2. Updated the verify analysis worksheet to only show analysis tabs
3. Updated the Instructions worksheet
4. Corrected a calculation for the error report for rural site types
5. Added Urban / Suburban Intersection Calibration Data. Urban / Suburban Segments are still under development.

August 2013 Release:
1. Added Ohio Calculated Calibration Factors for Rural Site Types
   b. Urban calibration factors to follow in late August/Early September.
   c. Freeway calibration factors will be completed by the end of 2013.

July 2013 Release:
1. Added Non-HSM Site Type analysis Sheets
   a. This will allow users to analyze corridors even if there is an intersection or segment that is not a standard HSM Site Type
   b. An additional summary report has been added for these sites.
   c. Users have the ability to filter what data is used in the benefit cost analysis.
2. Added a Design Exception Report
   a. With the release of the new design exception policy, a report can be generated to know if table needs to be completed.
   b. These report flag sites that are above thresholds outlined in the ODOT Location and Design Manual, Volume 1.
3. Added the ability for users to adjust the intersection radius buffer on the Project information tab.
   a. Column I in the Project Elements Description Table (Formerly the “Length” Column) has been modified to be “Length (mi) OR Intersection Radius Buffer (mi)”.
   b. This will allow the user to change the intersection radius buffer from the default of 0.05 miles (250’), if desired.
   c. The intersection buffers are highlighted in green to differentiate between lengths and intersection buffers.
April 2013 Release:
1. Updated the calculation for Potential for Safety Improvement (PSI) or expected excess crash frequency. The table now includes negative values and will highlight in red values greater than 0 (sites with PSI). This change was made to allow the PSI calculation to be consistently shown throughout the element, report summary, and CMF summary worksheets.

**Future Enhancements**

1. Update Two Lane Two Way Rural Segments for Safety Effects of Roadway Alignment Combinations
   a. Used to better quantify the safety effects of horizontal curve and grade combinations