BEFORE & AFTER STUDY PHASE II

June 2021

Prepared by HKGi
in partnership with Bolton & Menk, inc.

METROPOLITAN COUNCIL

June 2021

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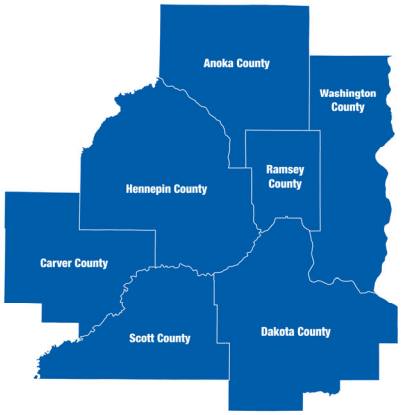

The Metropolitan Council is the regional planning organization for the seven-county Twin Cities area. The Council operates the regional bus and rail system, collects and treats wastewater, coordinates regional water resources, plans and helps fund regional parks, and administers federal funds that provide housing opportunities for low- and moderate-income individuals and families. The 17-member Council board is appointed by and serves at the pleasure of the governor.

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EXECUTIVE SUMMARY

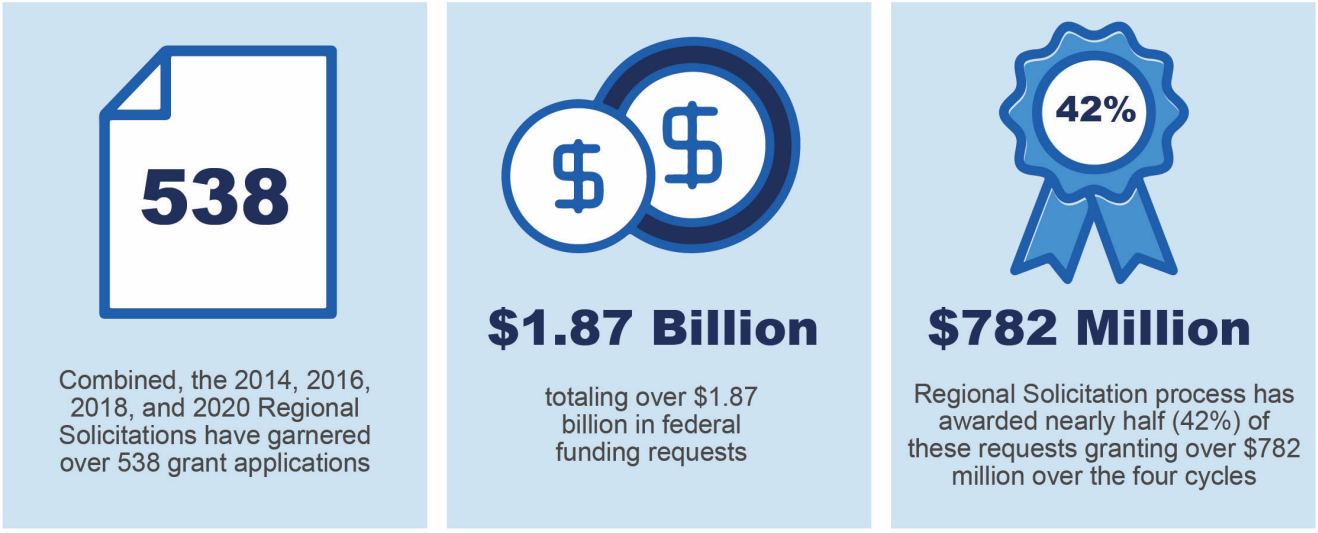
The first phase of the Before & After Study was launched in early 2018 to document the Regional Solicitation's benefits and impacts to the region and was completed in April 2019. This was done through a performance-based approach that evaluated the "after" conditions of projects that received federal transportation funds through the program. Findings from the first phase of the study sparked interest in examining more closely how the Regional Solicitation process could be improved, while continuing to refine the approach for monitoring "after conditions" of projects that have received federal transportation funds. Phase II was launched in April 2020.

Phase II includes a wealth of research, data analysis, and input from Focus Groups. Findings from these efforts helped inform the study's recommendations for improving or modifying the Regional Solicitation. Some of these recommendations are minor in nature (e.g., tweaks to the application), while some point to larger policy discussions that need to occur with various committees to see implementation. Therefore, this study should be viewed as a framework for guiding future discussion and decisions to improve or modify the Regional Solicitation.

Key findings and recommendations from this study are listed below:

a) Built projects that have been funded by the Regional Solicitation program continue to provide regional benefits by reducing the number of vehicle crashes, improving congestion levels, and building out the Regional Bicycle and Transportation Network (RBTN) to name just a few. The Metropolitan Council should continue to monitor "after" conditions to help document these benefits over the long-term, while refining the before & after condition methodologies to align with new data sources and best practices.

b) Combined, the 2014, 2016, 2018, and 2020 Regional Solicitations have garnered 538 grant applications, totaling over $1.87 billion in federal funding requests. The Regional Solicitation process has awarded nearly half (42%) of these requests granting over $782 million over the last four cycles.



c) The number of unfunded projects clearly demonstrates there is a funding shortfall and backlog of transportation projects throughout the region. The most obvious recommendation is to merely suggest that more federal transportation funding is needed. Until there is a significant increase in federal transportation funding, the Regional Solicitation program will continue to be relied on by many to fund a variety of transportation needs. Therefore, it is important to revisit the Regional Solicitation process to ensure the allocation of federal transportation funds are going towards projects that can deliver the greatest regional benefits.

d) Findings from the MPO peer review and Focus Group meetings suggest that the allocation of federal transportation funds are stretched across too many funding categories and scoring measures. This may result in more projects being funded, but can also result in smaller scale projects that are not providing significant regional benefits.

   Clearly defined goals and objectives that are consistent with the broader Transportation Policy Plan goals and objectives, should be established for the program. Defining these goals and objectives will likely require large policy discussions and may best be achieved during or after a major Transportation Policy Plan update. It is assumed these policy discussions will also revolve around how Regional Solicitation funds are allocated. The MPO Peer Review that was conducted as part of the Phase I study should be used as a resource to help facilitate these discussions. Future discussion should focus on the following:

   - What gaps in the Transportation Policy Plan strategies do Regional Solicitation goals and objectives hope to address?
   - What are the Regional Solicitation's goals and objectives for each application category?
   - Do the 11 different funding application categories help achieve the Regional Solicitation's goals and objectives?
   - Is there a different funding model (based on the peer review) the region should consider to better achieve the desired goals and objectives?

e) There are opportunities to improve the bicycle/pedestrian measures by incorporating a scoring criterion that considers the project's design and its ability to improve one's comfort level and safety. The Focus Group considered this a stronger measure in evaluating a project's potential for generating bicycle/pedestrian usage.

f) This study does not recommend any major changes to the risk assessment measure. If there is a strong desire to streamline the application process, the risk assessment criteria could be adjusted to become a qualifying requirement. This approach would require stronger standards an applicant must meet (e.g., right-of-way has been secured, local match has been secured, or design is 80% complete) in order to submit a project for funding consideration.

INTRODUCTION

Regional Solicitation Overview

As the region's federally designated Metropolitan Planning Organization (MPO), the Metropolitan Council works with the Transportation Advisory Board (TAB) every two years to administer the Regional Solicitation program and distribute federal transportation funds. Locally initiated projects are selected based on how each project meets regional transportation needs. These projects also help implement the regional transportation goals, objectives, and strategies described in the 2040 Transportation Policy Plan.

Federal funds are available for roadway, bridge, transit capital and operating, and bike and pedestrian projects. The Metropolitan Council, Minnesota Department of Transportation, transit providers, local governments, and other agencies like the Minnesota Pollution Control Agency and regional parks implementing agencies can all submit project proposals. The criteria and measures for evaluating project applications and the solicitation process are reviewed and updated every two years through the region's cooperative planning process, and the revised application is adopted by the TAB and Met Council. Project applications are solicited, reviewed, scored, and ranked through this process. Once selected, the TAB sends the recommended program of projects to the Met Council, which either approves the recommendation or sends it back to for reconsideration. The selected projects are then included in the next draft of the Transportation Improvement Program.

Study Overview

The first phase of the Before & After Study was launched in early 2018 to document the Regional Solicitation's benefits and impacts to the region and was completed in April 2019. This was done through a performance-based approach that evaluated the "after" conditions of projects that received federal transportation funds through the program. This phase of the study also documented how other MPOs solicit and distribute federal transportation funds.

Findings from the first phase of the study sparked interest in examining more closely how the Regional Solicitation process could be improved, while continuing to refine the approach for monitoring "after conditions" of projects that have received federal transportation funds. Phase II was launched in April 2020.

Phase II includes a wealth of research, data analysis, and input from Focus Groups. Findings from these efforts helped inform the study's recommendations for improving or modifying the Regional Solicitation program. Some of these recommendations are minor in nature (e.g., tweaks to the application), while some point to larger policy discussions that need to occur with various committees to see implementation. Therefore, this study should be viewed as a framework for guiding future discussion and decisions to improve or modify the Regional Solicitation program. A summary of the study's findings and recommendations are discussed throughout the next sections of this report.

A summary of the Phase II work is summarized below.

1. **Refine the approach for monitoring "after" conditions of projects that have received federal transportation funds:** The first phase of the Before & After Study created a framework for monitoring the benefits (after conditions) of built projects through a performance-based approach. Phase II helped refine this framework by exploring new methodologies to help streamline the reporting process. The Before & After Study (Phase I and Phase II) includes seven performance measures:
    - Performance Measure #1: Roadway Congestion
    - Performance Measure #2: Roadway Safety
    - Performance Measure #3: Transit
    - Performance Measure #4: Bicycle & Pedestrian Safety
    - Performance Measure #5: Regional Bicycle Transportation Network Contribution
    - Performance Measure #6: Pedestrian/Bicycle Connections Achieved
    - Performance Measure #7: HSIP Safety Benefits

2. **Research Ways to Streamline the Application Process:** The study focused on ways to improve the application process. This was achieved under the following work:

Focus Groups: The study leveraged input and insight from two Focus Groups to inform the study's recommendations:

- Grant Writing Consultants: Representatives from various consulting groups (Bolton & Menk, HKGi, SEH, SRF, Toole Design Group, WSB, and Zan Associates) with experience preparing Regional Solicitation applications met to discuss opportunities for improving the application process and new methods for monitoring before & after conditions.
- Bicycle and Pedestrian Planners & Engineers: Representatives from various consulting groups and agencies (Alta, Bolton & Menk, HKGi, Toole Design Group, Dakota County, MnDOT, Metropolitan Council, and Zan Associates) were consulted on various means to track and monitor bicycle and pedestrian usage.

Bicycle and Pedestrian Usage Measures: This task examines the different approaches MPOs use to measure a project's existing and future bicycle and pedestrian usage. Findings from this research can be used to help modify the application process or determine how to better monitor a project's before & after conditions.

Projects Not Funded by Regional Solicitation: This task examines the number of projects funded since the 2014 Regional Solicitation cycle and how many have been resubmittals of previously unfunded applications. It also explores the status of unfunded projects and how an agency may move forward in building a project without receiving federal transportation dollars.

Risk Assessment: This task examines the barriers (e.g., design schedules, right-of-way acquisition, construction permits, securing remaining funds), if any, that are preventing funded projects from being built on-time or altogether. Findings from this task help determine if any improvements need to be made to the program's risk assessment criteria.

Best Practices for Using Crash Modification Factors (CMFs): This task identifies a list of preferred CMFs that should be used when evaluating a project's safety benefits. The first phase of the study discovered applicants under the Regional Solicitation process and Highway Safety Improvement Program (HSIP) were using a wide range of CMFs with varying levels of anticipated crash reductions to determine the safety benefits for similar projects. This variation has made it difficult to score and rank projects for funding. A CMF guide was created in partnership with MnDOT's Office of Traffic Engineering – Traffic Safety Section to be used for future Regional Solicitations and HSIP solicitations.

MONITORING BEFORE & AFTER CONDITIONS

The Before & After Study's (Phase I and II) main objective is to compare a funded project's "before" conditions with "after" conditions to assess their benefits and whether the criteria used in the project application were effective at measuring the benefits. To achieve this objective, the Phase I study established seven performance measures:

- Performance Measure #1: Roadway Congestion
- Performance Measure #2: Roadway Safety
- Performance Measure #3: Transit
- Performance Measure #4: Bicycle & Pedestrian Safety
- Performance Measure #5: Regional Bicycle Transportation Network Contribution
- Performance Measure #6: Pedestrian/Bicycle Connections Achieved
- Performance Measure #7: HSIP Safety Benefits

The performance measures were chosen to help the Metropolitan Council meet some of its federal and state reporting requirements. For example, the Minnesota State Legislature adopted statutes in 1996 requiring the Metropolitan Council to perform an evaluation of the Twin Cities transportation system prior to each update of the Transportation Policy Plan (TPP). These performance measures are also reflective of transportation system performance objectives stated in the *2040 Transportation Policy Plan*.

Before & After Conditions

Projects chosen for this evaluation were based on available data sets to assess their before & after conditions and came mostly from the 2014 funding cycle. Best practices suggest two to three years of "after" condition data is needed to provide an accurate picture of benefits (e.g., reduction in roadway congestion and crashes). This has presented challenges in measuring a number of projects from the 2014 funding cycle. For example, not enough time has elapsed for projects that were programed/built after 2018 (see Table 1) to accurately measure benefits or they have not been built all together.

Table 1 – Regional Solicitation Year & Programming Years

Regional Solicitation Year	Program Years
2014	2017, 2018 & 2019
2016	2020 & 2021
2018	2022 & 2023
2020	2024 & 2025

At that time of this study, there were also a number of challenges in using regional data sets to measure before & after conditions as a result of the COVID-19 pandemic and its impacts on travel behavior (e.g., decrease in traffic volumes and transit ridership). As a result, there are too many anomalies associated with 2020 and 2021 data sets (e.g., crash data, traffic volumes, and transit ridership) to accurately measure "after" conditions.

Based on these data constraints, the Phase II study placed a larger focus on exploring ways to improve the methodologies for measuring before & after conditions.

Performance Measure #1: Roadway Congestion Methodology

Roadway congestion benefits are typically measured by conducting a no-build (without improvement) and build (with improvement) condition assessment using traffic modeling software (i.e., Synchro analysis). Results are then used to answer roadway application criteria. The Phase I study used the same methodology to measure "after" conditions for built projects. Replicating this methodology to measure congestion benefits after a project has been built requires a large level-of-effort Therefore, StreetLight Insight© was reviewed by the Project Team to determine its ability to measure before & after conditions.

StreetLight data is subscription-based service that provides an aggregate of location-based service records collected from cellphone providers that track traffic congestion and traffic times, amongst other attributes. The Metropolitan Council currently has a subscription to this service and is commonly used by other MPOs and roadway agencies (counties and DOTs) for traffic analysis.

StreetLight data was tested to measure before & after conditions for six roadway expansion projects (now called strategic capacity projects) to determine travel time reductions (see Table 2 and Attachment A). These projects were funded under the 2014 Regional Solicitation cycle and built between 2017 and 2019. To ensure confidence in the before & after condition findings, the project team confirmed that each project was substantially complete and open to traffic prior to the 2020 COVID-19 pandemic, which drastically reduced commuter traffic volumes.

Findings

a) StreetLight data is an effective data set to quantifying before & after conditions. More importantly, it was determined that StreetLight data offers data sets that have been populated as early as 2011, giving greater confidence in using the data to analyze before & after conditions. Attachment B includes a "How to Manual" that demonstrates how Metropolitan Council staff can replicate this analysis for future congestion monitoring efforts.
b) Based on StreetLight findings, four of the five roadway expansion projects achieved a travel time reduction (see Table 2).

Table 2 – Total Travel Time Reductions

2014 Regional Solicitation: Funded Roadway Expansion Projects	AM Reduction	PM Reduction	All Day Reduction
TH 41 Expansion (Carver County)	19%	2%	11%
70th St and Robert Trail Roundabout (Dakota County)	1%	17%	7%
CSAH 42/52 Interchange (Rosemount)	10%	-3%	13%
CSAH 13/I-94 Crossing (Woodbury)	6%	5%	4%
CSAH 31 Expansion (Eagan) *	-50%	-37%	-28%

** Central Park Commons shopping center partially opened during analysis periods, causing incomparable results.*

Performance Measure #2: Roadway Safety, Performance Measure #4: Bicycle & Pedestrian Safety, and Performance Measure #7: HSIP Safety Benefits

Improving safety is a local, regional, and national goal. This goal is reflected in the Metropolitan Council's Transportation Policy Plan (TPP) and includes the following objectives:

- Reduce crashes and improve safety and security for all modes of travel
- Reduce the transportation system's vulnerability to natural and manmade incidents and threats.

As the MPO for the region, the Council is required by federal law to set regional safety targets on an annual basis. The federally required safety targets include the total number and rate (per 100 million vehicle miles travelled) of fatal crashes, the total number and rate of serious injury crashes, and the total number of non-motorized fatalities and series injuries. These serve not only to fulfill the Council's federal obligations, but to engage with regional partners and set goals to guide the region to a safer transportation network for all modes.

A TPP Safety & Security strategy includes "regional transportation partners should monitor and routinely analyze safety and security data by mode and severity to identify priorities and progress." This study helps address this strategy by evaluating the safety outcomes for built roadway projects that have received Regional Solicitation funds. As part of this effort, the Project Team explored ways to streamline a safety analysis that doesn't require traffic modeling software, which can be a time-consuming exercise.

The Project Team determined crash data from MnDOT can easily be analyzed and monitored in a Geographic Information System (GIS) without using traffic modeling software. A customized GIS tool was created for the Metropolitan Council to achieve this goal (see Attachment C). The tool includes the following reporting features through a GIS "dashboard" for built roadway projects that have received federal transportation funds:

- Total crashes
- Fatal crashes
- Serious crashes
- Fatal or serious crashes
- Fatal and serious crash rate
- Pedestrian or bike crashes
- Crash cost
- Approximate crash rate

The tool was developed under the following parameters:

- A three-year window of crash data is used to measure safety outcomes. Reporting features for built projects that have less than three years of data are still reported, but should be considered "preliminary findings" until three years of data can be obtained. Furthermore, projects completed after 2017 should be considered preliminary.
- 2017 AADT was used for all before rates. The most recent AADT available form MnDOT was 2019, which was used for all after rates.
- Dataset of crashes. Includes 10 years of crashes (2011-2020). Includes crash year, crash type/diagram, and crash severity. Also includes project specific information such as whether crash occurred within 3 years before/after construction.
- Summary of yearly crash counts for project. Each record of dataset corresponds to a single year and includes breakdowns of total crash counts by severity, diagram, and severity/diagram combinations (e.g., fatal right-angle crashes).
- Project boundaries are built in GIS using a 75-foot buffer around the project extent to capture crashes.
- Crash rates are calculated by total crashes / per 1 million vehicle miles based on the average AADT within its project extents. (e.g., Average AADT * length * 3 * 365)/1,000,000)

Findings

- Only two of the thirteen projects were completed in 2017 and have a full three years of crash data under normal conditions (see Tables 3.1 and 3.2). Meaning eleven of the project crash summaries are "preliminary findings" and do not provide a complete and true analysis.
- Of the two complete safety analyses reduction of total crashes, crash costs, and crash rates was achieved (see Tables 3.1 and 3.2).

Performance Measure #3: Transit

The main objective for this performance measure is to determine if transit ridership projections have been achieved. Transit ridership has significantly been impacted by the COVID-19 pandemic. As a result, the Project Team decided to forgo any analysis until the longer-term impacts of the pandemic are better understood. There are no recommendations to revise the performance measure's methodology that was used as part of the Phase I study.

Table 3.1 Project #1 - Crash Analysis Summary (with 3 Years of Data)

CSAH 31/Pilot Knob Rd (City of Eagan)	Before	After	Difference
Total Crashes	70	39	-31
Crash Cost	$1,579,400	$1,186,800	$-392,600
Total K&A	0	0	0
Total Ped & Bike	0	1	1
Crash Rate	7.94	3.87	-4.07
K&A Crash Rate	0.00	0.00	0.00

Table 3.2 Project #3 - Crash Analysis Summary (with 3 Years of Data)

CSAH 65/White Bear Ave Reconstruction (Ramsey County)	Before	After	Difference
Total Crashes	114	88	-26
Crash Cost	$3,201,200	$3,104,200	$-97,000
Total K&A	0	0	0
Total Ped & Bike	7	8	1
Crash Rate	6.64	5.09	-1.55
K&A Crash Rate	0.00	0.00	0.00

Performance Measure #5: Regional Bicycle Transportation Network Contribution

The main objective for this performance measure is to tabulate the number of bikeway miles funded and programmed and their contribution to the Regional Bicycle Transportation Network (RBTN).

Findings

Findings from the Phase I study determined approximately 62 bikeway miles have been built or programmed that have contributed to the RBTN. Since that time, the 2020 funding cycle has contributed an additional 12.3 miles (see Table 4).

Table 4 – Programmed or built RBTN miles

Metric	Phase I Findings (2007, 2009, 2011, 2014, 2016, and 2018 Regional Solicitation funding cycle)	Phase II Findings (2020 Regional Solicitation funding cycle)	Sub Total
Tier 1 Bikeway Alignment	27.5 miles	9.0 miles	36.5 miles
Tier 2 Bikeway Alignment	20.2 miles	1.7 miles	21.9 miles
Tier 1 Bikeway Corridor	8.3 miles	1.4 miles	9.7 miles
Tier 2 Bikeway Corridor	6.1 miles	0 miles	6.1 miles
Total	62.1 miles	12.3 miles	74.4 miles

Performance Measure #6: Pedestrian/Bicycle Connections Achieved

The main objective for this performance measure is to document the number of desirable destinations (e.g., jobs, homes, recreation, shopping, etc.) connected/linked by built or programmed pedestrian or bikeway projects:

- Job and Activity Centers: Data was obtained through the Metropolitan Council. The job and activity centers describe contiguous areas where there are at least 1,000 jobs and the employment density is at least 10 jobs per net acre. The data also includes some regionally significant manufacturing and distribution centers that have at least 1,000 jobs but densities less than 10 jobs per acre.

  One-hundred and seven (107) centers are defined. Nearly two-thirds of all jobs in the seven-county Twin Cities metropolitan area are located within the job and activity centers. The job and activity centers are classified into six scaled categories based on total employment or special recognition, and five industry types (Major, Professional, Industrial, Activity, and Diversified) based on predominant industry.

  In general, job and activity center boundaries follow U.S. Census block boundaries.

- Job Concentration Centers: Data was obtained through the Metropolitan Council. Job density displays the most accurately located employment density within the metropolitan area of Minneapolis and St. Paul. Job density is based on employer locations and counts from the Minnesota Department of Employment and Economic Development's (DEED's) Quarterly Census of Employment and Wages (QCEW), which only includes jobs that are covered by the Unemployment Insurance Program (about 90 to 95 percent of all jobs). Some self-employment jobs might be excluded.

  The QCEW data was converted to a smoothly tapered surface of employment values. The resulting data surface provides the best representation of job density in the metropolitan area.

- Areas of Concentrated Poverty: Data was obtained through the Metropolitan Council. The Metropolitan Council defines Areas of Concentrated Poverty (ACPs) as census tracts where 40% or more of the residents have family or individual incomes that are less than 185% of the federal poverty threshold. In 2017, 185% of the federal poverty threshold was $46,424 for a family of four or $23,103 for an individual living alone. Some census tracts that meet this poverty threshold have a large share of college or graduate students. These areas are excluded from the Met Council's defined Areas of Concentrated Poverty census tracts.

Findings

Findings from the Phase I study determined projects have built a number of new pedestrian and bicycle connections to/from Job and Activity Centers (see Table 4), Job Concentration Centers (see Table 5), and Areas of Concentrated Poverty (see Table 6). Since that time, the 2020 funding cycle has contributed similar benefits (see Table 4 - 6).

Table 4 – Direct/Indirect Connections to Job & Activity Centers

Job & Activity Centers	Phase I Findings (2007, 2009, 2011, 2014, 2016, and 2018 Regional Solicitation funding cycle)	Phase II Findings (2020 Regional Solicitation funding cycle)	Sub Total
Active	5.9 miles	1.1 miles	7 miles
Diversified	1.6 miles	0.9 miles	2.5 miles
Industrial	4 miles	0 miles	4 miles
Major	4.9 miles	2.7 miles	7.6 miles
Professional	7 miles	4.9 miles	11.9 miles
Total	23.5 miles	8.7 miles	32.2 miles

Table 5 – Direct/Indirect Connections to Job Concentration Centers

Job Concentration Centers	Phase I Findings (2007, 2009, 2011, 2014, 2016, and 2018 Regional Solicitation funding cycle)	Phase II Findings (2020 Regional Solicitation funding cycle)	Sub Total
3,000 – 5,999 jobs	8 miles	1.1 miles	9.1 miles
6,000 – 9,999 jobs	6 miles	3.3 miles	9.3 miles
10,000 – 39,999 jobs	3.5 miles	1.8 miles	5.3 miles
40,000 – 160,000 jobs	2.9 miles	1.2 miles	4.1 miles
Total	20.5 miles	7.3 miles	27.8 miles

Table 6 – Direct/Indirect Connections to Areas of Concentrated Poverty

Areas of Concentrated Poverty	Phase I Findings (2007, 2009, 2011, 2014, 2016, and 2018 Regional Solicitation funding cycle)	Phase II Findings (2020 Regional Solicitation funding cycle)	Sub Total
Areas of concentrated poverty	9 miles	10.7 miles	19.7 miles

RECOMMENDATIONS FOR BEFORE & AFTER CONDITIONS

Recommendations

The following recommendations should be considered in helping improve the application process and tracking a built project's "after" conditions.

a) Performance Measure #1: Roadway Congestion
    i. Move towards a more effective means in monitoring before & after conditions by using StreetLight or other speed data sources. Attachment B includes a "How to Manual" that demonstrates how the Metropolitan Council can continue to replicate this study's methodology for monitoring congestion benefits.

b) Performance Measure #2: Roadway Safety, Performance Measure #4: Bicycle & Pedestrian Safety, and Performance Measure #7: HSIP Safety Benefits
    i. Move towards a more efficient means in monitoring crash data by using the safety tool created for this study or similar approach (see Attachment C).

c) Performance Measure #3: Transit
    i. Revisit the performance measure when long-term COVID-19 impacts to transit ridership are better understood throughout the region.

d) Performance Measure #5: RBTN Contribution
    i. Continue to monitor project contributions to the RBTN.

e) Performance Measure #6: Pedestrian/Bicycle Connections Achieved
    i. Revisit this measure to incorporate new metrics that evaluate a project's benefits that align with affordable housing goals.
    ii. Consider working towards a new measure that monitors pedestrian and bicycle usage. This approach is talked in more detail on page 20.

STREAMLINING THE APPLICATION PROCESS

This section identifies ways to improve the application process by learning from consulting firms with extensive experience preparing applications and advising agencies on the Regional Solicitation process. Their input helped provide an outsider's perspective on how the application process can be improved or streamlined based on their experience.

A. Focus Group Input

Focus Group meetings were held with staff representing various consulting firms (representatives from Bolton & Menk, HKGi, SEH, SRF, Toole Design, WSB, and Zan Associates) with hands-on experience working with jurisdictions and submitting projects for Regional Solicitation funding. The Project Team felt a meeting with this group was a unique opportunity to better understand how their clients perceived the Regional Solicitation process and where there are the opportunities for streamlining the application process. Combined, this group has prepared over 500 applications for their clients since the late 1990s.

The Project Team prepared questions for the participants that attempted to garner information on specific ways in which the application process could be simplified and streamlined. The questions posed, feedback provided, and overall themes gathered as part of this endeavor are summarized in Attachment D and E. The Project Team also enlisted ideas from individuals from local consulting firms and other planning professionals to inform the study's objectives in measuring before & after conditions for built multiuse trail or bicycle/pedestrian projects (see Attachment E).

Findings

The following key themes emerged during the discussions with the Focus Groups:

a) There is no need to eliminate the risk assessment measure (see page 28).

b) The application process is easy to understand for those who participate in the process (e.g., grant writers, TAC and TAB members). Those would do not regularly participate in the process find it difficult to understand how projects are being scored and selected for funding.

c) Funding is being spread across too many funding categories, which makes it unclear as to what the Regional Solicitation process is trying to accomplish. It is also unclear how some of the measures relate to the funding categories, as there is some ambiguity as to how the measures associate with perceived goal of a particular category (e.g., housing, congestion, safety, multimodal elements, equity, and public engagement)

d) The new housing measure used in the 2020 Regional Solicitation proved difficult and time consuming to quantify and answer. This new measure required the applicant to quantify the development stage, number of units, number of bedrooms per unit, and level of affordability using 2019 affordability limits. It also required information on whether the affordability is guaranteed through funding restrictions (i.e., Low-Income Housing Tax Credit) or is unsubsidized, if housing choice vouchers are/will be accepted, and if there is a fair housing marketing plan required or in place. This type of information is difficult to obtain and can be very time-consuming to collect. There are also limitations to what affordable housing information can be made public. Focus Group members also felt this measure was redundant when considering other measures that look at the community's housing performance score and the project's proximity to populations and employment centers.

e) Measuring congestion reduction and air quality for the roadway applications is time-consuming and difficult to quantify. It requires judgement and analysis from a person with knowledge of traffic engineering and the use of traffic modeling software to develop a valid result. This cannot always be done in-house by the applicant (e.g., city or county) and typically requires the use of consulting services. This is especially true for projects (e.g., interchanges) that require a more complex approach/methodology.

B. Bicycle and Pedestrian Usage Measures

One of the most challenging questions to answer in the multiuse trails/bicycle facilities and pedestrian facilities applications is how to approach the usage criterion. The only measure in this criterion attempts to quantify the project's potential usage based on the existing population and employment near the project. There are also opportunities throughout the application to provide a written description about the project's ability to generate new users. Applicants have used different methodologies to determine the number of existing and future users. In many cases, these assumptions are a "best-guess." In an effort to help refine the usage criterion, the study included an exploration of other ideas through Focus Groups, a peer review, and exploring new data sets.

Focus Groups

The study leveraged insight from the consulting community and planning and engineering professionals to modify the pedestrian/bicycle usage measure, while seeking ideas on how to streamline the application process. A summary of the Focus Group's input is included in Attachment D. The following key themes emerged during the discussions with the Focus Groups regarding bicycle/pedestrian measures:

a) It is unclear what type of bicycle and pedestrian projects are considered a higher priority for funding. The group articulated that the assumption is that projects that are part of the Regional Bicycle Transportation Network (RBTN) are a higher priority based on the scoring criteria.

b) There are opportunities to improve the bicycle/pedestrian measures by incorporating a scoring criterion that considers the project's design and its ability to improve one's comfort level and safety. The Focus Group considered this a stronger measure in evaluating a project's potential for generating bicycle/pedestrian usage. Examples of this approach by other MPOs can be found in Attachment E.

c) Not every community has the resources available to collect bicycle/pedestrian data. If the Metropolitan Council wants to collect before & after data, free resources (e.g., portable counters or access to existing Council data) should be readily available to agencies.

Peer Review

Phase I documented how other Metropolitan Planning Organizations (MPOs) solicit and distribute federal transportation funds. Phase II revisited this research and the same MPOs were selected for this review to assess their application processes and criteria used to measure bicycle and pedestrian usage. A summary of this research is provided in Attachment E and highlighted below:

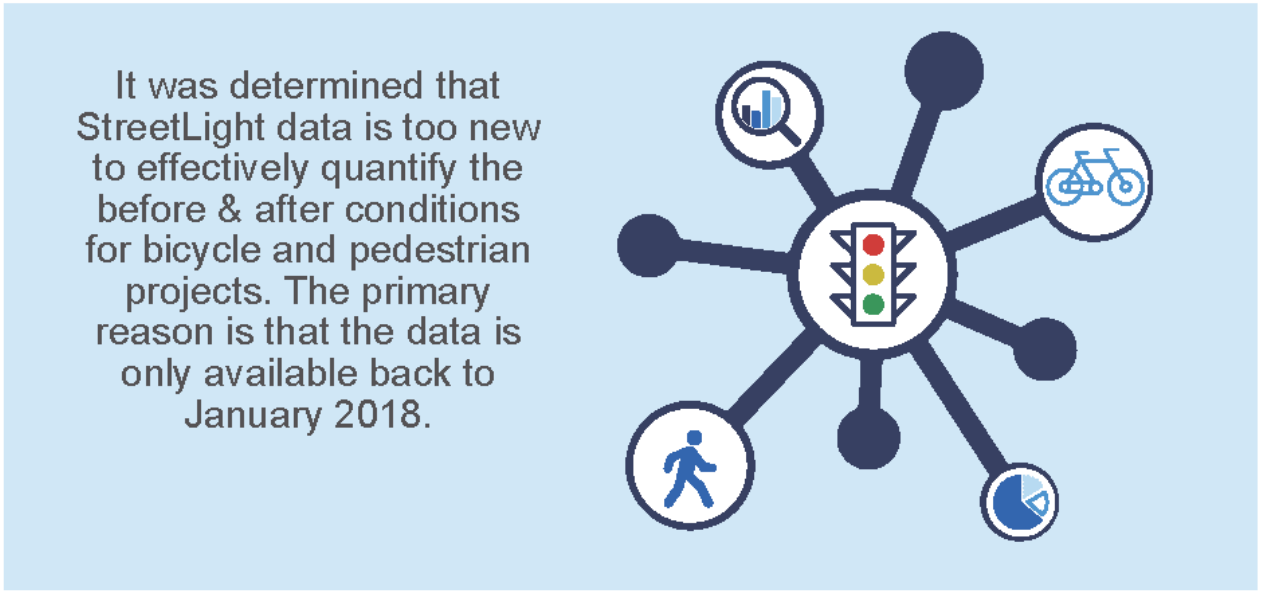
- Several MPOs (e.g., Dallas and St. Louis) score projects based on their design and ability to improve the user's comfort level. This is done through a Level of Traffic Stress (LTS) analysis.
- Several MPOs (e.g., Denver and Baltimore) score projects based on their proximity to populations and Environment Justice (EJ) areas.
- Several MPOs (e.g., Portland and Seattle) score projects based on their ability to reduce vehicle trips.

- MPOs that require before & after usage to be used as a scoring factor (e.g., Denver, Dallas, and Seattle) approach the criteria with descriptive or qualitative estimates (rather than modeling or explicit quantitative measures).

Big Data Sets

Quantifying the number of people biking and walking is a difficult task to achieve at a local or regional level. New data sources to quantify the number of users and pinpoint their routes are becoming available. These data sets are typically collected through mobile applications that track movement (e.g., fitness applications). One data source is StreetLight Insight©, which is an aggregate of location-based services records collected from cellphone providers. This data set was reviewed by the Project Team to determine its ability to measure before & after conditions of bicycle and pedestrian usage.

The Project Team determined that StreetLight data is too new to effectively quantify the before & after conditions for bicycle and pedestrian projects. The primary reason is that data provided by the StreetLight platform is only available back to January 2018. Many of the projects being analyzed for this study were awarded funding in 2014 started construction by 2017. Based on the misalignment of the construction years and the availability of StreetLight data, the Project Team was unable to obtain before data for a comparative analysis.



Another item of note is the output for bicycle and pedestrian data is different from the estimated vehicles counts provided at a corridor or segment level. For example, the bicycle and pedestrian outputs can demonstrate how one location or facility compares to another, but does not give actual estimated counts. Instead, bicycle and pedestrian counts are provided by geographical areas (e.g., zones) that may contain multiple trails or routes.

A reliable bicycle and pedestrian count is needed to effectively quantify before & after conditions. It is anticipated that bicycle and pedestrian data will become more reliable as StreetLight data advances over time.

Findings

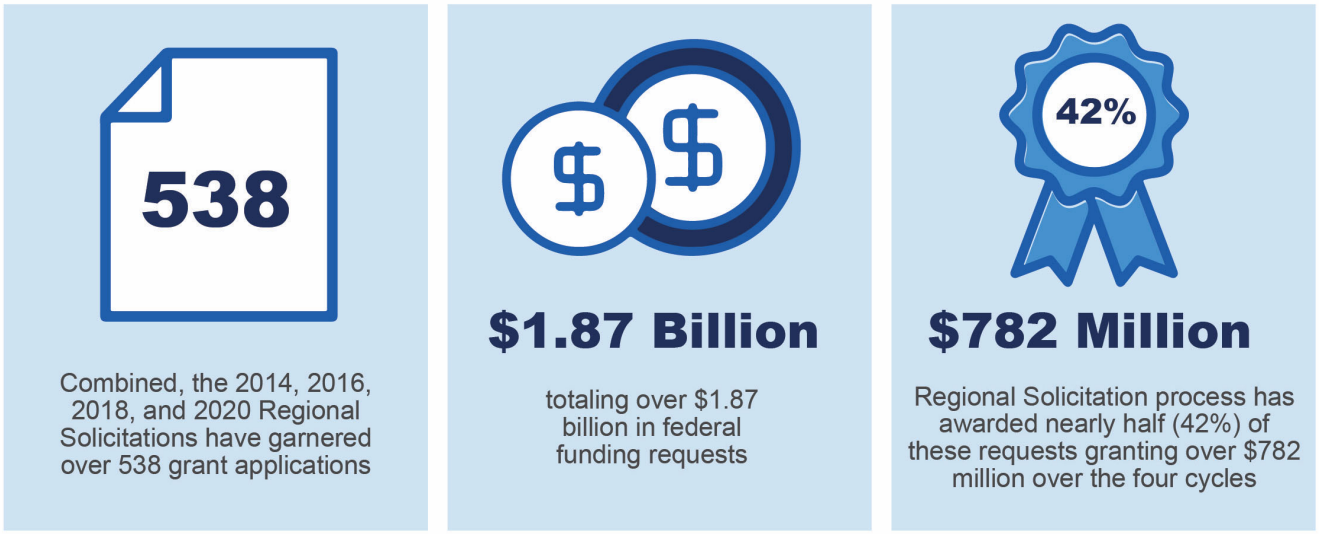
a) StreetLight© data is too new to measure pedestrian and bicycle before & after usage at this time.

b) Many MPOs rely on the projects identified in their Long Range Transportation Plan for allocating federal transportation funds. In some respect, this approach is similar in nature to how the Metropolitan Council developed the Regional Bicycle Transportation Network (RBTN). The RBTN was established in the 2040 TPP and articulates a vision for a region-wide bicycle network but does not identify/prioritize specific projects for federal transportation funding.

C. Examination of Projects Not Funded through the Regional Solicitation Process

Combined, the 2014, 2016, 2018, and 2020 Regional Solicitations have garnered 538 grant applications totaling over $1.87 billion in federal funding requests. The Regional Solicitation process has awarded nearly half (42%) of these requests granting over $782 million over the last four funding cycles. A summary of these findings is displayed in Figure 1.

Figure 1: 2014, 2016, 2018, and 2020 Regional Solicitation Summary



Historically, funding requests have greatly exceeded the amount of available funds (see Tables 7 - 10). This emphasizes the funding shortfalls many communities are facing in maintaining and expanding their transportation systems. This trend has also contributed to a number of unfunded projects being resubmitted at a later funding cycle (see Table 11). Most resubmittals have occurred under the 'Multiuse Trails' funding category.

The Focus Groups noted (see Attachment D and E) that without Regional Solicitation funds, projects are being scaled back (e.g., fewer amenities/enhancements) or delayed until competitive funding is secured.

There have been varying results in the success of resubmittals receiving funds. For example, approximately 30% of recent resubmittals were awarded funds as part of the 2016, 2018, or 2020 Regional Solicitation process. These findings do not suggest a project will eventually receive funding.

Findings

a) The Regional Solicitation process has awarded nearly half (42%) of the funding requests - granting over $782 million over the past four cycles. Based on the 2014, 2016, 2018, and 2020 Regional Solicitation awards, 313 projects remain unfunded through this program (see Tables 7 - 10).

b) While some projects still move forward without Regional Solicitation funding, often projects are being scaled back (e.g., fewer amenities/enhancements) or delayed until competitive funding is secured.

c) Applications that did not receive funding for a given solicitation but re-submitted at a later date had varying success in their resubmittal efforts, with approximately 29% eventually receiving funding (see Table 11).

d) The number of funding requests (applications) do not necessarily equate to demand. However, the number or applications under one category may indicate a clear understanding on what the Regional Solicitation process is trying to fund. A small number of applications under one category may indicate a lack of understanding or vision for what that funding category is trying to achieve. For example, the Pedestrian Facilities category has historically seen a small number of funding requests.

Table 7: Number of Applications Submitted by Funding Category

Funding Category	2014	2016	2018	2020	Total	Percentage
Bridges	6	8	8	7	29	5%
Multiuse Trails	30	39	40	37	146	27%
Pedestrian Facilities	9	7	12	8	36	7%
Roadway Expansion/ Strategic Capacity	23	21	17	17	78	14%
Roadway Reconstruction/Modernization	21	34	15	17	87	16%
Roadway System Mgmt./ Traffic Mgmt. Technology	10	4	3	5	22	4%
Safety Spot Improvement	NA	NA	NA	10	10	2%
Safe Routes to School (SRTS)	3	3	8	6	20	4%
Transportation Management Organizations (TMO)/Travel Demand Management (TDM)	6	6	14	4	30	6%
Transit Expansion	16	10	9	10	45	8%
Transit Modernization	1	13	10	8	32	6%
Unique Projects	0	1	2	0	3	1%
Total	**125**	**146**	**138**	**129**	**538**	**100%**

Table 8: Number of Projects Awarded by Funding Category

Funding Category	2014	2016	2018	2020	Total	Percentage
Bridges	1	2	3	2	8	4%
Multiuse Trails	10	12	11	11	44	20%
Pedestrian Facilities	2	6	2	8	18	8%
Roadway Expansion/ Strategic Capacity	9	7	10	7	33	15%
Roadway Reconstruction/Modernization	8	13	7	4	32	14%
Roadway System Mgmt./ Traffic Mgmt. Technology	10	4	2	2	18	8%
Safety Spot Improvement	NA	NA	NA	4	4	2%
Safe Routes to School (SRTS)	3	3	4	6	16	7%
Transportation Management Organizations (TMO)/Travel Demand Management (TDM)	2	6	6	4	18	8%
Transit Expansion	4	5	6	3	18	8%
Transit Modernization	1	4	4	4	13	6%
Unique Projects	0	1	2	0	3	1%
Total	**50**	**63**	**57**	**55**	**225**	**100%**

Table 9: Amount of Funds Requested by Funding Category

Funding Category	2014	2016	2018	2020	Total	Percentage
Bridges	$25,078,153	$34,995,440	$39,558,012	$33,411,765	$133,043,370	7%
Multiuse Trails	$55,099,201	$78,048,270	$96,060,389	$84,131,469	$313,339,330	17%
Pedestrian Facilities	$7,676,692	$4,839,840	$8,789,368	$5,907,040	$27,212,940	1%
Roadway Expansion/ Strategic Capacity	$139,990,534	$120,416,196	$97,238,680	$130,386,330	$488,031,740	26%
Roadway Reconstruction/Modernization	$112,027,669	$165,517,290	$77,975,520	$94,380,592	$449,901,071	24%
Roadway System Mgmt./ Traffic Mgmt. Technology	$10,683,050	$5,856,200	$5,905,600	$11,616,885	$34,061,735	2%
Safety Spot Improvement	NA	NA	NA	$24,097,023	$24,097,023	1%
Safe Routes to School (SRTS)	$1,195,821	$2,539,760	$5,554,550	$4,113,343	$13,403,474	1%
Transportation Management Organizations (TMO)/Travel Demand Management (TDM)	$34,000,000	$1,258,995	$9,858,335	$1,315,044	$46,432,374	2%
Transit Expansion	$73,108,294	$57,406,988	$34,734,054	$34,288,421	$199,537,756	11%
Transit Modernization	$5,711,040	$64,762,400	$43,275,306	$24,549,920	$138,298,666	7%
Unique Projects	$0	$2,700,000	$4,585,000	$0	$7,285,000	0%
Total	**$464,570,454**	**$538,341,380**	**$423,534,814**	**$448,197,831**	**$1,874,644,480**	**100%**

Table 10: Amount of Funds Awarded by Funding Category

Funding Category	2014	2016	2018	2020 *	Total	Percentage
Bridges	$7,000,000	$14,000,000	$10,636,296	$13,888,000	$45,524,296	6%
Multiuse Trails	$20,296,117	$28,943,889	$26,819,800	$26,532,473	$102,592,279	13%
Pedestrian Facilities	$1,640,000	$3,839,840	$2,000,000	$5,907,040	$13,386,880	2%
Roadway Expansion	$53,636,800	$42,420,725	$60,685,420	$69,049,600	$225,792,545	29%
Roadway Reconstruction/Modernization	$29,404,836	$68,346,340	$34,500,000	$28,000,000	$160,251,176	20%
Roadway System Mgmt./ Traffic Mgmt. Technology	$17,183,319	$5,856,200	$2,905,600	$4,500,800	$30,445,919	4%
Safety Spot Improvement	NA	NA	NA	$9,897,200	$9,897,200	1%
Safe Routes to School (SRTS)	$1,131,484	$2,539,760	$2,342,550	$4,113,343	$10,127,137	1%
Transportation Management Organizations (TMO)/Travel Demand Management (TDM)	$7,000,000	$1,258,995	$7,364,780	$1,315,044	$16,938,819	2%
Transit Expansion	$27,375,741	$31,867,509	$20,571,516	$8,942,679	$88,757,445	11%
Transit Modernization	$5,288,000	$21,200,000	$27,000,000	$17,243,520	$70,731,520	9%
Unique Projects	$0	$2,700,000	$4,585,000	$0	$7,285,000	1%
Total	**$169,956,297**	**$222,973,258**	**$199,410,961**	**$189,389,699**	**$781,730,215**	**100%**

** Note: Table 10 does not reflect the F-Line Arterial Bus Rapid Transit project that was approved for $25M in 2020.*

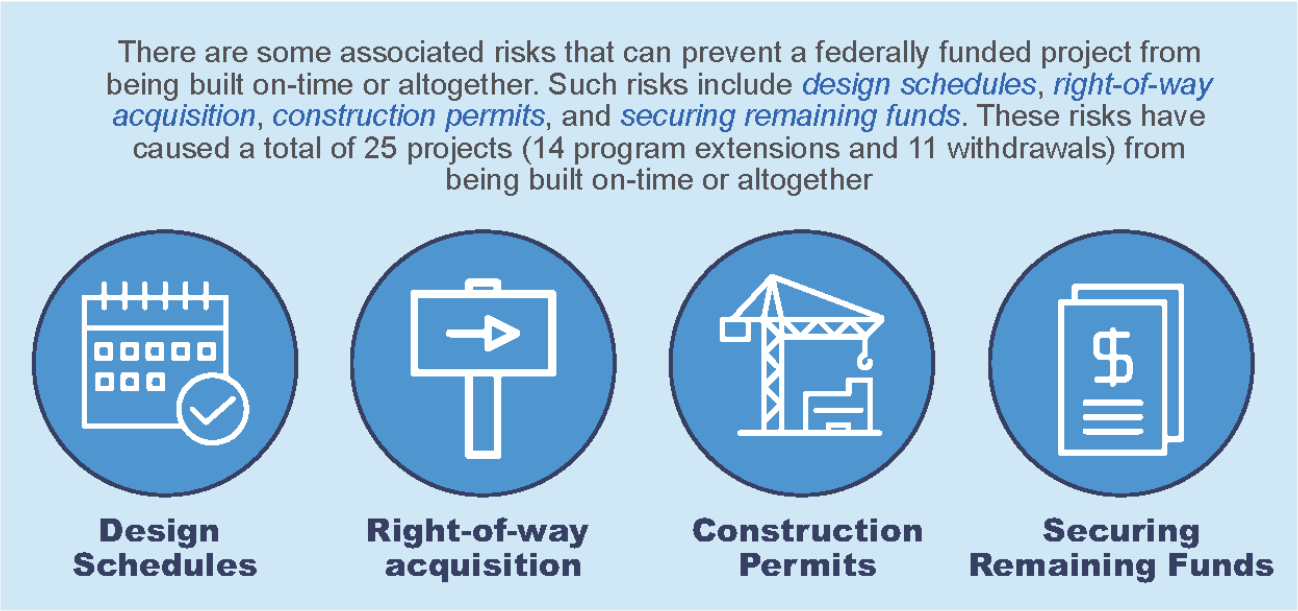
Table 11: 2016, 2018, & 2020 Regional Solicitation Applications - Resubmittals

Funding Category	# of Resubmittals	Not Funded	2016 Resubmittals Funded	2018 Resubmittals Funded	2020 Resubmittals Funded	Total Funded	% of Resubmittals Funded
Bridges	3	2	0	1	1	2	67%
Multiuse Trails	24	9	2	4	3	9	38%
Pedestrian Facilities	1	1	0	0	0	1	0%
Roadway Expansion	17	5	1	2	0	5	18%
Roadway Reconstruction/Modernization	13	3	1	1	1	3	23%
Grand Total	**58**	**20**	**4**	**8**	**5**	**20**	**29%**

D. Examination of the Risk Assessment Process

As part of the Regional Solicitation & Highway Safety Improvement Program (HSIP) solicitation processes, applicants are asked to fill out a similar risk assessment form. This criterion rates applications on several risk factors. High-risk applications increase the likelihood that projects will withdraw or request a program year extension at a later date. If this happens, the region is forced to reallocate federal funds in a short amount of time or return them to the US Department of Transportation for distribution to other regions.

There are some associated risks that can prevent a federally funded project from being built on-time or altogether. Such risks include design schedules, right-of-way acquisition, construction permits, and securing the remaining funds necessary to complete the project. Since the 2014 Regional Solicitation, these risks have caused a total of 25 projects (14 program year extensions and 11 withdrawals) from being built on-time or altogether (see Tables 12 & 13). Note that this total includes projects awarded under the HSIP for the metropolitan region. HSIP projects use federal funds that adhere to similar programming requirements as the Regional Solicitation, though are not funded by the Regional Solicitation process.



These 25 projects were looked at more closely (see Table 12 & 13) to determine if any revisions need to be made to the risk assessment measure to prevent future projects from being withdrawn or requesting program year extensions. For example, Metropolitan Council committees have asked if potential changes need to occur to the program year policy to provide additional time to deliver a project. It has also been suggested by applicants to remove the risk assessment measure to help streamline the application process. In 2018, the Metropolitan Council conducted a sensitivity analysis to determine if the removal of the risk assessment criteria would affect the outcome of a project's score and its funding outcome. The sensitivity analysis determined that the risk assessment criteria had little or no impact on the projects overall score and funding outcome. However, it is important to note the Focus Groups felt (see Attachment D and E) the value in continuing with a risk assessment process to ensure applicants are doing their due diligence when evaluating a project's potential risks and ability to be constructed on-time and within budget.

Table 12: Program Year Extensions

Project Name	Solicitation Year	Program Year	Program Year Extension	Approval/ Denial	Applicant	Funding Category	Award Amount	Reason
CSAH 31/CSAH 58 Intersection Improvements	2014	2019	2020	Approval	Ramsey County	HSIP	$1,018,607	Construction/design delay
77th Street Extension/MN 77 Bridge	2016	2020	2021	Approval	City of Richfield	Roadway	$7,000,000	The remaining funds have not been secured in time (but were secured at a later date)
CSAH 11 Reconstruction	2016	2020	2021	Approval	Anoka County	Roadway	$7,000,000	Schedule delays related to working with the railroad
CSAH 25/Beltline Pedestrian Improvements	2016	2020	2021	Approval	City of St. Louis Park	Multiuse Trail	$560,000	To align construction schedules with other projects
CSAH 46 Pedestrian Improvements	2016	2019	2020	Approval	Hennepin County	Multiuse Trail	$506,480	To align construction schedules with other projects
CSAH 86 Reconstruction	2016	2020	2021	Approval	Dakota County	Roadway	$4,200,000	Schedule delays related to working with the railroad
Hennepin Avenue Transit Expansion	2016	2021	2023	Approval	Metro Transit	Transit	$7,000,000	To align construction schedules with other projects
Highway 252/ 66th Avenue Interchange	2016	2021	2023	Approval	City of Brooklyn Center	Roadway	$7,000,000	To align construction schedules with other projects and funding sources
Highway 252/70th Avenue Pedestrian Bridge	2016	2021	2023	Approval	City of Brooklyn Center	Multiuse Trail	$1,902,640	To align construction schedules with other projects and funding sources
Kellogg Boulevard Bridge (#90378) Reconstruction	2016	2021	2022	Approval	City of Saint Pal	Bridge	$7,000,000	Construction/design delay and the local match is not available
Lake Marion Greenway Trail	2016	2019	2020	Approval	City of Burnsville	Multiuse Trail	$1,598,400	Construction/design delay
Lake Street Transit Expansion	2016	2020	2022	Approval	Metro Transit	Transit	$7,000,000	To align construction schedules with other projects
Washington Tech Safe Routes to School Improvements	2016	2018	2019	Approval	City of Saint Paul	SRTS	$816,000	The remaining funds have not been secured
Signal Safety Improvements on Minnehaha Avenue East	2018	2022	2023	Approval	City of Saint Paul	HSIP	$1,080,000	To align construction schedules with other projects

Table 13: Project Withdrawals

Project Name	Solicitation Year	Program Year	Applicant	Awarded Amount	Funding Category	Reason
Kellogg Bridge (#62080 and 62080A) Reconstruction	2014	2018	City of Saint Paul	$7,000,000	Bridges	The remaining funds were not secured. The project reapplied in the 2020 funding cycle and secured $7M again.
TH 5 Trail between CSAH 17 and CSAH 101	2014	2017	Carver County	$321,520	Multiuse Trail	No longer cost effective to utilize federal funds
Maryland Avenue/Edgerton Street Intersection	2014	2018	Ramsey County	$1,018,607	HSIP	Change in scope/design
Jefferson and Olson Schools SRTS Improvements	2014	2016	City of Bloomington	$208,992	SRTS	Obtain MnDOT SRTS Infrastructure Funds
Downtown Hopkins Green Line Station Park & Ride	2014	2017	City of Hopkins	$6,000,000	CMAQ	Right-of-way not secured/disagreements with developer on project
CSAH 58/MSAS 138 Roundabout	2016	2020	City of Maplewood	$679,500	HSIP	Change in scope/design
Bruce Vento Bridge Connection	2016	2020	City of Saint Paul	$5,500,00	Multiuse Trail	The remaining funds were not secured
Scott County Shoulder Pavement Improvement Projects	2016	2020	Scott County	$1,260,000	HSIP	No longer cost effective to utilize federal funds
CSAH 40 Pavement Shoulder & Signage Improvements	2016	2021	Carver County	$1,800,000	HSIP	Change in scope/design
Snelling Avenue (TH 51) Expansion	2016	2020	City of Roseville	$2,718,292	Roadway	The remaining funds were not secured & construction/design delay
Shared Mobility, Community Outreach, and Development Program Demonstration	2016	-	CarFreeLife	$200,000	TDM	Project was determined to be federally ineligible after the award

Program Year Extensions & Withdrawals

Federal transportation funds are allocated every two years and correspond to a program year in which awarded projects must be let (see Table 14). If an awarded project cannot be built on-time, the responsible agency may either ask for a one-year program extension or withdraw the project.

Table 14: Regional Solicitation Year & Programming Years

Regional Solicitation Year	Program Years
2014	2017, 2018 & 2019
2016	2020 & 2021
2018	2022 & 2023
2020	2024 & 2025

Program year extensions are reviewed by both the Technical Advisory Committee (TAC) Funding & Programming Committee and TAC before being approved or denied by the Transportation Advisory Board (TAB). A total of 14 program year extensions have been requested for projects awarded in the 2014 and 2016 Regional Solicitations (see Table 12) and have all been approved by TAB. There has been four program year extensions filed for projects funded by the 2018 Regional Solicitation as of May 2021.

Some projects are not able to meet their program year and are withdrawn by the agency. In most cases, these funds are reallocated during the next Regional Solicitation cycle. A total of 11 projects have been withdrawn as part of the 2014 and 2016 Regional Solicitation (see Table 13). There have been no withdrown projects funded by the 2018 Regional Solicitation as of May 2021.

Findings

a) One-half of the program year extensions were requested to help align a project's delivery/construction schedule with other programmed projects in the area. The Highway 252/66th Avenue Interchange and Highway 252/70th Avenue Pedestrian Bridge are both examples where construction schedules needed to correspond with larger improvements being programmed for the Highway 252 corridor.

b) There is no evidence suggesting a common theme to the type of projects that request withdrawals. The only commonality of note is the HSIP withdrawals, which are all tied to scope/design changes.

c) The risk assessment criterion has proven to help to ensure that projects will likely advance on-time and prevents the number of program year extensions or withdrawals. Thus, the risk assessment has shown to have a positive effect.

d) Sensitivity analyses have shown the risk assessment have not had a significant impact on project scores or funding, but is valuable in ensuring applicants consider risks before applying for funding.

e) A small number of projects (3 out of the 14 requests) received program year extensions because the local funding match was not secured.

f) Project withdrawals have resulted in a total of $21.2 million being returned to the Regional Solicitation program for redistribution. Eighteen percent of these funds are tied to HSIP projects, which were primarily withdrawn for scope/design changes.
    - 61% of the withdrawn funds are tied to two large infrastructure projects:
        i. The Kellogg Avenue Bridge Reconstruction ($7,000,000)
        ii. Downtown Hopkins Green Line Station Park & Ride ($6,000,000)

E. Research Best Practices for Using Crash Modification Factors

The first phase of the study discovered applicants under the Highway Safety Improvement Program (HSIP) were using a wide range of Crash Modification Factors (CMFs) with varying levels of anticipated crash reductions to determine the safety benefits for similar projects. There is a desire to simplify the process and consolidate a list of CMFs for a better "apple-to-apples" scoring of similar projects. As a result, this study phase allowed for creation of CMF guides to allow applicants to easily select and apply the CMF that best fits the scenario of the project being applied for during a given application cycle. This also includes a step by step 'how to' for using reading and using the CMF guides for evaluating a project's safety benefits. See Attachment G for more details and the complete CMF guides.

Steps for using the CMF guides and applying CMFs include:

1. Look through the project types and sub-types that may be applicable to the project.
2. Consider additional qualifiers that may help fit the CMF to the project (often, these are existing conditions of what is to be improved).
3. Choose which area type the project exists in (urban, rural, suburban, etc.).
4. Consider the crash types and crash severities.
5. Select a CMF for use that best fits the project as well as context of the area. Some projects may require the use of multiple CMFs to best represent the improvements, although the use of more than two is not recommended for most HSIP projects.
6. Ensure you are applying the CMF to the correct crash severities and types. CMFs that cover all severities and types should be used with caution.
7. Ensure that the crashes utilized match the timeframe/conditions of the application. Use whole calendar years.

Findings

a) Applicants are using a wide range of CMFs with varying levels of anticipated crash reductions to determine the safety benefits for similar projects. This has resulted in challenges in scoring projects.

RECOMMENDATIONS: STREAMLINING THE APPLICATION PROCESS

General Application Recommendations

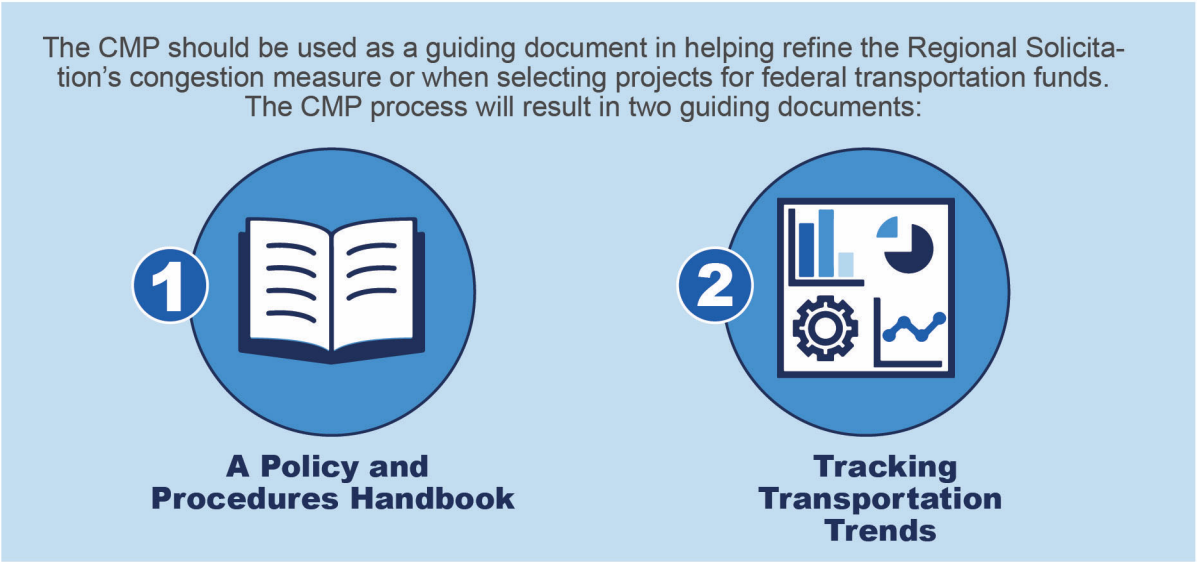
Recommendations for modifying the application are presented below:

a) **Public Engagement:** A larger word count should be provided when responding to public engagement questions. Responding to public engagement questions in 200 words can be very challenging for projects that have included a robust public engagement process, especially when trying to address the equity components.
   - The public engagement questions are considered redundant in the 'Equity & Housing Performance' section and 'Risk Assessment' form. Stronger direction is needed to help the applicant respond accordingly, in addition to providing more transparency on how these measures are being scored.
   - During discussions with Metropolitan Council staff about Focus Group feedback pertaining to confusion around the redundancy and how to respond to the 'Equity & Housing Performance' section and 'Risk Assessment' form, it was discovered that the application reviewers use 4 to 5 questions to score responses across all projects. It was determined that it would be beneficial to provide the applicants these questions within the measure description to provide more clarity on how projects are being scored.

b) **Housing:** Stronger guidance or data should be provided to help answer the housing development question. Collecting a comprehensive list of housing developments is cumbersome and the guidance is unclear in how this data is used in the scoring process. There are also limitations to what affordable housing information can be publicly mapped and disclosed, and this should be included in the application guidance for consistency of all submittals.

c) **Congestion:** The congestion measure should be reevaluated to determine if there is an easier way to measure a project's congestion benefits. However, it is likely that traffic modeling software will still need to be utilized to provide some measure for analyzing the anticipated benefits of a project. Applicants should be required to submit their traffic models in an effort to assist Met Council in monitoring 'after benefits.' This study also provides recommendations (starting on page 8) on the use of 'Big Data' to streamline the 'after benefits' analysis of a project. If a new methodology (e.g., using StreetLight Insight©) is selected for monitoring 'after benefits,' the applicant would no longer be required to submit their traffic model.

d) The Focus Groups also recognized the amount of energy being placed on developing the Congestion Management Process (CMP). The CMP is a joint effort of the Metropolitan Council, the Minnesota Department of Transportation (MnDOT), FHWA, and the counties and cities throughout the region. The resulting plan, process, and evaluation will identify and shape projects designed to improve congestion and make it easier for all modes to move around the region. The CMP should be used as a guiding document in helping refine the Regional Solicitation's congestion measure or when selecting projects for federal transportation funds.



Bicycle and Pedestrian Usage Recommendations

The following recommendations should be considered in helping improve the criteria used to measure bicycle and pedestrian usage and before & after conditions.

a) Monitor "big data" sets for future use in applications to measure existing conditions.
b) Promote MnDOT's Portable Counter Borrowing Program for data collection.
c) Establish clear funding priorities for bicycle and pedestrian projects. This recommendation stems from the findings and recommendation listed for "Streamlining the Application Process."
d) Encourage or require agencies to provide the Council with a report of bicycle and pedestrian usage of built projects that received federal transportation funds. This reporting process should occur after the project has been completed and open to the public after one year.
e) Move away from scoring criteria that determine bicycle/pedestrian usage through population densities. New measures should consider a project's ability to increase bicycle or pedestrian usage by improving the user's level of comfort through design and safety improvements. Examples of this approach are used by the East-West Gateway Council of Governments (EWG COG): St. Louis, MO and the North Central Texas Council of Governments (NCTCOG): Dallas, TX. There methodology and scoring system is documented in Attachment F.

Risk Assessment Recommendations

This study does not recommend any major changes to the risk assessment measure. If there is a strong desire to streamline the application process, the risk assessment criteria could be adjusted to become a qualifying requirement. This approach would require stronger standards an applicant must meet (e.g., right-of-way has been secured, local match has been secured, or design is 80% complete) in order to submit a project for funding consideration.

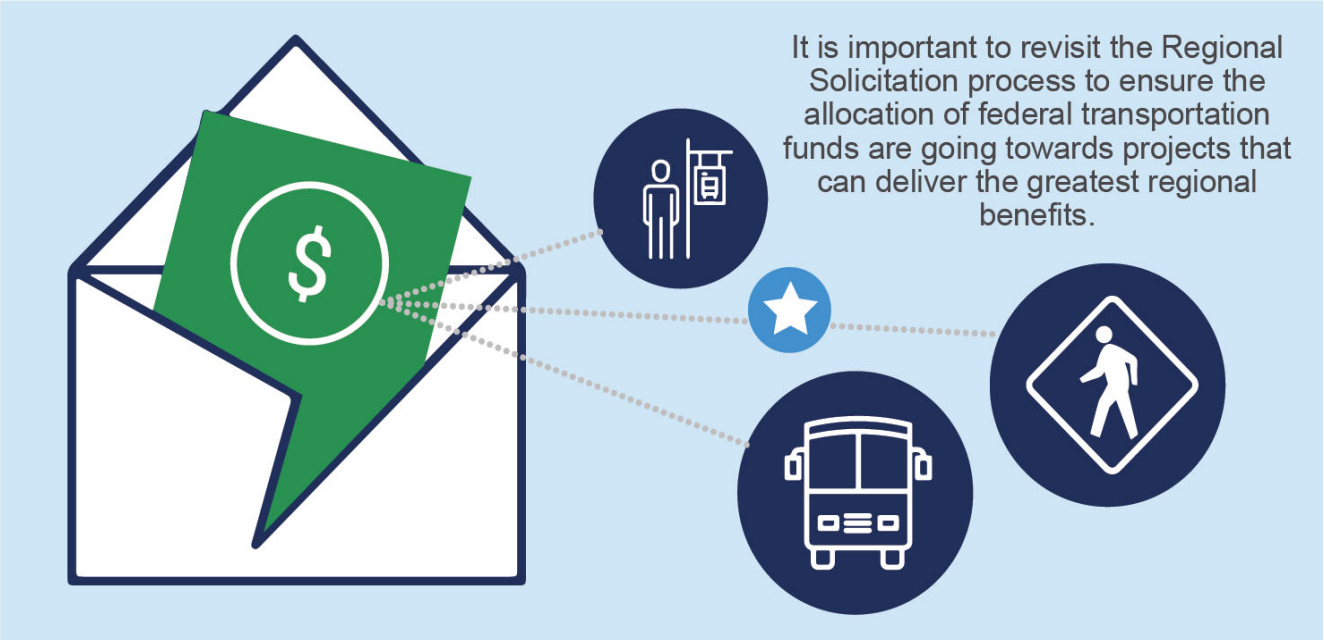
Removing the risk assessment measure may be viewed as an opportunity to streamline the application process, especially when considering the impact the risk assessment scores have played on a project's overall outcome in receiving past funds. However, it is important to recognize the value the risk assessment measure brings to the process. This was noted throughout the Focus Group discussions (see Attachment D and E). For example, the risk assessment measure forces the applicant to evaluate a project's potential risks before submitting and helps them better understand if a project can be delivered within a programmed year(s).

The risk assessment criteria could be transitioned to qualification requirements if there is a strong desire to streamline the application process. This approach would require higher standards that an

applicant must meet (e.g., right-of-way has been secured, local match has been secured, or design is 80% complete) in order to submit a project for funding consideration.

Funding Program Recommendations

The number of unfunded projects clearly demonstrates there is a funding shortfall and backlog of transportation projects throughout the region. The most obvious recommendation is to merely suggest that more federal transportation funding is needed. Until there is a significant increase in federal transportation funding, the Regional Solicitation program will continue to be relied on by many to fund a variety of transportation needs. Therefore, it is important to revisit the Regional Solicitation process to ensure the allocation of federal transportation funds are going towards projects that can deliver the greatest regional benefits.



The Metropolitan Council has started to document these benefits through a series of performance-based measures (starting on page 7). As these benefits are tracked for a longer period of time, the Transportation Advisory Board (TAB) will gain a better understanding on the type of project that can deliver the highest benefits. These findings will help determine if any changes are needed to the Regional Solicitation process and how projects should be scored or funded.

It is also important to recognize the various funding approaches MPOs use to allocate their federal transportation dollars. One funding approach includes a process that targets projects that provide the highest overall benefit to the region, which typically includes the largest investments towards transit and regionally significant highway corridors that span many communities. The Metropolitan Council's funding process continues to be modified to fund multiple projects across various funding categories (11 in 2020), which can result in smaller projects. This process is unique compared to most MPOs.. This research was documented as part of the Phase I study, but also discussed as part of the Focus Group meetings. The region has never evaluated the potential benefits of regional projects that are not pursued in the Regional Solicitation against Regional Solicitation projects

The Focus Groups (see Attachment D and E) also inquired if the current Regional Solicitation process was funding projects that provide the highest benefits. The consensus felt the allocation of federal transportation funds are stretched across too many funding categories and scoring measures. This may result in more projects being funded, but can also result in smaller scale projects that are not providing significant regional benefits. As noted, the before & after condition database has started to document the overall benefits of funded projects. This database should continue to be monitored and updated to

inform any change to the Regional Solicitation program that may impact how projects are scored or funded.

Community Engagement Recommendations

First-time applicants or recipients of Regional Solicitation funds are not always aware of the federal requirements tied to federal transportation funds. For example, an awarded project will need to provide some level of environmental documentation under the National Environmental Policy Act (NEPA). This type of documentation is sometimes overlooked. More thorough guidance from the Metropolitan Council on federal requirements would help ensure applicants do not jeopardize funding by failing to submit proper documentation.

Other findings suggest more can be done to help educate stakeholders on the purpose and intent behind the Regional Solicitation. Clearly defined goals and objectives should be established for the program. Defining these goals and objectives will likely require large policy discussions. It is assumed these policy discussions will also revolve around how regional solicitation funds are allocated. The MPO Peer Review that was conducted as part of the Phase I study should be used as a resource to help facilitate these discussions. Future discussion should focus on the following:

a) What are the Regional Solicitation's goals and objectives for each application category?
b) Do the 11 different funding application categories help achieve the Regional Solicitation's goals and objectives?
c) Is there a different funding model (based on the peer review) the region should consider to better achieve the desired goals and objectives?

Crash Modification Factors Recommendations

Begin using the CMF guide for future Regional Solicitation and HSIP applications. Additional training or directions on how to use this guide should be provided for the next solicitation.

Attachment A – StreetLight Findings

TH 41 Expansion- Carver County

- Before: September - October 2017, March - April 2018
- After: September - October 2018, March - April 2019
- Notes:
  - Used middle filter analysis and supplemental analysis to capture full extents of project area without including alternative routes between zones that could have never traveled on TH 41
  - Before AADT from 2016/2018, After AADT from 2016/2019, as most legs have updated values

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	245	434	1,469	198	425	1,312
Total Vehicles Traveled	8,071	11,190	40,250	7,685	12,029	41,034
% Reduction VHT				19%	2%	11%

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 41 Travel	Before Travel Time (s/veh)	144	199	167
	After Travel Time (s/veh)	118	146	136
	TT Reduction (s/veh)	26	53	31
	TT Reduction (%)	18%	27%	19%
SB 41 Travel	Before Travel Time (s/veh)	134	208	176
	After Travel Time (s/veh)	120	144	139
	TT Reduction (s/veh)	14	64	37
	TT Reduction (%)	10%	31%	21%

70th Street and Robert Trail Roundabout - Dakota County

- Before: September – October 2018, March-April 2019
- After: December 2019 – February 2020
- Notes:
  - Four singular zones, one at each leg of the roundabout.
  - Due to construction dates and COVID, analyses were not run on the same time periods, which is not preferable and should be considered when looking at results.
  - AADT value is the same before and after, as no updated AADT available past 2016/2017

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	44	69	220	44	57	203
Total Vehicles Traveled	3,043	4,707	15,350	3,187	4,598	15,350
% Reduction VHT				1%	17%	7%

	Reductions in Average Travel Time		
	AM (6 am - 9 am)	PM (3 pm - 6 pm)	All Day
Before Travel Time (s/veh)	52	53	52
After Travel Time (s/veh)	49	45	48
TT Reduction (s/veh)	3	8	4
TT Reduction (%)	6%	15%	7%

CSAH 42/52 Interchange (Rosemount)

- Before: September – October 2016, March – April 2017
- After: March – April 2019, September – October 2019
- Notes:
  - Four singular zones, one at each leg of the interchange.
  - Before AADT from 2015/2016, After AADT from 2015/2018/2019, as some legs have updated values.

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	165	185	722	148	190	625
Total Vehicles Traveled	10,050	11,065	42,500	9,473	12,083	43,850
% Reduction VHT				10%	-3%	13%

	Reductions in Average Travel Time		
	AM (6 am - 9 am)	PM (3 pm - 6 pm)	All Day
Before Travel Time (s/veh)	59	60	61
After Travel Time (s/veh)	56	57	51
TT Reduction (s/veh)	3	4	10
TT Reduction (%)	5%	6%	16%

CSAH 13 / I-94 Crossing (Woodbury)

- Before: September – October 2018, March – April 2019
- After: December 2019 – February 2020
- Notes:
  - Due to construction dates and COVID, analyses were not run on the same time periods, which is not preferable and should be considered when looking at results.
  - Before AADT from 2017, After AADT from 2019

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	26	98	280	24	93	268
Total Vehicles Traveled	4,323	10,562	36,000	4,292	11,099	36,500
% Reduction VHT				6%	5%	4%

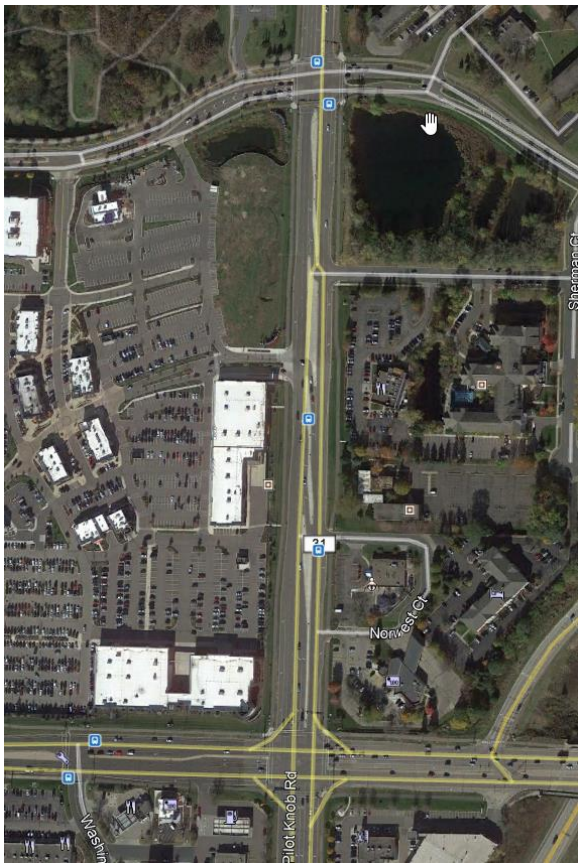
Mainline CSAH 13 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 13 Travel	Before Travel Time (s/veh)	77	99	96
	After Travel Time (s/veh)	79	105	96
	TT Reduction (s/veh)	**-2**	**-6**	**0**
	TT Reduction (%)	**-3%**	**-6%**	**0%**
SB 13 Travel	Before Travel Time (s/veh)	73	90	92
	After Travel Time (s/veh)	76	99	92
	TT Reduction (s/veh)	**-3**	**-9**	**0**
	TT Reduction (%)	**-4%**	**-10%**	**0%**

CSAH 31 Reconstruction (Eagan)

- Before: January – March 2016
- After: January – March 2017
- Notes:
  - Multiple middle filters used to capture vehicle routes only on mainline (CSAH 31)
  - Construction of shopping center to west of project impacts travel time and volumes significantly. Before and after analyses were done as close to construction of roadway as possible, but the shopping center partially opened between the before and after time periods, which may cause incomparable results.
  - Before AADT from 2014/2015, After AADT from 2019

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	127	280	999	191	384	1,278
Total Vehicles Traveled	8,951	14,090	52,350	9,141	15,486	57,550
% Reduction VHT				-50%	-37%	-28%

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 31 Travel	Before Travel Time (s/veh)	79	115	89
	After Travel Time (s/veh)	101	111	106
	TT Reduction (s/veh)	-22	4	-17
	TT Reduction (%)	-28%	3%	-19%
SB 31 Travel	Before Travel Time (s/veh)	98	105	100
	After Travel Time (s/veh)	155	127	129
	TT Reduction (s/veh)	-57	-22	-29
	TT Reduction (%)	-58%	-21%	-29%



Attachment B – StreetLight How To Guide

BOLTON & MENK

Real People. Real Solutions.

Using StreetLight to Compare Trip Durations

Regional Solicitation Before and After Study Phase 2

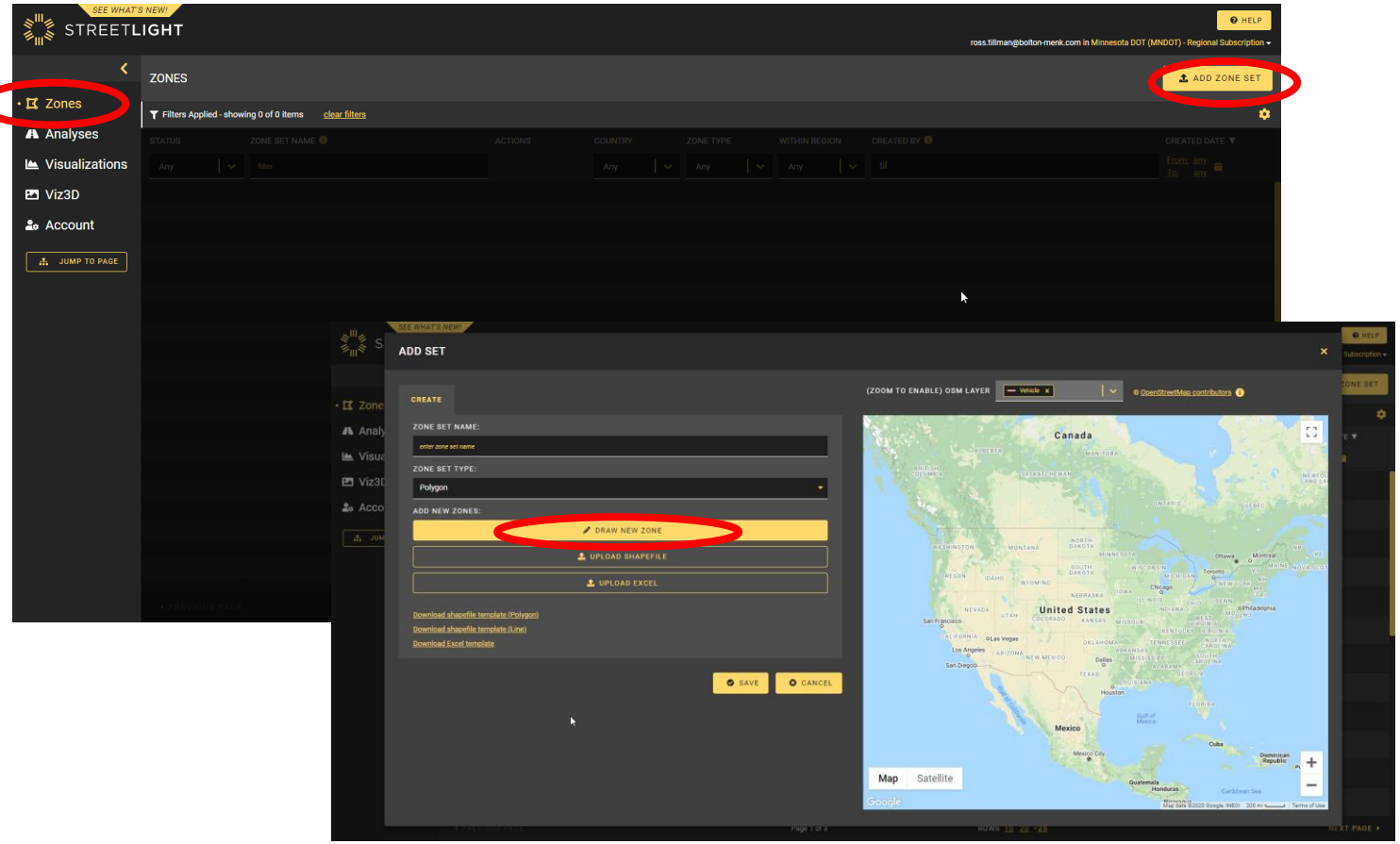
October 19th, 2020

Process

1. Create a zone set
2. Run the analysis
3. Export the data
4. Sort the data
5. Calculate results
6. Check volumes

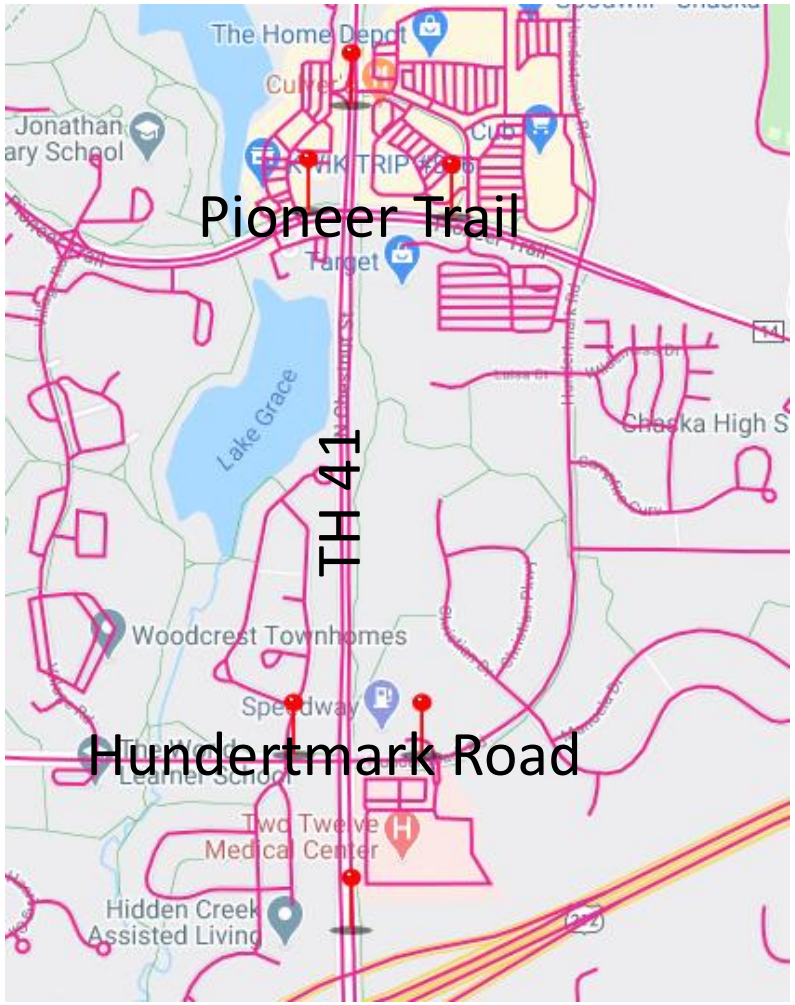
Creating a Zone Set

- To begin creating a zone, go to the *Zones* tab on the left
- Select *Add a New Zone Set*
- Name the zone set, and select *Draw New Zone*



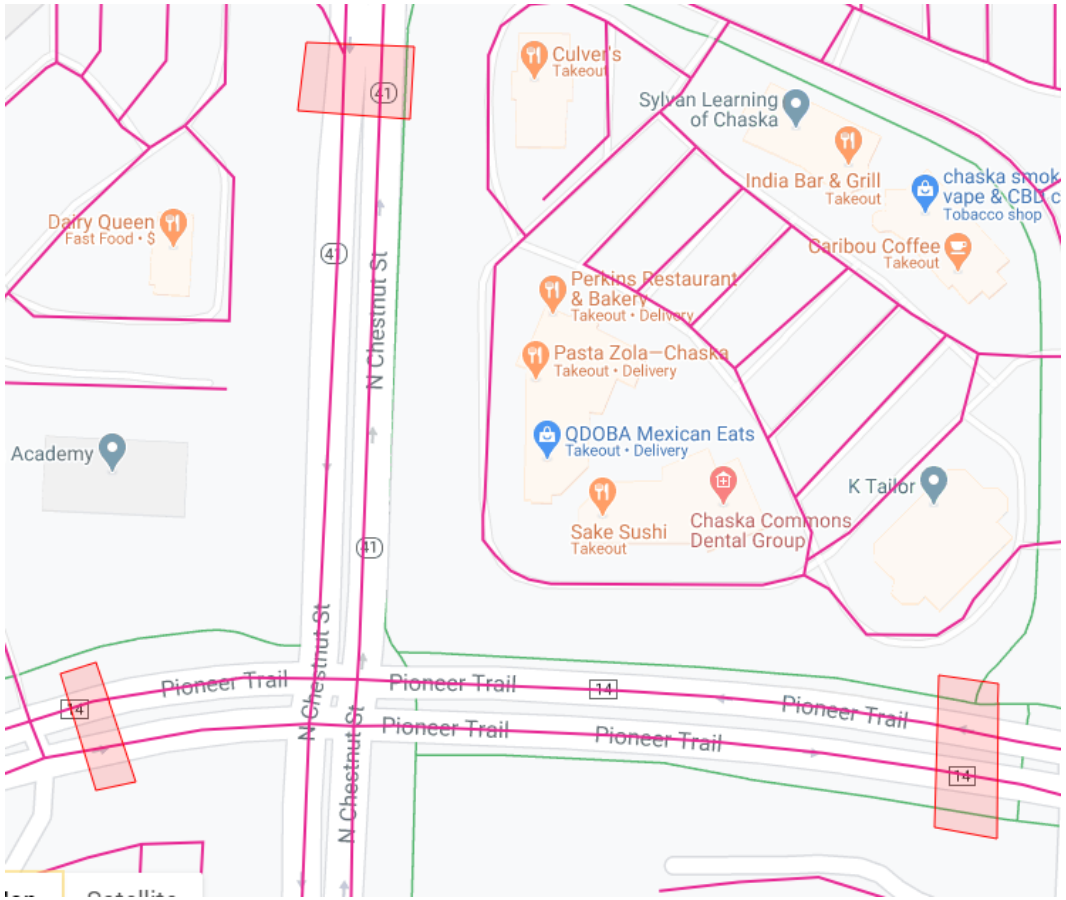
Creating a Zone Set

- Draw zones along the project extents
  - Shown here as red pins
  - For this project area, 6 zones were created within the zone set, 3 at each exterior leg of the two intersections that start and end the project area
- Have OSM filter on to show the vehicle paths (shown in pink) when drawing zones



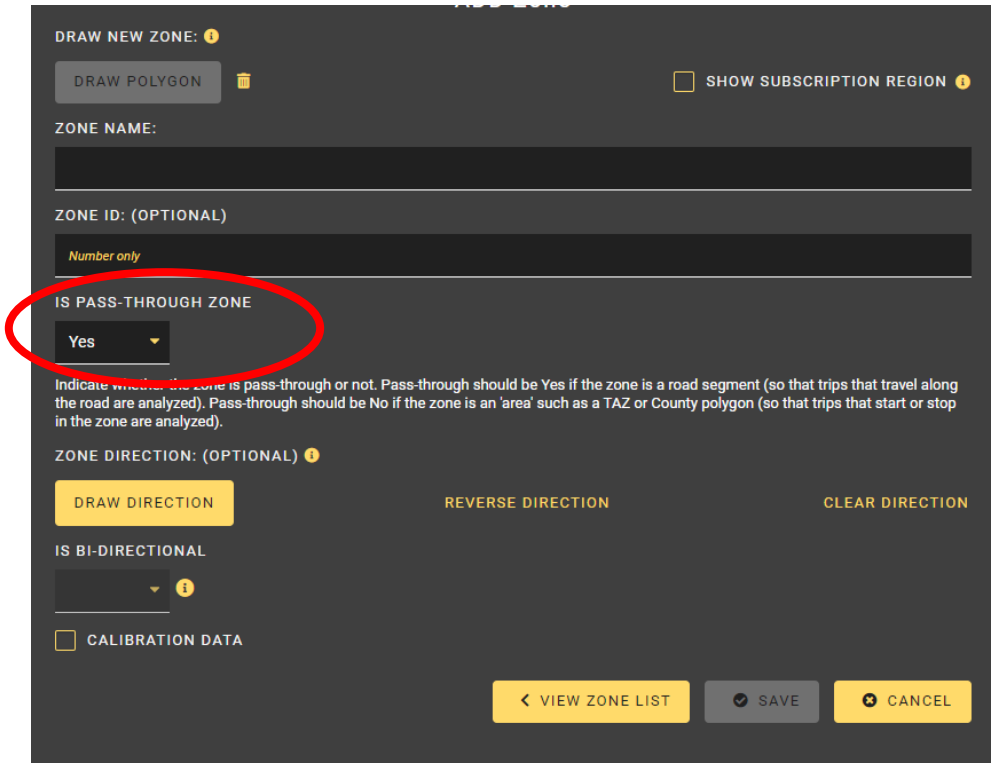
Creating a Zone Set

- Zone Placement
  - Far enough back from the intersection so that vehicles waiting in a queue will have their delay counted properly
  - Not any further than the nearest intersection, so that no vehicles are missed
- Zone Naming Convention
  - Name zones so they're identifiable without looking at them. For example, "Pioneer Trail W of 41" or "41 S of Hundertmark



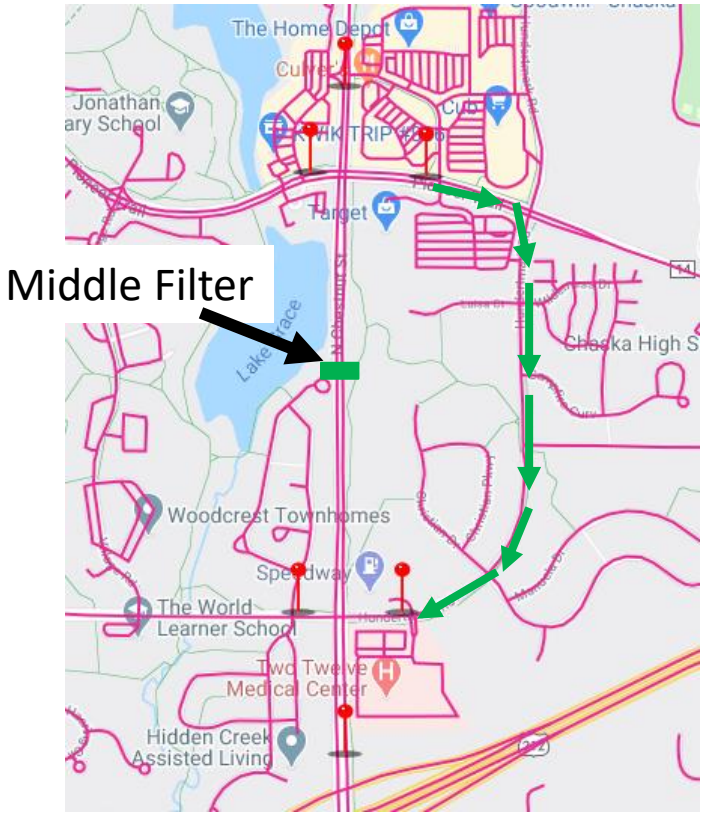
Creating a Zone Set

- Zone covers both directions of travel (if applicable) by crossing pink line(s)
- Select *Yes* in the *Is Pass Through Zone* Dropdown



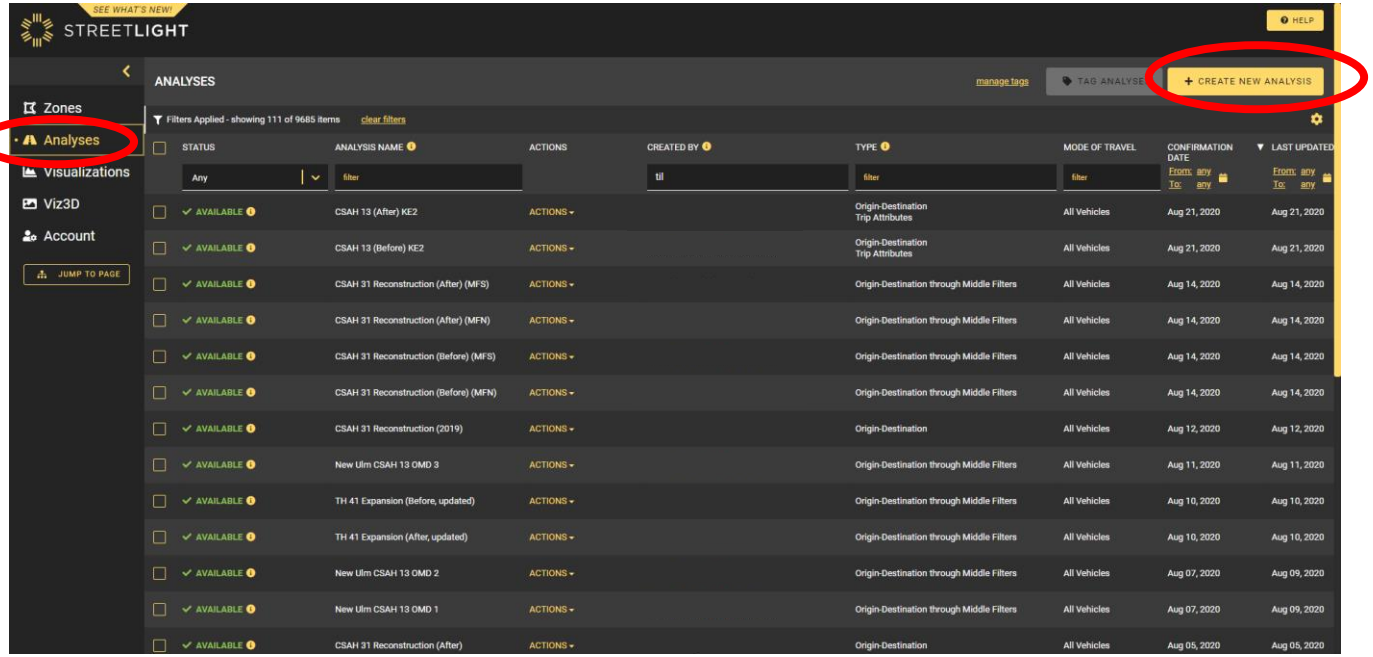
Creating a Middle Filter Zone Set

- Some project areas have alternative routes cars could travel if they wanted to bypass the area of interest (TH 41 for this example). If they did this, they could run through two zones in the network without ever having traveled along the area of interest.
- To avoid collecting data for trips bypassing the project area, an analysis with a middle filter needs to be run. This ensures that only trips passing through the middle filter will be counted.
- For project with a middle filter create two zone sets:
  - One zone set that has only the exterior zones at the end intersections
  - One zone set with a single zone in the middle of the corridor where all the traffic would travel through



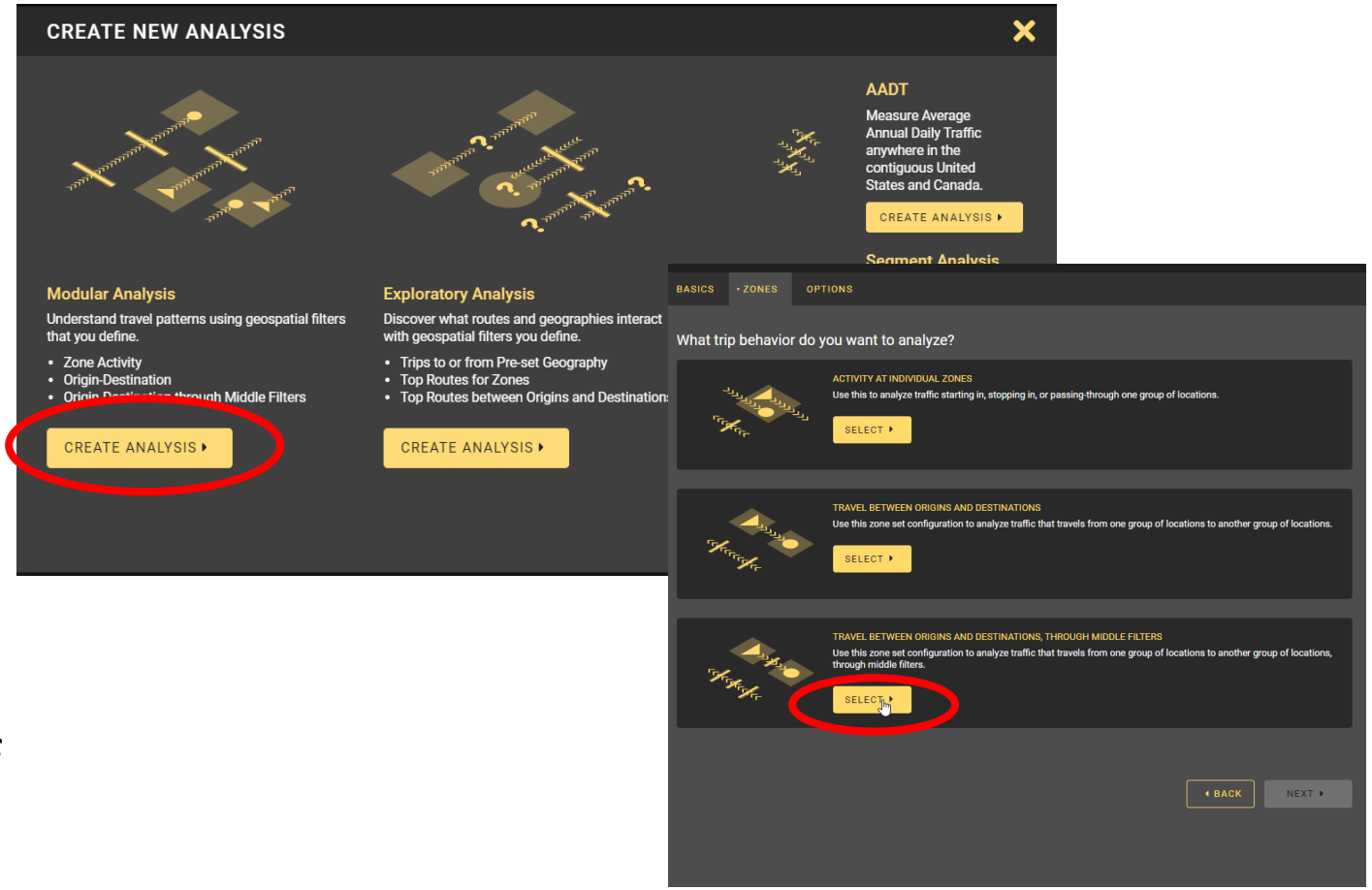
Running the Analysis – Create Analysis

- To begin creating an analysis, go to the *Analysis* tab on the left
- Select *Create a New Analysis*
- Name the zone set, and select *Draw New Zone*



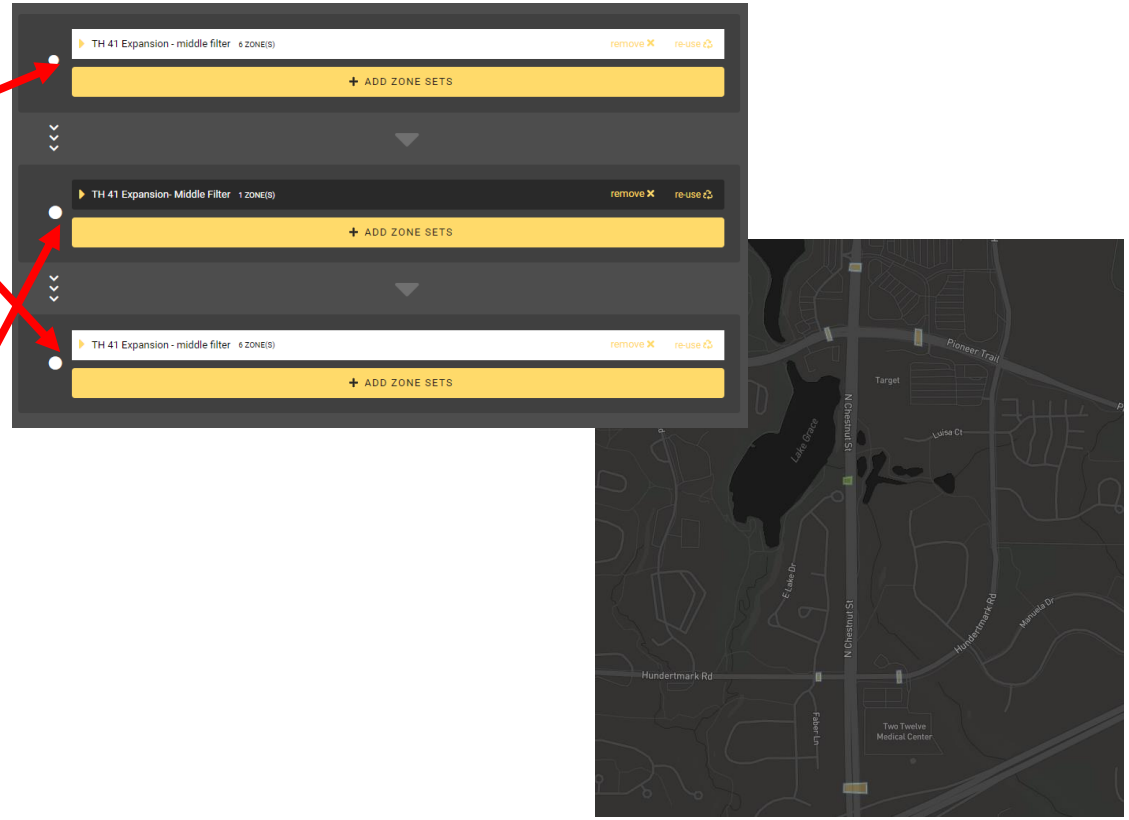
Running the Analysis – Create Analysis

- To create an Origin-Destination or Origin-Destination through Middle Filter analysis, select *Create Analysis* under *Modular Analysis*
- Then, choose *Travel Between Origins and Destinations, Through Middle Filter*
- Choose *All Vehicles* for mode of travel



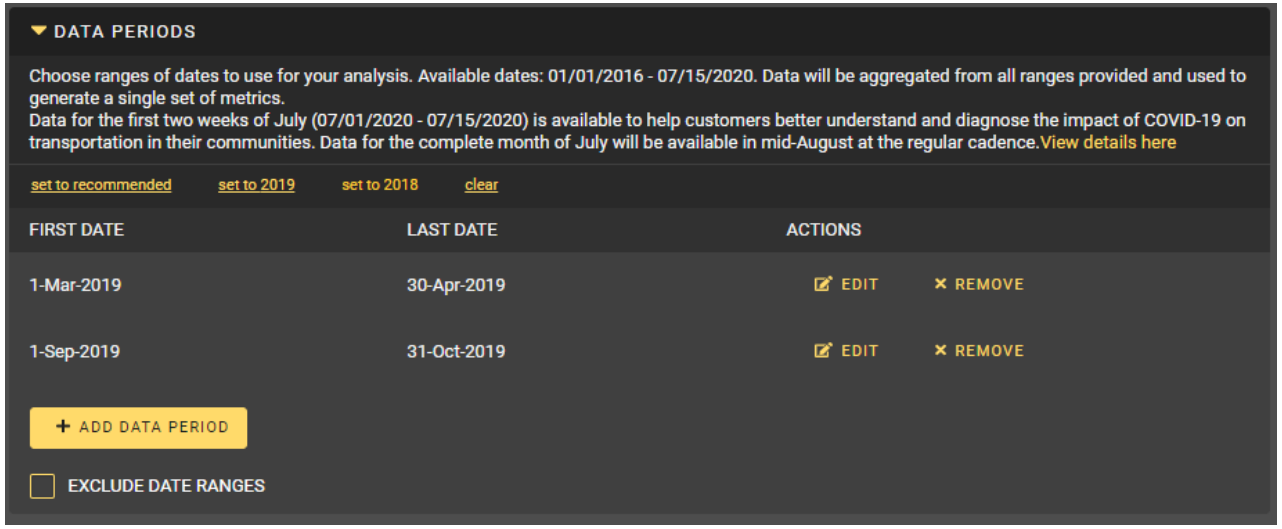
Running the Analysis - Choosing Zone Sets

- In the first and third box, use the zone set with all the exterior zones for the origin and destination
- If analysis has a middle filter, add middle filter zone set to the middle box



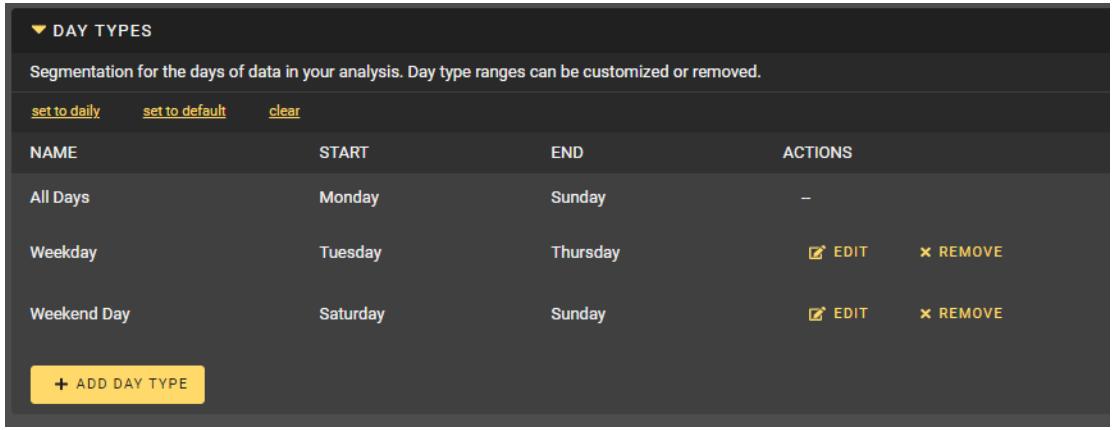
Running the Analysis - Data Periods

- Data Periods
  - Run two separate analyses for the before and after periods
  - StreetLight data available: 2016 to present day
  - Pull 4 months of data for each analysis (if possible, pull the same 4 months for the before and after analyses)
  - Optimal months for typical traffic
    - March – April
    - September - October



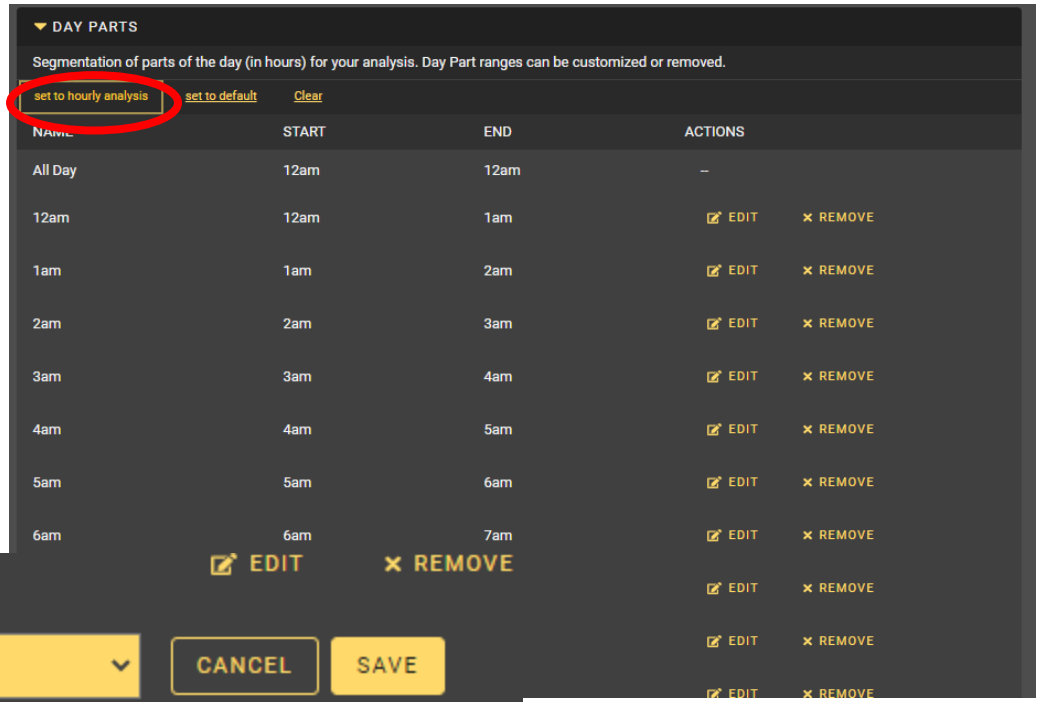
Running the Analysis - Day Types

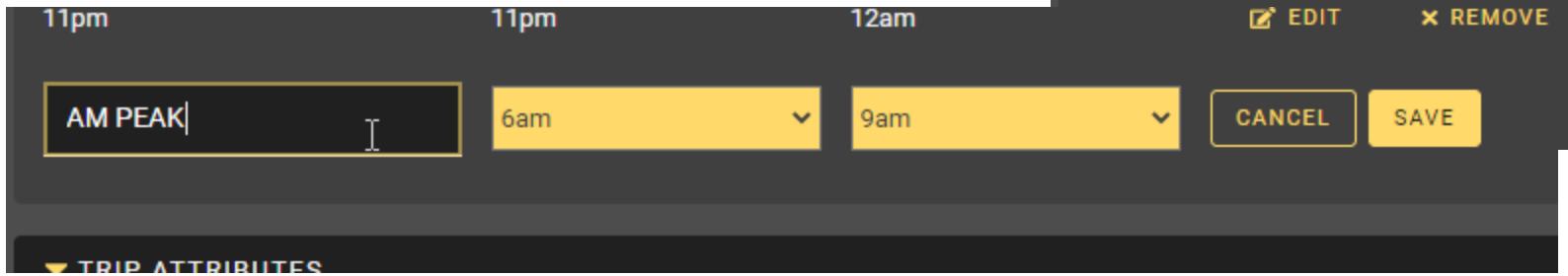
- Day Type
  - Edit which days to pull StreetLight data for
  - **Weekday data will be analyzed and should be set to Tuesday – Thursday** (Default is Monday to Thursday)



Running the Analysis - Day Parts

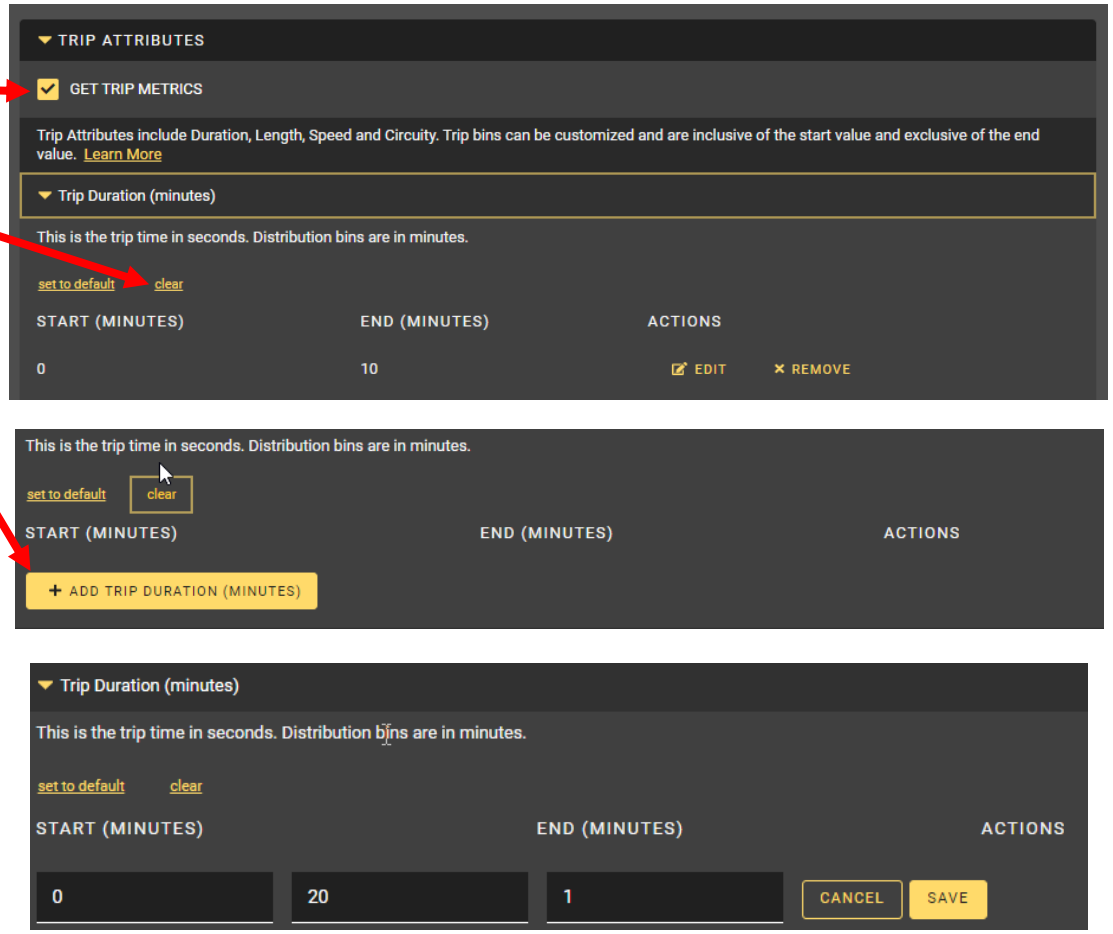
- Day Parts
  - Set to hourly analysis (will allow data to be sorted into single hour increments)
  - Select *Add Day* Part at the bottom of the tab
    - Create peak periods (i.e. 6 am - 9 am) to collect multiple hours of interest in one output





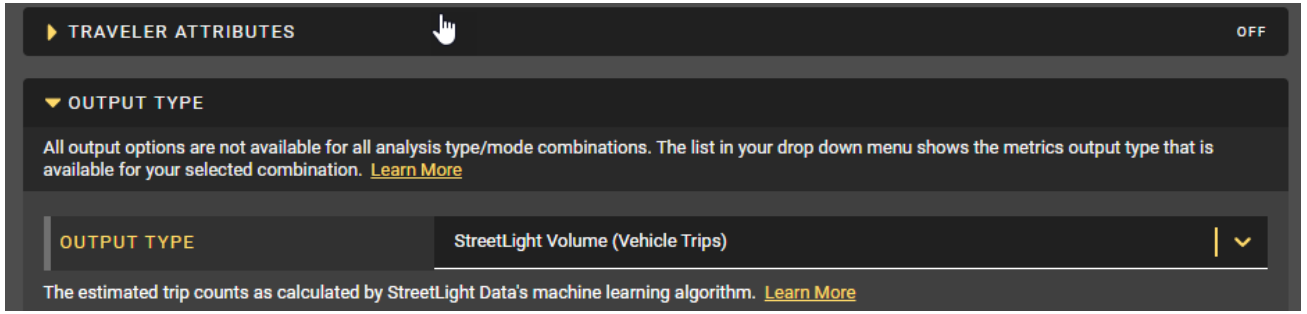
Running the Analysis – Trip Attributes

- Toggle *Get Trip Metrics on*
  - Under *Trip Duration*, select *clear*
  - Select *Add Trip Duration (Minutes)*
    - Start: 0
    - End: 20
    - Increment: 1
- *Trip Length, Trip Speed, and Trip Circuity* can all be left as default



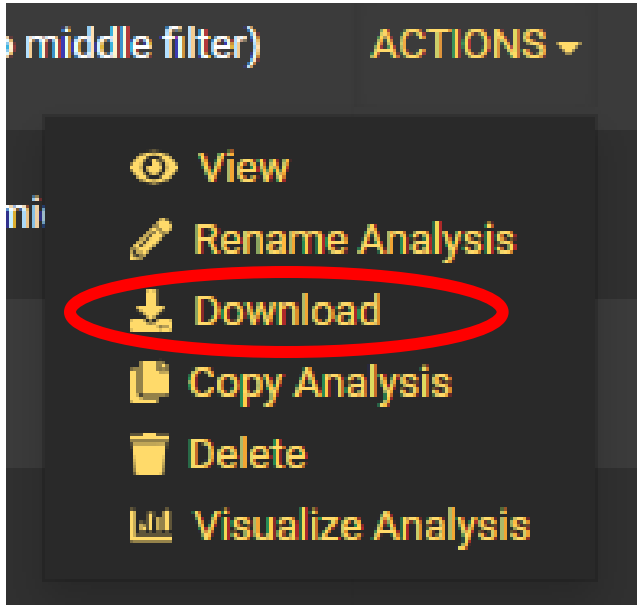
Running the Analysis – Traveler Attributes and Output Type

- *Traveler Attributes* can be left as default (OFF)
- *Output Type* should be *StreetLight Volume (Vehicle Trips)*
- Select *Confirm Analysis* when all preferences and settings have been selected



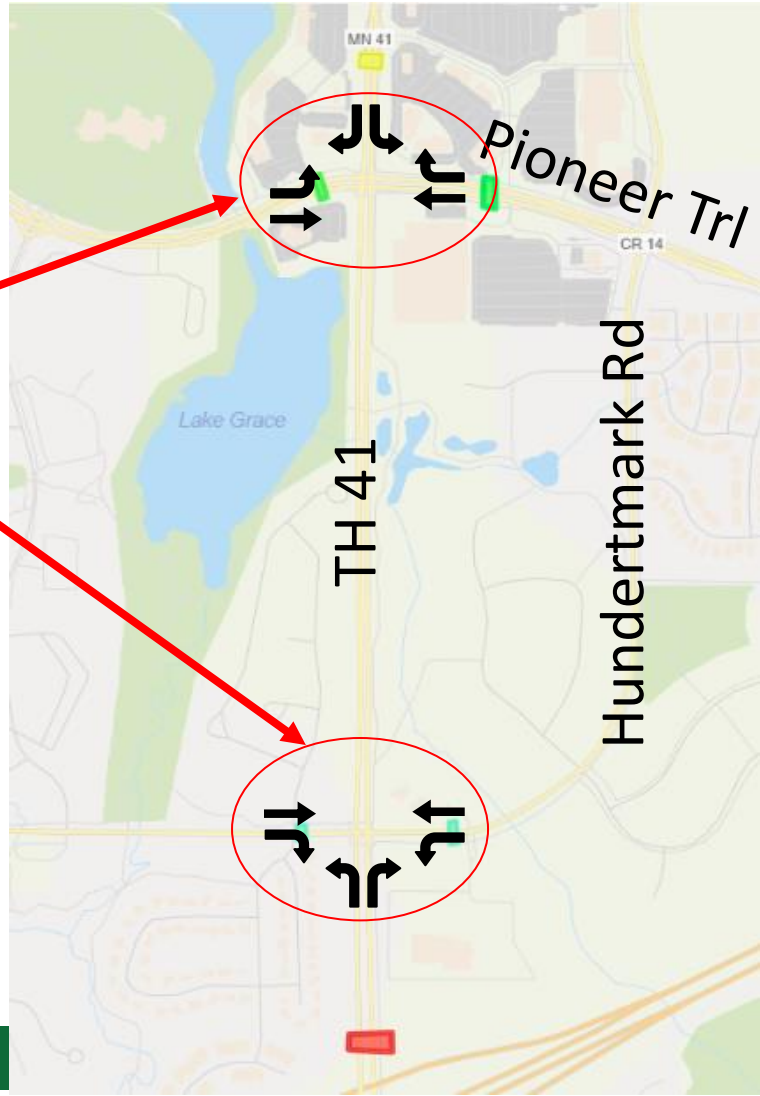
Running the Analysis- Exporting the Data

- Once the analysis is available, choose *Download* from the actions dropdown
  - This will download as a .zip file
  - Download and save the .csv file
    - NOTE: If running an analysis without a middle filter, two .csv files will be available, choose the one that ends in _od_trip_all.csv



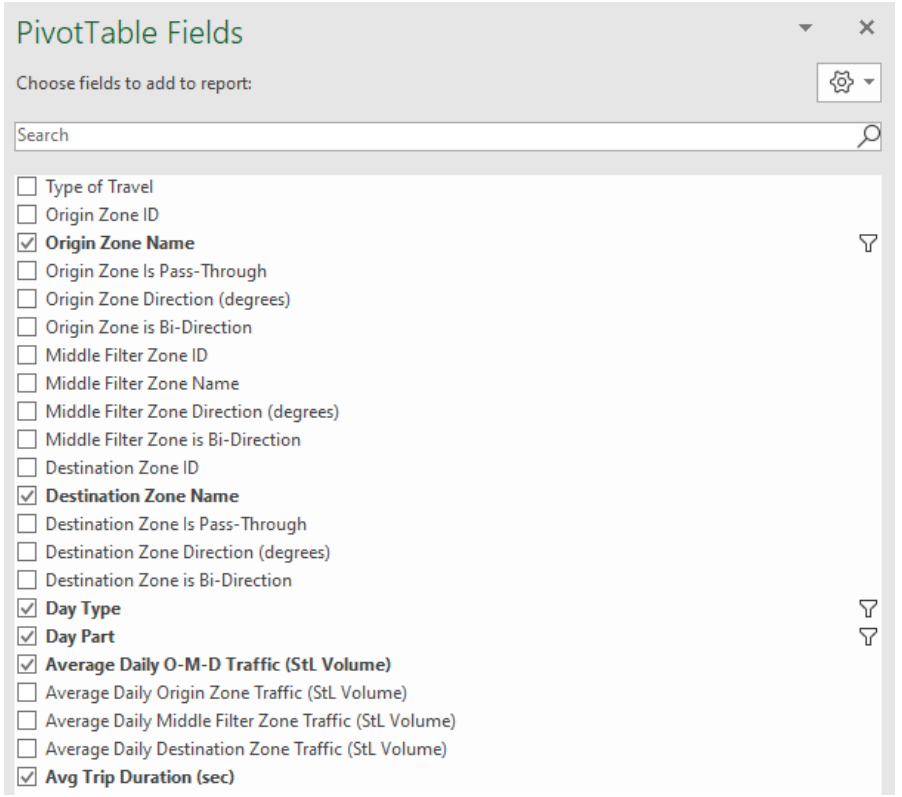
Running the Analysis- Additional Analysis

- In order to summarize the entire project area, analyses run with middle filters will need supplemental analyses to capture the **exterior intersection movements** that don't pass through the middle filter
  - Run the O-D analyses again <u>without a middle filter</u>
  - Add in the volumes and delays for the intersection movements not yet accounted for



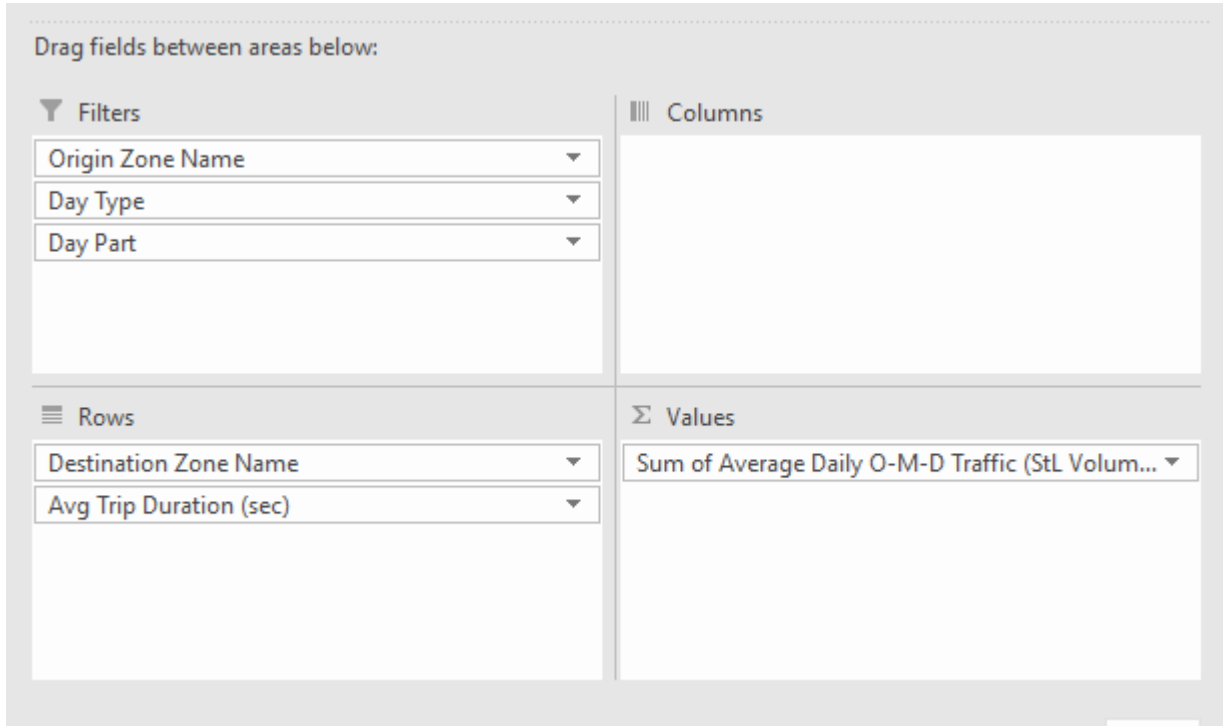
Sorting the Data - Pivot Tables

- In the excel file, select all the data and insert a pivot table
- Select the PivotTable Fields as seen on the right



Sorting the Data - Pivot Tables

- Drag and drop to match figures below



Origin Zone Name	TH 41 S of Hundertmark
Day Type	1: Weekday (Tu-Th)
Day Part	00: All Day (12am-12am)
Row Labels	**Sum of Average Daily O-M-D Traffic (StL Volume)**
Hundertmark E of TH 41	**20**
N/A	20
Hundertmark W of TH 41	**21**
540	21
Pioneer Trl E of TH 41	**554**
199	554
Pioneer Trl W of TH 41 (Destination)	**618**
221	618
TH 41 N of Pioneer Trl	**1524**
141	1524
Grand Total	**2737**

Average Trip Duration/Travel Time (s)

Sorting the Data - Pivot Tables

- Copy and paste the pivot table across the row for as many day parts as needed
- Copy and paste the pivot tables down the column so that each row can be a different origin zone
- Leaving extra rows and columns between tables is advised for future calculations
- Repeat process until all zones/routes are accounted for
- In some cases, certain zones will appear in the destination to its own origin, these should be ignored

Before (fall 2017 and spring 2018)

Origin Zone Name	Hundertmark E of TH 4
Day Type	1: Weekday (Tu-Th)
Day Part	08: 6-9 (6am-9am)

Row Labels	Sum of Average Dail
Pioneer Trl E of TH	4
300	4
Pioneer Trl W of TH	11
344	11
TH 41 N of Pioneer	13
458	13
TH 41 S of Hundertn	1
N/A	1
Grand Total	29

Origin Zone Name	Hundertmark E of TH 4
Day Type	1: Weekday (Tu-Th)
Day Part	18: 3-6 (3pm-6pm)

Row Labels	Sum of Average Dail
Hundertmark W of	4
N/A	4
Pioneer Trl E of TH	6
209	6
Pioneer Trl W of TH	18
385	18
TH 41 N of Pioneer	20
307	20
TH 41 S of Hundert	6
N/A	6
Grand Total	54

Origin Zone Name	Hundertmark E of TH 41
Day Type	1: Weekday (Tu-Th)
Day Part	00: All Day (12am-12am)

Row Labels	Sum of Average Daily O-
Hundertmark W of TH 41	7
N/A	7
Pioneer Trl E of TH 41	33
276	33
Pioneer Trl W of TH 41 (Des	55
343	55
TH 41 N of Pioneer Trl	79
346	79
TH 41 S of Hundertmark	11
N/A	11
Grand Total	185

Origin Zone Name	Hundertmark W of TH 4
Day Type	1: Weekday (Tu-Th)
Day Part	08: 6-9 (6am-9am)

Row Labels	Sum of Average Daily O-M-D Traffic
Pioneer Trl E of TH	24
273	24
Pioneer Trl W of TH	8
323	8
TH 41 N of Pioneer	138
164	138
TH 41 S of Hundertn	1
N/A	1
Grand Total	171

Origin Zone Name	Hundertmark W of TH 4
Day Type	1: Weekday (Tu-Th)
Day Part	18: 3-6 (3pm-6pm)

Row Labels	Sum of Average Dail
Pioneer Trl E of TH	49
261	49
Pioneer Trl W of TH	19
314	19
TH 41 N of Pioneer	85
224	85
TH 41 S of Hundert	3
N/A	3
Grand Total	156

Origin Zone Name	Hundertmark W of TH 41
Day Type	1: Weekday (Tu-Th)
Day Part	00: All Day (12am-12am)

Row Labels	Sum of Average Daily O-M-D
Hundertmark E of TH 41	2
26	2
Pioneer Trl E of TH 41	164
265	164
Pioneer Trl W of TH 41 (Des	68
313	68
TH 41 N of Pioneer Trl	460
188	460
TH 41 S of Hundertmark	9
661	9
Grand Total	703

Origin Zone Name	Pioneer Trl E of TH 41
Day Type	1: Weekday (Tu-Th)
Day Part	08: 6-9 (6am-9am)

Row Labels	Sum of Average Daily O-M-D Traffic
Hundertmark E of T	1
N/A	1
Hundertmark W of T	13
324	13
TH 41 N of Pioneer	2
N/A	2
TH 41 S of Hundertn	77
313	77
Grand Total	93

Origin Zone Name	Pioneer Trl E of TH 41
Day Type	1: Weekday (Tu-Th)
Day Part	18: 3-6 (3pm-6pm)

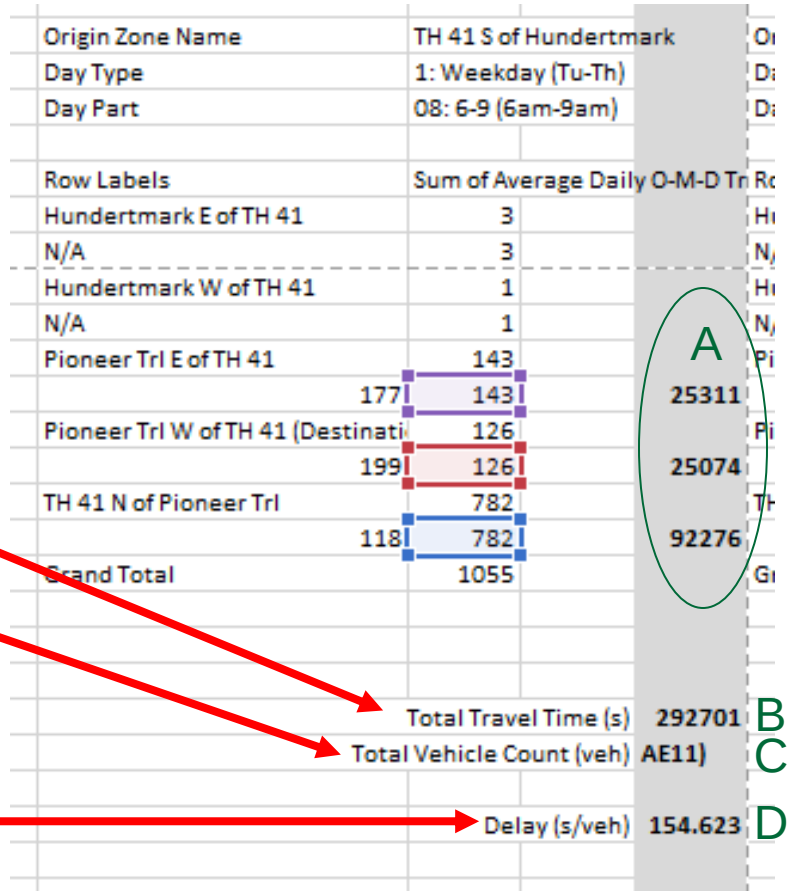
Row Labels	Sum of Average Dail
Hundertmark E of T	6
866	6
Hundertmark W of	72
325	72
Pioneer Trl W of TH	5
N/A	5
TH 41 N of Pioneer	5
N/A	5
TH 41 S of Hundert	262
398	262
Grand Total	350

Origin Zone Name	Pioneer Trl E of TH 41
Day Type	1: Weekday (Tu-Th)
Day Part	00: All Day (12am-12am)

Row Labels	Sum of Average Daily O-
Hundertmark E of TH 41	13
621	13
Hundertmark W of TH 41	285
302	285
Pioneer Trl W of TH 41 (Des	5
N/A	5
TH 41 N of Pioneer Trl	12
N/A	12
TH 41 S of Hundertmark	1010
350	1010
Grand Total	1325

Creating Results

- For each day part column:
  - A. Multiply each trip duration (travel time) by the associated trip volume (output is bolded in gray column)
  - B. Sum trip duration*volumes from step A for **all movements** and **all origins** in the time period being analyzed
  - C. Sum the volumes (volumes are listed twice, so only count one per destination)
  - D. Divide the *Total Travel Time* by the *Total Vehicle Count* to determine the average *Delay*



Creating Results – Combining Tables

- Once every pivot table is created for both the before and after data, combine the data by copying all pivot tables into one file and save as a .csv, then again as an .xlsx
  - This eliminates the references of the pivot tables, converting all data to values and allows you to copy and past formulas throughout the excel workbook

TH 41 N of Pioneer Trl	350			TH 41 N of Pioneer Trl	1638	
80	350		28000	77	1638	126126
TH 41 S of Hundertmark	277			TH 41 S of Hundertmark	1335	
293	277			235	1335	
Grand Total	4387			Grand Total	16805	
Origin Zone Name	TH 41 N of Pioneer Trl			Origin Zone Name	TH 41 N of Pioneer Trl	
Day Type	1: Weekday (Tu-Th)			Day Type	1: Weekday (Tu-Th)	
Day Part	18: 3-6 (3pm-6pm)			Day Part	00: All Day (12am-12am)	
Row Labels	Sum of Average Daily O-D Traffic (StL Volume)			Row Labels	Sum of Average Daily O-D Traffic (StL Volume)	
Hundertmark E of TH 41	58			Hundertmark E of TH 41	178	
490	58			513	178	
Hundertmark W of TH 41	189			Hundertmark W of TH 41	471	
237	189			239	471	
Pioneer Trl E of TH 41	323			Pioneer Trl E of TH 41	1085	
145	323		46835	133	1085	144305
Pioneer Trl W of TH 41 (Destin	486			Pioneer Trl W of TH 41 (Destin	1198	
52	486		25272	67	1198	80266
TH 41 N of Pioneer Trl	3241			TH 41 N of Pioneer Trl	12771	
0	3241			0	12771	
TH 41 S of Hundertmark	792			TH 41 S of Hundertmark	2472	
227	792			190	2472	
Grand Total	5089			Grand Total	18175	
Origin Zone Name	TH 41 S of Hundertmark			Origin Zone Name	TH 41 S of Hundertmark	
Day Type	1: Weekday (Tu-Th)			Day Type	1: Weekday (Tu-Th)	
Day Part	18: 3-6 (3pm-6pm)			Day Part	00: All Day (12am-12am)	
Row Labels	Sum of Average Daily O-D Traffic (StL Volume)			Row Labels	Sum of Average Daily O-D Traffic (StL Volume)	
Hundertmark E of TH 41	615			Hundertmark E of TH 41	2622	
53	615		32595	57	2622	149454
Hundertmark W of TH 41	677			Hundertmark W of TH 41	1888	
97	677		65669	76	1888	143488
Pioneer Trl E of TH 41	434			Pioneer Trl E of TH 41	1634	
310	434			270	1634	
Pioneer Trl W of TH 41 (Destin	462			Pioneer Trl W of TH 41 (Destin	1438	
250	462			252	1438	
TH 41 N of Pioneer Trl	661			TH 41 N of Pioneer Trl	3707	
217	661			175	3707	
TH 41 S of Hundertmark	5007			TH 41 S of Hundertmark	19336	
0	5007			0	19336	
Grand Total	7856			Grand Total	30625	
	Total Delay Sum		**6E+05**		Total Delay Sum	**2E+06**
	Total Vehicle Count		**6104**		Total Vehicle Count	**21340**
	Delay		**91.85**		Delay	**87**

Creating Results - All Movements

Vehicle Hours Traveled

Sum every *Total Travel Time* (including supplemental) for each time period, and divide by 3600 s to produce *Vehicle Hours Traveled*

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	200	347	1,198	157	337	1,041
Total Vehicles Traveled	6,582	8,952	32,826	6,097	9,543	32,554

NOTE

This summarizes <u>all movements</u> between the two exterior intersections

Total Vehicles Traveled

Sum each of the *Total Vehicle Counts* (including supplemental) for each time period

Creating Results – Calibrating Volumes and Vehicle Hours Traveled

- Some projects see an increase or decrease in volumes between before and after time periods, or may not perfectly align with the true AADT
  - In order to get a true comparison, calibrate the volumes from streetlight with those from an official AADT count
  - Find AADT values that most closely represent the AADT value of the years for the before and after periods.

Creating Results – Calibrating Volumes and Vehicle Hours Traveled

1. Calculate the peak hour distributions
   - Divide the *Total Vehicles Traveled* AM Peak and PM peak by the All day, for both before and after time periods.

A	B	C	D
	Before		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	200	347	1,198
Total Vehicles Traveled	6,582	8,952	32,826
Peak Hour Distributions (1)	=B6/D6	27%	

2. Calculate the *Calibrated Vehicle #s*
   - Multiply the percentages by the new AADT value
     - Find AADT values that most closely represent the AADT value of the years for the before and after periods.

A	B
	AM (6 am - 9 am)
Vehicle Hours Traveled	200
Total Vehicles Traveled	6,582
Peak Hour Distributions (1)	20%
Calibrated Vehicle #s (2)	=B8*B13
Calibrated VHT (3)	250
	41034

3. Calculate the calibrated VHT
   - Multiply the *Average Travel Time* (converted to hours) by the *Calibrated Vehicle #s*

7	Average Travel Time (s/veh)	109
8	Peak Hour Distributions (1)	20%
11	Calibrated Vehicle #s (2)	8228
12	Calibrated VHT (3)	=(B7/3600)*B11

Creating Results – Calibrating Volumes and Vehicle Hours Traveled

- Once calibrated, create a table to show this direct comparison

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	250	434	1,498	198	425	1,312

Creating Results - Mainline Travel Time

- For corridor improvement projects compare the mainline travel time before and after construction

Creating Results - Mainline Travel Time

Origin Zone Name	TH 41 S of Hundertmark	
Day Type	1: Weekday (Tu-Th)	
Day Part	08: 6-9 (6am-9am)	
Row Labels	Sum of Average Daily O-M-D Tr	
Hundertmark E of TH 41	3	
N/A	3	
Hundertmark W of TH 41	1	
N/A	1	
Pioneer Trl E of TH 41	143	
177	143	25311
Pioneer Trl W of TH 41 (Destinati	126	
199	126	25074
TH 41 N of Pioneer Trl	782	
118	782	92276
Grand Total	1055	

NB Travel:

Select the travel time that starts on TH 41 south of Hundertmark, and ends at TH 41 north of Pioneer Trl

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 41 Travel	Before Travel Time (s/veh)	144	199	167
	After Travel Time (s/veh)	118	146	136
	TT Reduction (s/veh)	**26**	**53**	**31**
	TT Reduction (%)	**18%**	**27%**	**19%**
SB 41 Travel	Before Travel Time (s/veh)	134	208	176
	After Travel Time (s/veh)	120	144	139
	TT Reduction (s/veh)	**14**	**64**	**37**
	TT Reduction (%)	**10%**	**31%**	**21%**

SB Travel:

Select the travel time that starts on TH 41 north of Pioneer Trl, and ends at TH 41 south of Hundertmark

Origin Zone Name	TH 41 N of Pioneer Trl	
Day Type	1: Weekday (Tu-Th)	
Day Part	08: 6-9 (6am-9am)	
Row Labels	Sum of Average Daily O-M-D Tr	
Hundertmark E of TH 41	19	
233	19	4427
Hundertmark W of TH 41	60	
143	60	8580
Pioneer Trl E of TH 41	4	
N/A	4	
Pioneer Trl W of TH 41 (Destinati	1	
N/A	1	
TH 41 S of Hundertmark	289	
120	289	34680
Grand Total	373	

NOTE

This shows <u>only</u> the travel on the mainline (TH 41)

Creating Results - Mainline Travel Time

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 41 Travel	Before Travel Time (s/veh)	144	199	167
	After Travel Time (s/veh)	118	146	136
	TT Reduction (s/veh)	**26**	**53**	**31**
	TT Reduction (%)	**18%**	**27%**	**19%**
SB 41 Travel	Before Travel Time (s/veh)	134	208	176
	After Travel Time (s/veh)	120	144	139
	TT Reduction (s/veh)	**14**	**64**	**37**
	TT Reduction (%)	**10%**	**31%**	**21%**

Travel Time Reduction (s/veh):

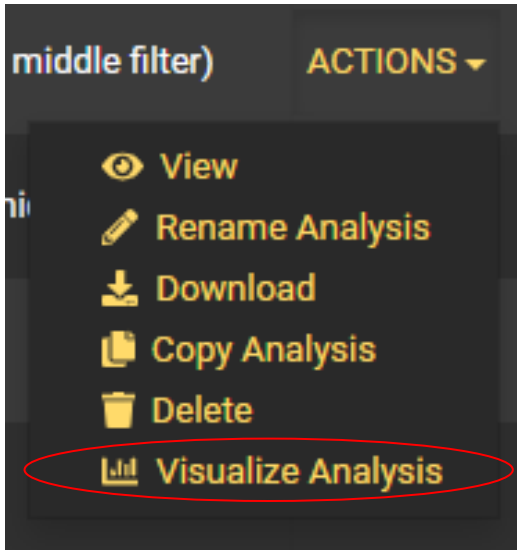
= Before Travel Time – After Travel Time

Travel Time Reduction (%):

= 1 - (After Travel Time/Before Travel Time)

Checking Volumes

- Select *Visualize Analysis* from the actions dropdown
- This feature allows you to quickly check the roadway volumes without creating pivot tables



6

SEE WHAT'S NEW!

STREETLIGHT

HELP

SWITCH ANALYSIS | ANALYSIS: | TYPE: | ADD-ON: None | EXPAND

- Zones
- Analyses
- Visualizations
- Viz3D
- Account

JUMP TO PAGE

TH-41-Expansion-After-updated | Analysis | Story | Duplicate | Basic Analysis Metrics

Attribute	Presentation	Device Type	Zone Type	Day Type	Day Part	Zone	Middle Filter Zo...	Selections	Insights
O-M-D Traffic	View as StreetLight V...	Personal	Origin	Weekday (Tu-Th)	All Day (12am-12am)	Hundertmark W of T...	TH 41		

Basic Analysis Metrics

Personal

Weekday (Tu-Th)

All Day (12am-12am)

Origin

Origin Zone: Hundertmark W of TH 41

Middle Filter Zone: TH 41

Excluding Origin = Destination

O-M-D Traffic

View as StreetLight Volume

O-M-D Traffic

451 - <600

302 - <451

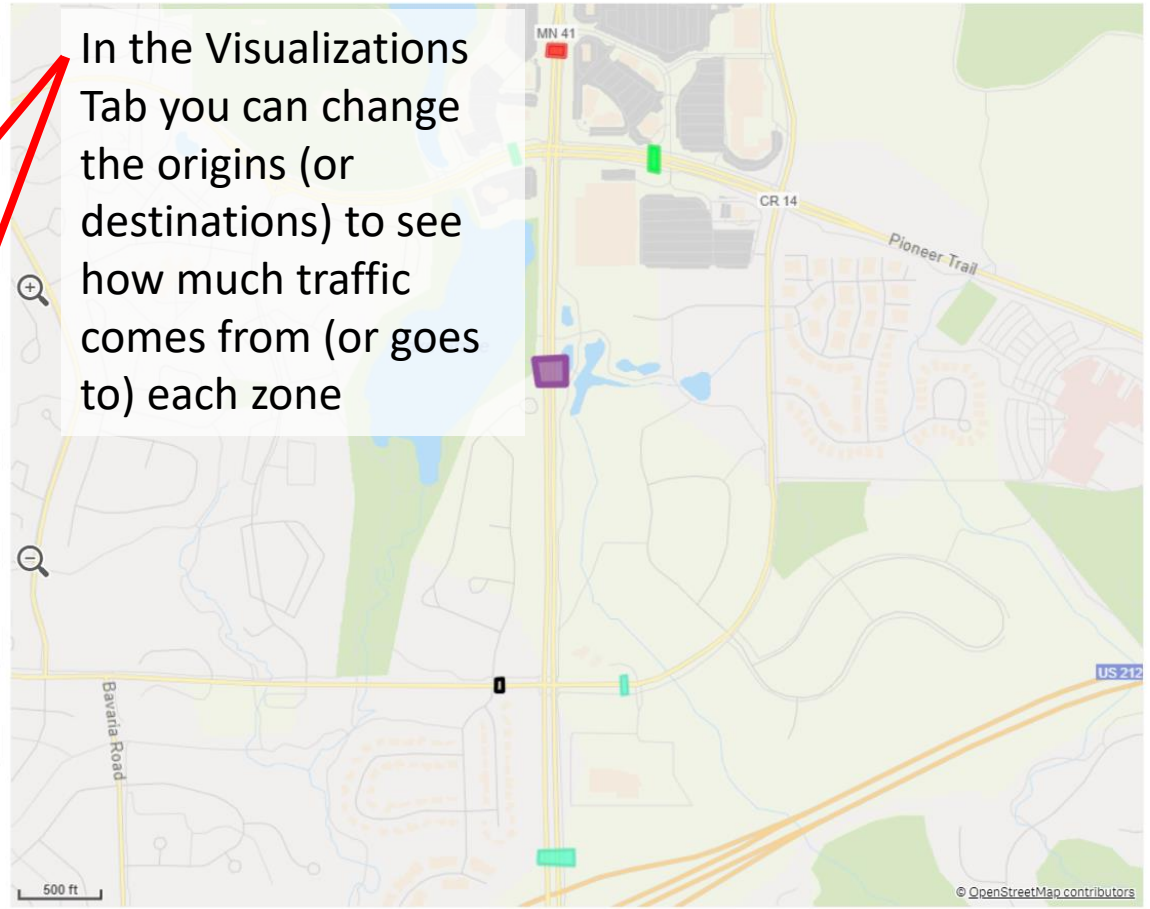
153 - <302

4 - <153

Heatmap of O-M-D Traffic Volume

Colors indicate the O-M-D Traffic to each destination Zone during the selected time period.

In the Visualizations Tab you can change the origins (or destinations) to see how much traffic comes from (or goes to) each zone

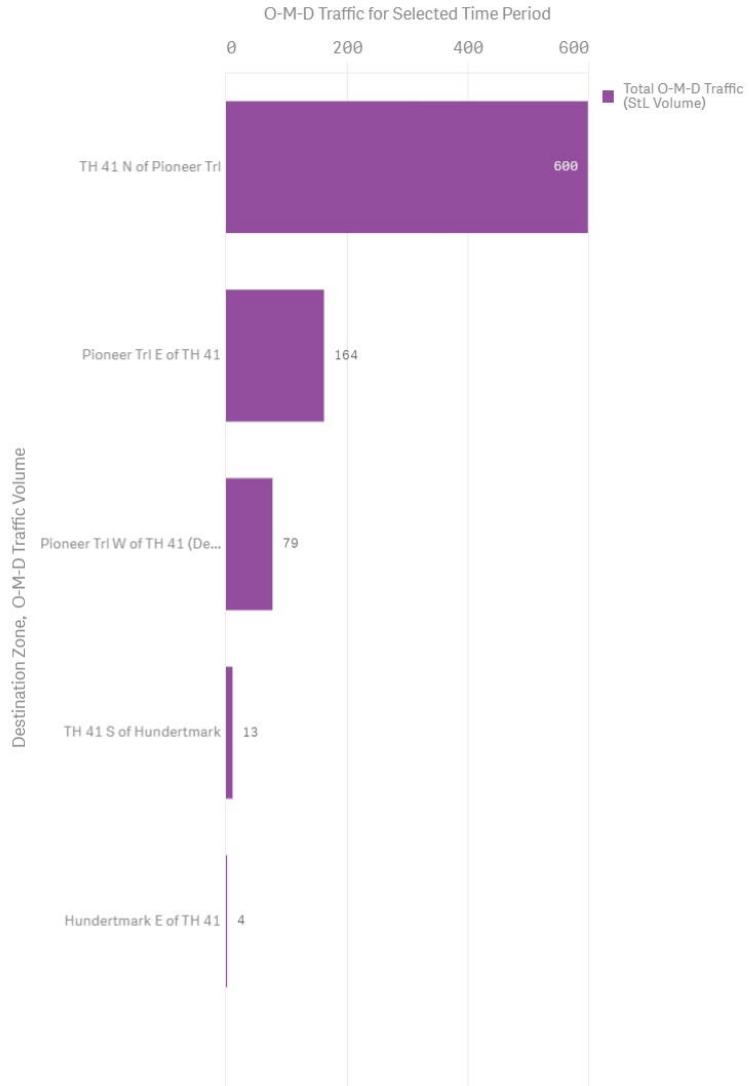


Origin Zone

Middle Filter Zone

To get more information on how to interpret your analysis traffic Output Type: https://support.streetlightdata.com/hc/en-us/articles/360029642992

O-M-D Traffic Volume



6

SEE WHAT'S NEW!

STREETLIGHT

HELP

SWITCH ANALYSIS | ANALYSIS: | TYPE: | ADD-ON: None | EXPAND

- Zones
- Analyses
- Visualizations
- Viz3D
- Account

JUMP TO PAGE

TH-41-Expansion-After-updated | Analysis | Story | Duplicate | Basic Analysis Metrics

Attribute: O-M-D Traffic | Presentation: View as StreetLight V... | Device Type: Personal | Zone Type: Origin | Day Type: Weekday (Tu-Th) | Day Part: All Day (12am-12am) | Zone: Hundertmark W of T... | Middle Filter Zo...: TH 41 | Selections | Insights

Basic Analysis Metrics

Personal

Weekday (Tu-Th)

All Day (12am-12am)

Origin

Origin Zone: Hundertmark W of TH 41

Middle Filter Zone: TH 41

Excluding Origin = Destination

O-M-D Traffic

View as StreetLight Volume

Heatmap of O-M-D Traffic Volume

Colors indicate the O-M-D Traffic to each destination Zone during the selected time period.

Set the "View as" to StreetLight Volume

O-M-D Traffic

451 - <600

302 - <451

153 - <302

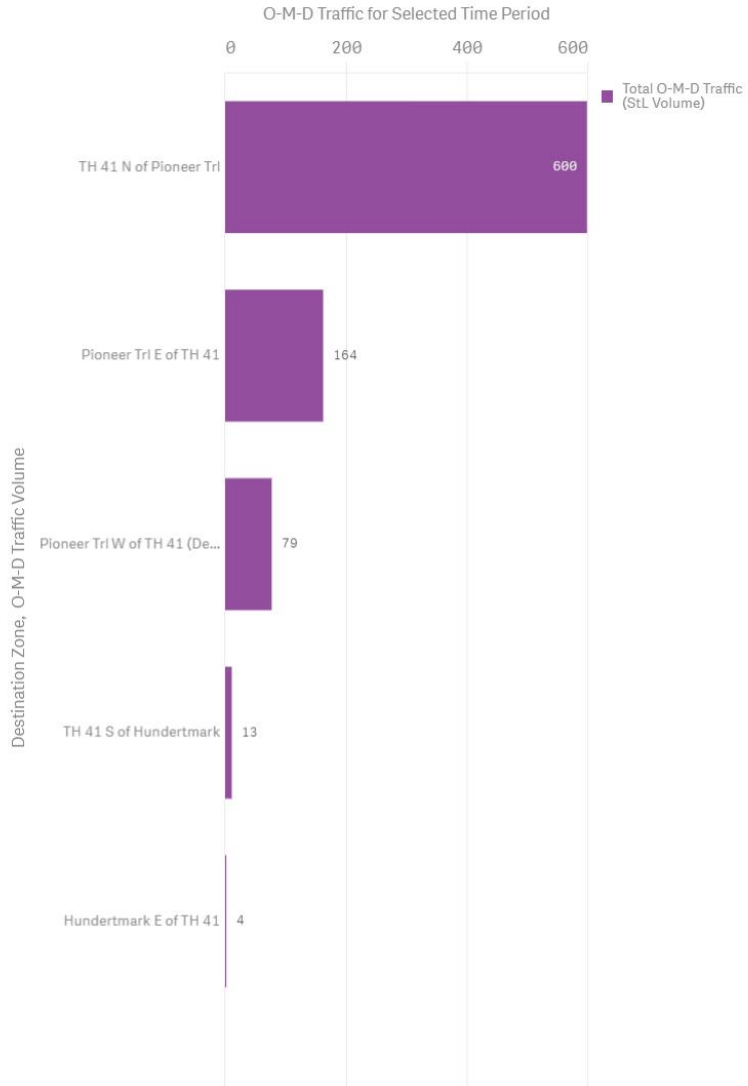
4 - <153

Origin Zone

Middle Filter Zone

To get more information on how to interpret your analysis traffic Output Type: https://support.streetlightdata.com/hc/en-us/articles/360029642992

O-M-D Traffic Volume



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To compare the TH 41 volume between the intersections of Pioneer Trl and Hundertmark Rd:

SEE WHAT'S NEW!

STREETLIGHT

HELP

SWITCH ANALYSIS

EXPAND

- Zones
- Analyses
- Visualizations
- Viz3D
- Account

JUMP TO PAGE

TH-41-Expansion-Afte

Duplicate | Basic Analysis Metrics

Attribute: O-M-D Traffic | Presentation: View as StreetLight V... | Device Type: Personal | Zone Type: Origin | Day Type: Weekday (Tu-Th) | Day Part: All Day (12am-12am) | Zone: Hundertmark W of T... | Middle Filter Zo...: TH 41

Selections | Insights

Basic Analysis Metrics

Personal

Weekday (Tu-Th)

All Day (12am-12am)

Origin

Origin Zone: Hundertmark W of TH 41

Middle Filter Zone: TH 41

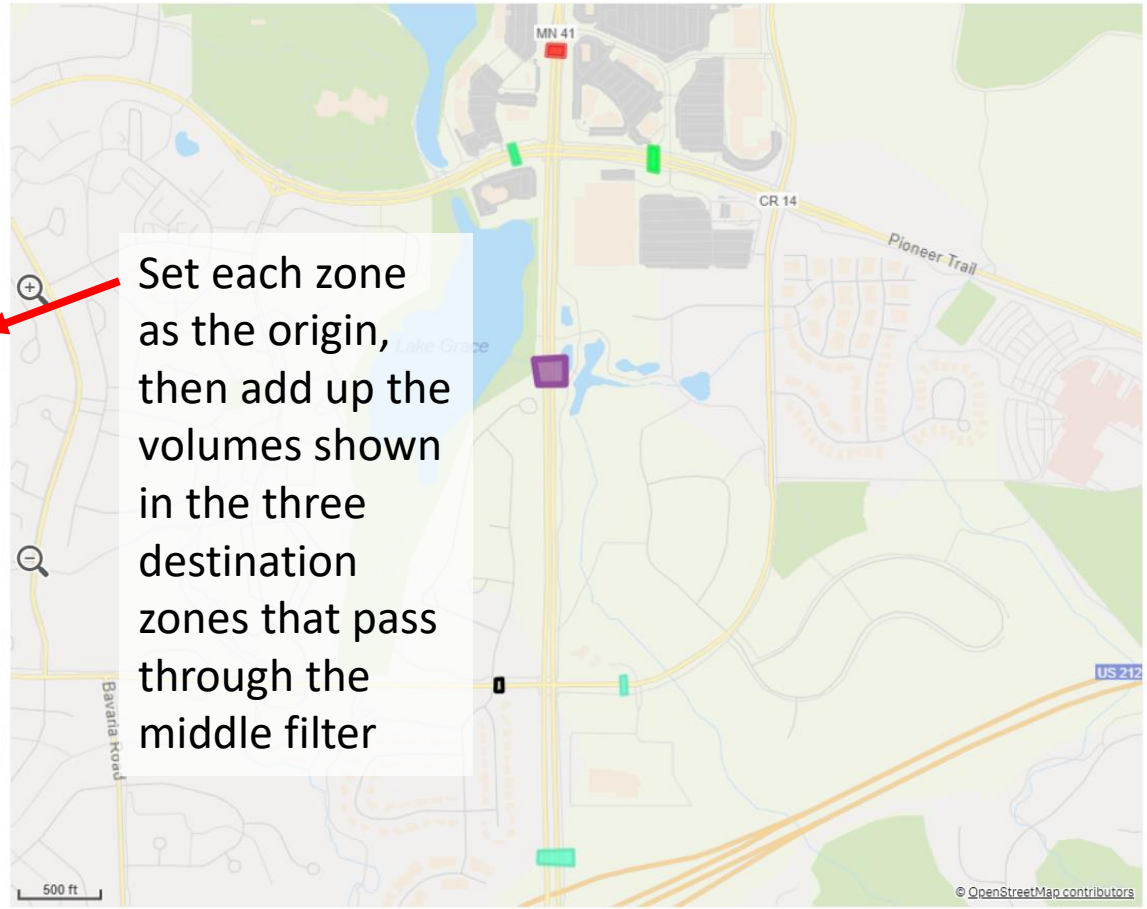
Excluding Origin = Destination

O-M-D Traffic

View as StreetLight Volume

Heatmap of O-M-D Traffic Volume

Colors indicate the O-M-D Traffic to each destination Zone during the selected time period.



Set each zone as the origin, then add up the volumes shown in the three destination zones that pass through the middle filter

O-M-D Traffic

451 - <600

302 - <451

153 - <302

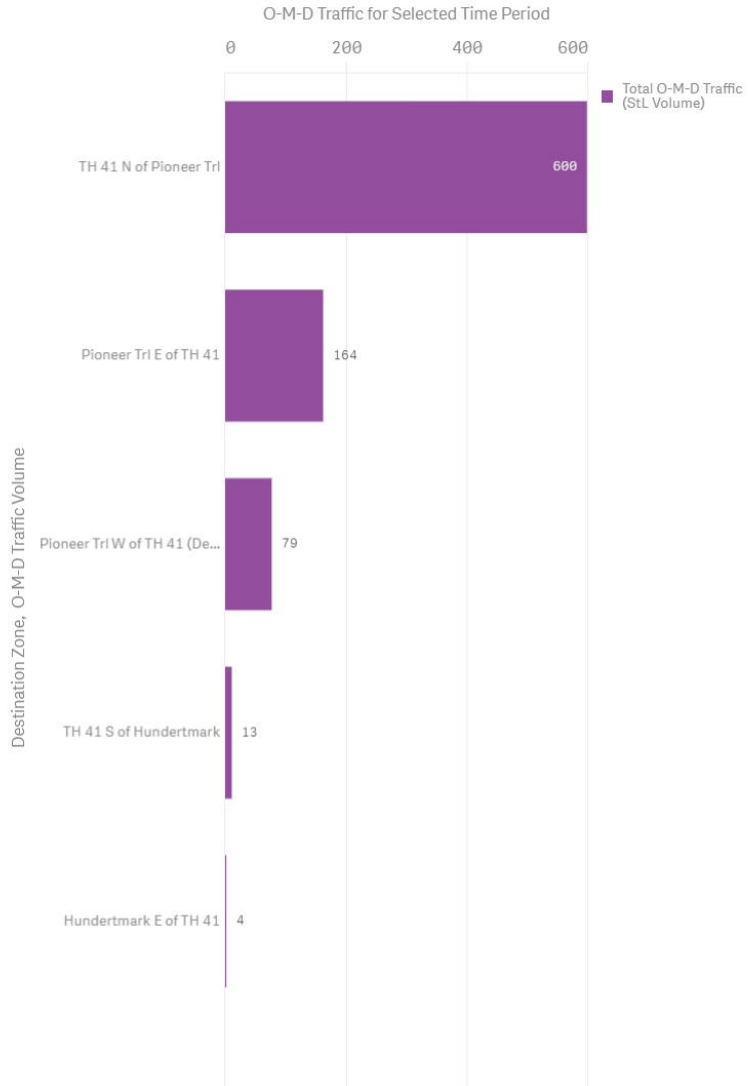
4 - <153

Origin Zone

Middle Filter Zone

To get more information on how to interpret your analysis traffic Output Type: https://support.streetlightdata.com/hc/en-us/articles/360029642992

O-M-D Traffic Volume



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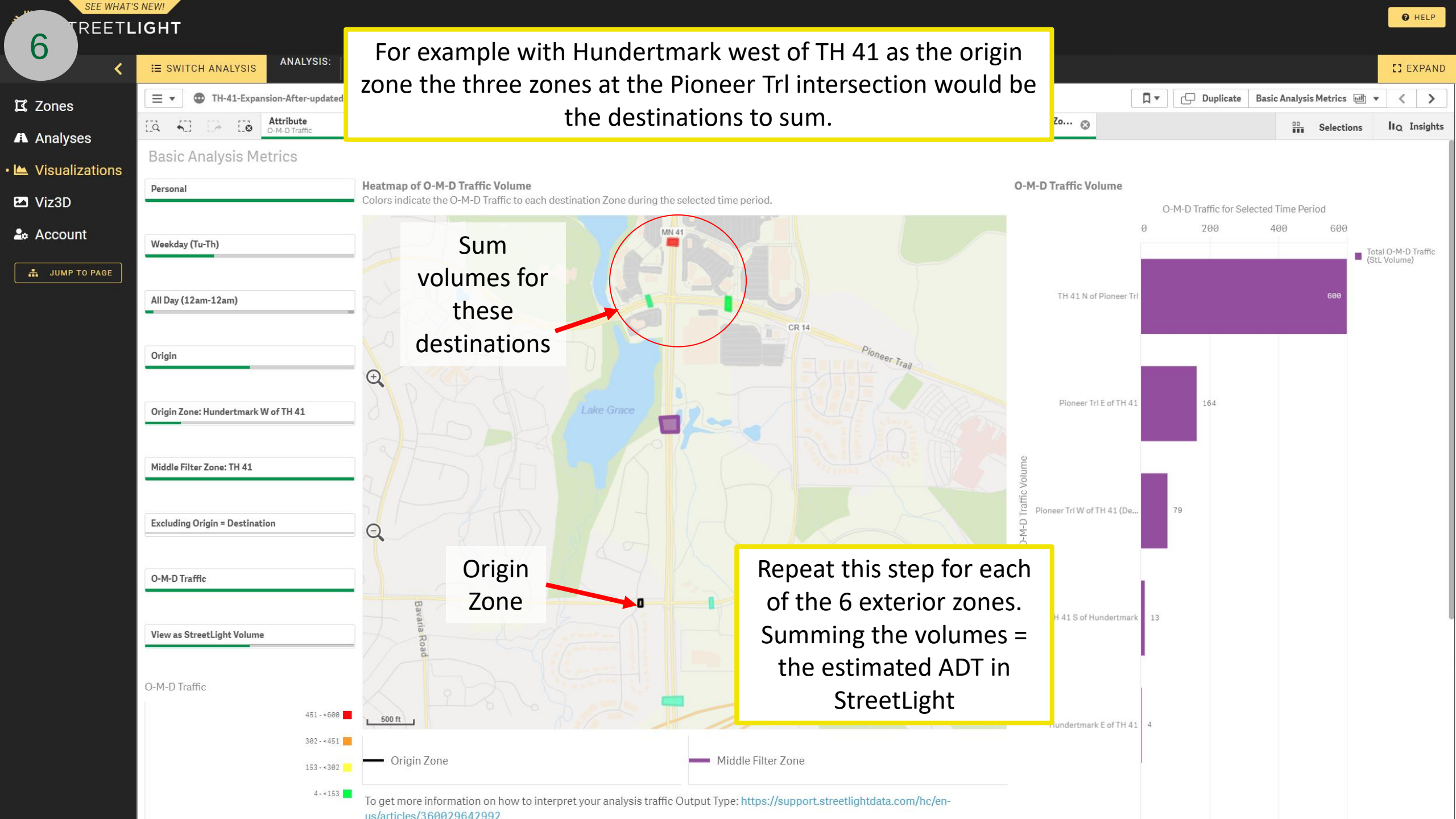
For example with Hundertmark west of TH 41 as the origin zone the three zones at the Pioneer Trl intersection would be the destinations to sum.



Checking Volumes

- Compare StreetLight estimated ADT to Historic AADTs
  - Mndot Traffic Mapping Application
- If volumes are significantly different recheck zones and the analysis set up to ensure you are capturing the correct movements

TH 41 Expansion (Carver County)

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	245	434	1,469	198	425	1,312
Total Vehicles Traveled	8,071	11,190	40,250	7,685	12,029	41,034
% Reduction VHT				19%	2%	11%

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 41 Travel	Before Travel Time (s/veh)	144	199	167
	After Travel Time (s/veh)	118	146	136
	TT Reduction (s/veh)	26	53	31
	TT Reduction (%)	18%	27%	19%
SB 41 Travel	Before Travel Time (s/veh)	134	208	176
	After Travel Time (s/veh)	120	144	139
	TT Reduction (s/veh)	14	64	37
	TT Reduction (%)	10%	31%	21%

- Notes:
  - Used middle filter analysis and supplemental analysis to capture full extents of project area without including alternative routes between zones that could have never traveled on TH 41
  - Before AADT from 2016/2018, After AADT from 2016/2019, as most legs have updated values

Before:
September - October 2017, March - April 2018
After:
September - October 2018, March - April 2019

RESULTS

70th St and Robert Trl Roundabout (Dakota County)

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	44	69	220	44	57	203
Total Vehicles Traveled	3,043	4,707	15,350	3,187	4,598	15,350
% Reduction VHT				1%	17%	7%

	Reductions		
	AM (6 am - 9 am)	PM (3 pm - 6 pm)	All Day
Before Travel Time (s/veh)	52	53	52
After Travel Time (s/veh)	49	45	48
TT Reduction (s/veh)	3	8	4
% TT Reduction	6%	15%	7%

- Notes:
  - Four singular zones, one at each leg of the roundabout.
  - Due to construction dates and COVID, analyses were not run on the same time periods, which is not preferable and should be considered when looking at results.
  - AADT value is the same before and after, as no updated AADT available past 2016/2017

Before:
September - October 2018, March – April 2019

After:
December 2019 – February 2020

CSAH 42 / 52 Interchange (Rosemount)

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	165	185	722	148	190	625
Total Vehicles Traveled	10,050	11,065	42,500	9,473	12,083	43,850
% Reduction VHT				10%	-3%	13%

	Reductions		
	AM (6 am - 9 am)	PM (3 pm - 6 pm)	All Day
Before Travel Time (s/veh)	59	60	61
After Travel Time (s/veh)	56	57	51
TT Reduction (s/veh)	3	4	10
TT Reduction (%)	5%	6%	16%

- Notes:
  - Four singular zones, one at each leg of the interchange.
  - Before AADT from 2015/2016, After AADT from 2015/2018/2019, as some legs have updated values.

Before:
September – October 2016, March - April 2017
After:
March - April 2019, September - October 2019

CSAH 13 / I-94 Crossing (Woodbury)

	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	26	98	280	24	93	268
Total Vehicles Traveled	4,323	10,562	36,000	4,292	11,099	36,500
% Reduction VHT				6%	5%	4%

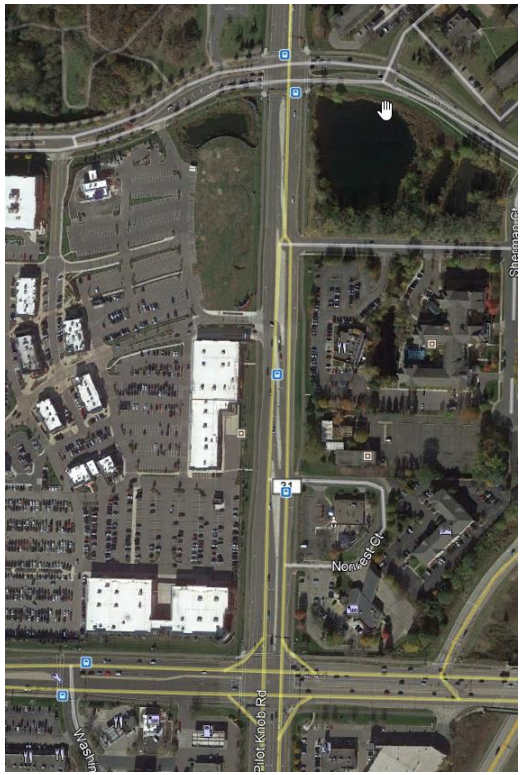
Mainline CSAH 13 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 13 Travel	Before Travel Time (s/veh)	77	99	96
	After Travel Time (s/veh)	79	105	96
	TT Reduction (s/veh)	-2	-6	0
	TT Reduction (%)	-3%	-6%	0%
SB 13 Travel	Before Travel Time (s/veh)	73	90	92
	After Travel Time (s/veh)	76	99	92
	TT Reduction (s/veh)	-3	-9	0
	TT Reduction (%)	-4%	-10%	0%

- Notes:
  - Due to construction dates and COVID, analyses were not run on the same time periods, which is not preferable and should be considered when looking at results.
  - Before AADT from 2017, After AADT from 2019

Before:
September - October 2018, March - April 2019
After:
December 2019 – February 2020

RESULTS

CSAH 31 Reconstruction (Eagan)



	Before			After		
	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day	AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
Vehicle Hours Traveled	127	280	999	191	384	1,278
Total Vehicles Traveled	8,951	14,090	52,350	9,141	15,486	57,550
% Reduction VHT				-50%	-37%	-28%

Mainline TH 41 Improvements				
		AM (6 am - 9 am)	PM (3 pm- 6 pm)	All Day
NB 31 Travel	Before Travel Time (s/veh)	79	115	89
	After Travel Time (s/veh)	101	111	106
	TT Reduction (s/veh)	-22	4	-17
	TT Reduction (%)	-28%	3%	-19%
SB 31 Travel	Before Travel Time (s/veh)	98	105	100
	After Travel Time (s/veh)	155	127	129
	TT Reduction (s/veh)	-57	-22	-29
	TT Reduction (%)	-58%	-21%	-29%

- Notes:
  - Multiple middle filters used to capture vehicle routes only on mainline (CSAH 31)
  - Construction of shopping center to west of project impacts travel time and volumes significantly. Before and after analyses were done as close to construction of roadway as possible, but the shopping center partially opened between the before and after time periods, which may cause incomparable results.
  - Before AADT from 2014/2015, After AADT from 2019

Before:
January – March 2016
After:
January – March 2017

RESULTS

Total Summary- All Project Reductions

Travel Time Reduction				
		AM	PM	All Day
TH 41 Expansion (Carver County)	NB	18%	27%	19%
	SB	10%	31%	21%
70th St and Robert Trl Roundabout (Dakota County)	Entire Area	6%	15%	7%
CSAH 42 / 52 Interchange (Rosemount)	Entire Area	5%	6%	16%
CSAH 13 / I-94 Crossing (Woodbury)	NB	-3%	-6%	0%
	SB	-4%	-10%	0%
CSAH 31 Reconstruction (Eagan)	NB	-28%	3%	-19%
	SB	-58	-21	-29

- Notes:
  - Travel Time reduction for projects with mainlines split into northbound and southbound

VHT and VHT Reduction				
		AM	PM	All Day
TH 41 Expansion (Carver County)	Before	245	434	1469
	After	195	425	1312
	Reduction	19%	2%	11%
70th St and Robert Trl Roundabout (Dakota County)	Before	44	69	220
	After	44	57	203
	Reduction	1%	17%	7%
CSAH 42 / 52 Interchange (Rosemount)	Before	165	185	722
	After	148	190	625
	Reduction	10%	-3%	13%
CSAH 13 / I-94 Crossing (Woodbury)	Before	26	98	280
	After	24	93	268
	Reduction	6%	5%	4%
CSAH 31 Reconstruction (Eagan)	Before	127	280	999
	After	191	384	1278
	Reduction	-50%	-37%	-28%

Attachment C – Safety Analysis

Met Council: Before & After Analysis of Regional Solicitation Projects

This document contains a rough roadmap to perform safety analysis using ArcGIS tools – either GUI based tools or using Python with arcpy module.

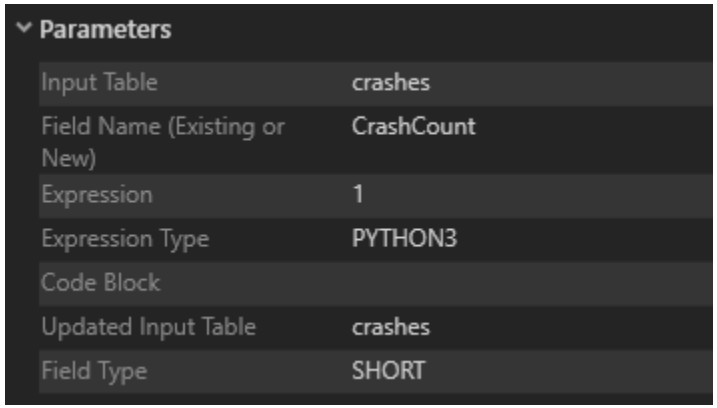
Included are links to geoprocessing tool help pages, screenshots of parameters, and Python code snippets.

Contact Tyler Johnson (Tyler.Johnson@bolton-menk.com) for any questions or comments.

Run several Calculate Field tools to prep the table

Add a new field “CrashCount” (all rows set to 1).

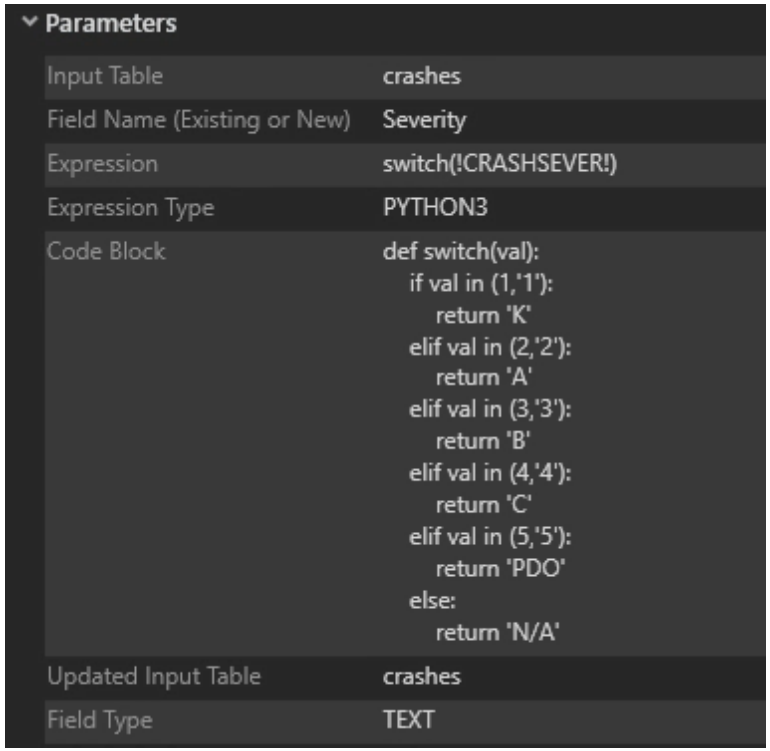
This field will act as value field for Pivot Table.




```
arcpy.management.CalculateField("crashes", "CrashCount", "1", "PYTHON3", '', "SHORT")
```

Replace MnCMAT2 severity codes with values (1 -> Fatal, 2 -> Serious, etc).

[Link to MnCMAT data dictionary]




```
arcpy.management.CalculateField("crashes", "Severity", "switch(!CRASHSEVER!)", "PYTHON3", """def switch(val):
  if val in (1,'1'):
    return 'K'
  elif val in (2,'2'):
    return 'A'
  elif val in (3,'3'):
    return 'B'
  elif val in (4,'4'):
    return 'C'
  elif val in (5,'5'):
    return 'PDO'
  else:
    return 'N/A'""", "TEXT")
```

Replace MnCMAT2 diagram (BASIC_TYPE) codes with values (1 -> Pedestrian, 2 -> Bike, 3 -> Ran off road, etc).

Diagram codes that matched HSIP B/C worksheet are kept, all others set to “Other”

Parameters

Input Table	crashes
Field Name (Existing or New)	Diagram
Expression	switch(!BASIC_TYPE!)
Expression Type	PYTHON3

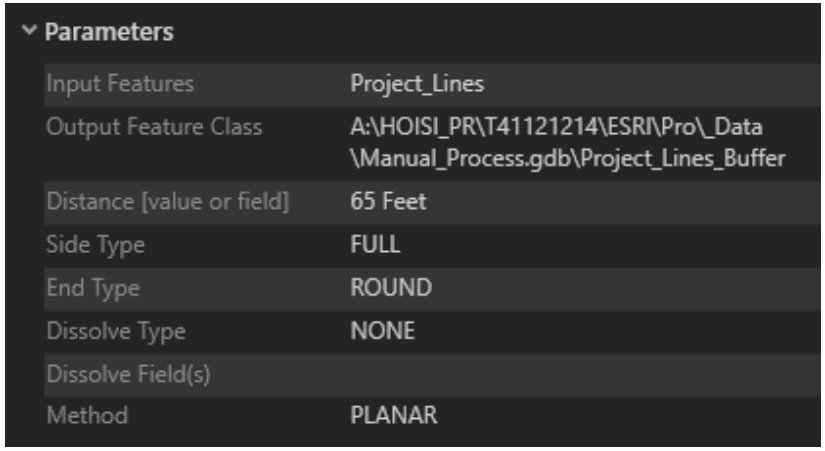
Code Block	def switch(val):
	  if val in (1, "1"):
	  return "Pedestrian"
	  elif val in (2, "2"):
	  return "Bicycle"
	  elif val in (3, "3"):
	  return "Ran Off Road"
	  elif val in (4, "4"):
	  return "Other"
	  elif val in (5, "5"):
	  return "Sideswipe Same Direction"
	  elif val in (6, "6"):
	  return "Head On/Sideswipe Opposing"
	  elif val in (7, "7"):
	  return "Rear End"
	  elif val in (8, "8"):
	  return "Head On/Sideswipe Opposing"
	  elif val in (9, "9"):
	  return "Left Turn"
	  elif val in (10, "10"):
	  return "Right Angle"
	  else:
	  return "Other"

Updated Input Table	crashes
Field Type	TEXT

```
arcpy.management.CalculateField("crashes", "Diagram", "switch(!BASIC_TYPE!)", "PYTHON3", """def switch(val):
  if val in (1, "1"):
    return "Pedestrian"
  elif val in (2, "2"):
    return "Bicycle"
  elif val in (3, "3"):
    return "Ran Off Road"
  elif val in (4, "4"):
    return "Other"
  elif val in (5, "5"):
    return "Sideswipe Same Direction"
  elif val in (6, "6"):
    return "Head On/Sideswipe Opposing"
  elif val in (7, "7"):
    return "Rear End"
  elif val in (8, "8"):
    return "Head On/Sideswipe Opposing"
  elif val in (9, "9"):
    return "Left Turn"
  elif val in (10, "10"):
    return "Right Angle"
  else:
    return "Other"""", "TEXT")
```

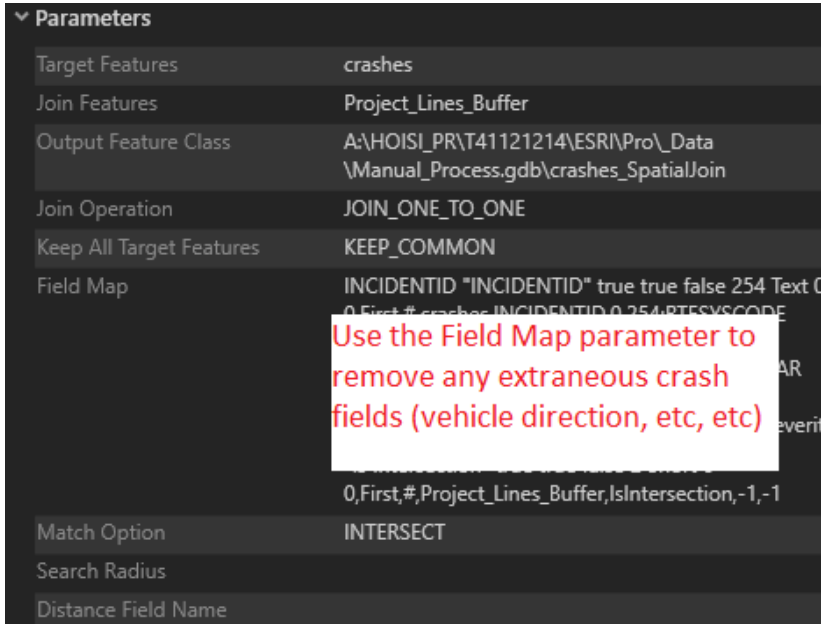
Buffer project lines

Buffer the project lines to get polygons and the extent of simple project influence area for crashes.



arcpy.analysis.Buffer("Project_Lines", “Project_Lines_Buffer", "65 Feet", "FULL", "ROUND", "NONE", None, "PLANAR")

Spatial join buffers with crashes



- Crashes are target (so output will be points)
- Project Buffers are join features
- Intersect match option with no search radius
- Don't keep all target features (this will get rid of crashes outside project buffers)
- Take advantage of field mapping to reduce the extraneous crash fields
    - Keep INCIDENTID, CRASH_YEAR, new severity field, new diagram field, new crash count field

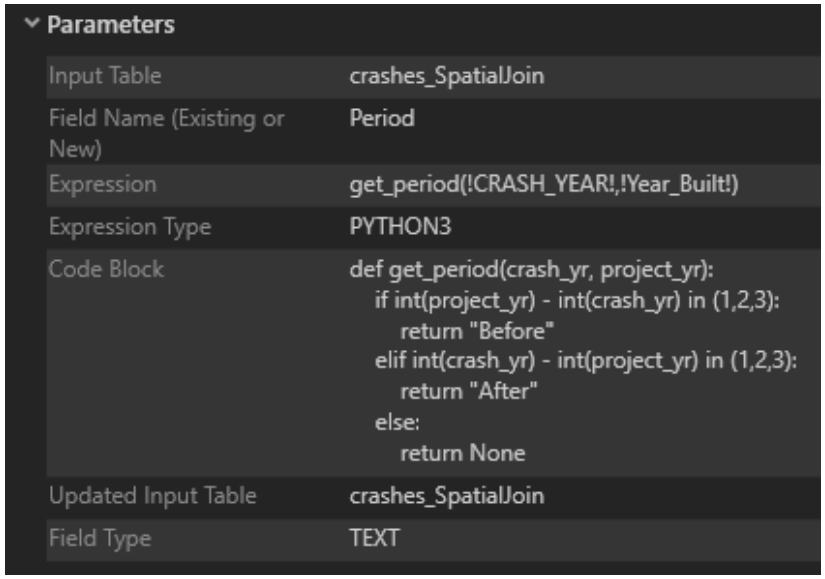
arcpy.analysis.SpatialJoin("crashes", "Project_Lines_Buffer", "crashes_SpatialJoin", "JOIN_ONE_TO_ONE", "KEEP_COMMON", 'INCIDENTID "INCIDENTID" true true false 254 Text 0 0,First,#,crashes,INCIDENTID,0,254;RTESYSCODE "RTESYSCODE" true true false 10 Long 0 10,First,#,crashes,RTESYSCODE,-1,-1;CRASH_YEAR "CRASH_YEAR" true true false 254 Text 0 0,First,#,crashes,CRASH_YEAR,0,254;Severity "Severity" true true false 254 Text 0 0,First,#,crashes,Severity,0,254;Diagram "Diagram" true true false 254 Text 0 0,First,#,crashes,Diagram,0,254;CrashCount "CrashCount" true true false 254 Text 0 0,First,#,crashes,CrashCount,0,254;Project "Project" true true false 50 Text 0 0,First,#,Project_Lines_Buffer,Project,0,50;ProjectID "ProjectID" true true false 25 Text 0 0,First,#,Project_Lines_Buffer,ProjectID,0,25;Applicant "Applicant" true true false 25 Text 0 0,First,#,Project_Lines_Buffer,Applicant,0,25;AADT_Pre "AADT Pre-Construction" true true false 4 Long 0 0,First,#,Project_Lines_Buffer,AADT_Pre,-1,-1;AADT_Post "AADT Post-Construction" true true false 4 Long 0 0,First,#,Project_Lines_Buffer,AADT_Post,-1,-1;Length "Project Length (Miles)" true true false 8 Double 0 0,First,#,Project_Lines_Buffer,Length,-1,-1;Year_Built "Year Completed" true true false 4 Long 0 0,First,#,Project_Lines_Buffer,Year_Built,-1,-1;Label "Label" true true false 100 Text 0 0,First,#,Project_Lines_Buffer,Label,0,100;IsIntersection "Is Intersection" true true false 2 Short 0 0,First,#,Project_Lines_Buffer,IsIntersection,-1,-1', "INTERSECT", None, '')

Calculate Period (Before/After category)

Calculates the “Period” category (Before/After construction)

Before analysis period will be the 3 years prior to construction year.
After analysis period will be the 3 years after construction year.

E.g. If year built = 2017, before = (2014,2015,2016) after = (2018, 2019, 2020).

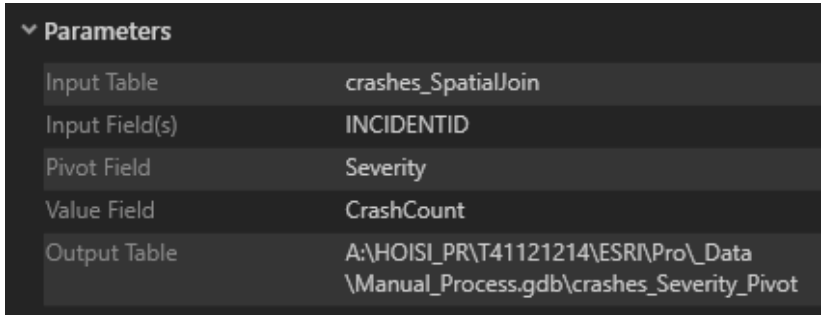



```
arcpy.management.CalculateField("crashes_SpatialJoin", "Period", "get_period(!CRASH_YEAR!,!Year_Built!)", "PYTHON3", """def get_period(crash_yr, project_yr):
    if int(project_yr) - int(crash_yr) in (1,2,3):
        return "Before"
    elif int(crash_yr) - int(project_yr) in (1,2,3):
        return "After"
    else:
        return None""", "TEXT")
```

Pivot Table to get Severity/Diagram Boolean Fields

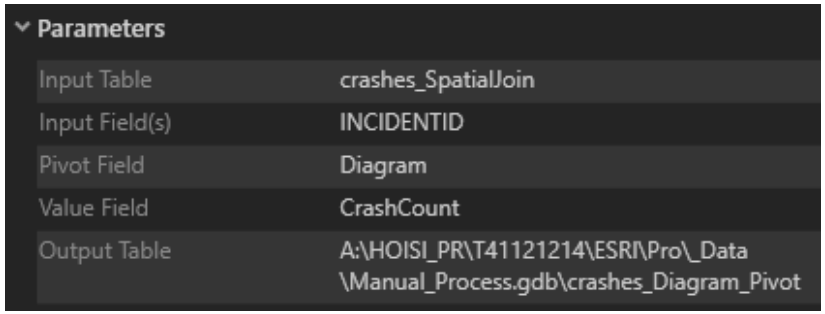
Use Pivot Table tool to create a field for each severity/diagram and populate with CrashCount (value of 1 if True, Null if not)

Then perform Join Field to link output pivot tables back to original crash table so it's all together



arcpy.management.PivotTable("crashes_SpatialJoin", "INCIDENTID", "Severity", "CrashCount", "crashes_Severity_Pivot")

arcpy.management.JoinField("crashes_SpatialJoin", "INCIDENTID", "crashes_Severity_Pivot", "INCIDENTID", "A;B;C;K;PDO")

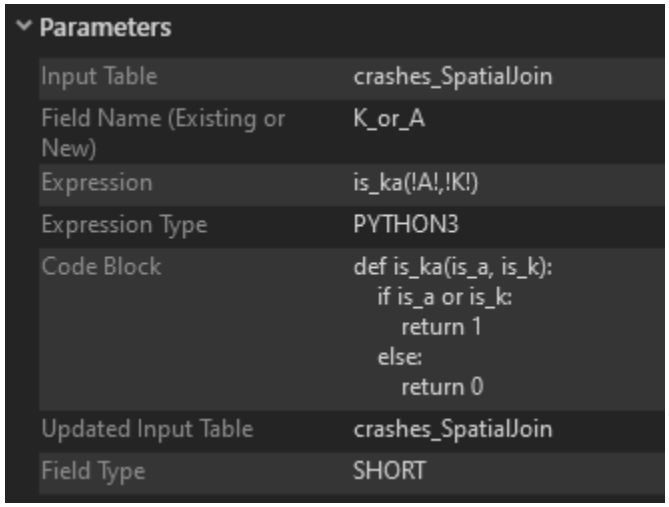


arcpy.management.PivotTable("crashes_SpatialJoin", "INCIDENTID", "Diagram", "CrashCount", "crashes_Diagram_Pivot")

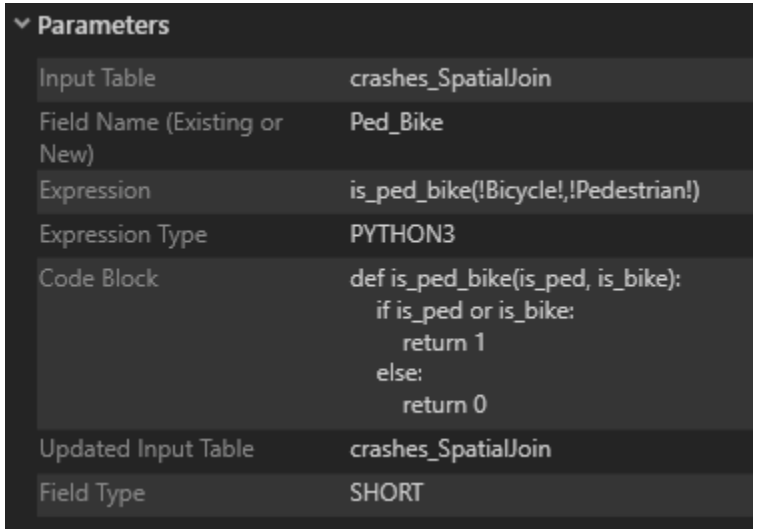
arcpy.management.JoinField("crashes_SpatialJoin", "INCIDENTID", "crashes_Diagram_Pivot", "INCIDENTID", "Bicycle;Head_On_Sideswipe_Opposing;Left_Turn;Other;Pedestrian;Ran_Off_Road;Rear_End;Right_Angle;Sideswipe_Same_Direction")

Calculate fields for K/A and Ped/Bike

Calculate field to denote whether crash is Fatal or Serious, and whether crash is Pedestrian or Bike.




```
arcpy.management.CalculateField("crashes_SpatialJoin", "K_or_A",
"is_ka(!A!,!K!)", "PYTHON3", """def is_ka(is_a, is_k):
    if is_a or is_k:
        return 1
    else:
        return 0""", "SHORT")
```



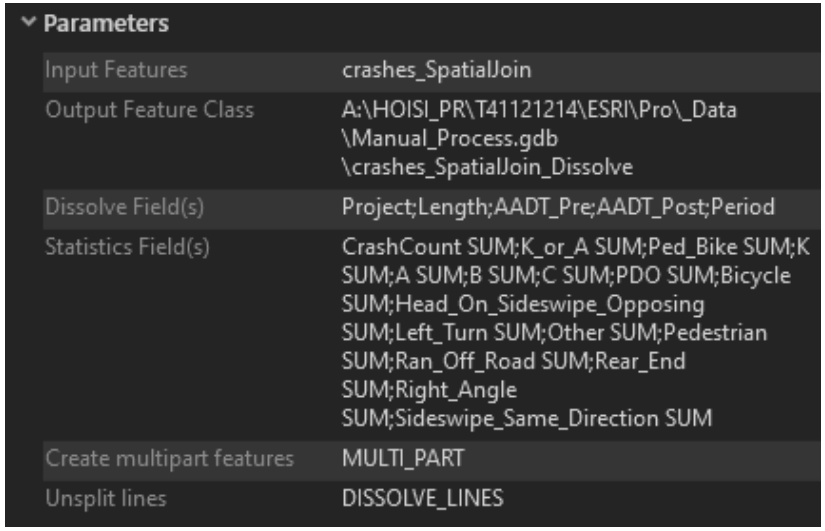

```
arcpy.management.CalculateField("crashes_SpatialJoin",
"Ped_Bike", "is_ped_bike(!Bicycle!,!Pedestrian!)", "PYTHON3",
"""def is_ped_bike(is_ped, is_bike):
    if is_ped or is_bike:
        return 1
    else:
        return 0""", "SHORT")
```

Dissolve crashes based on project and period to get projects' 3-year totals

Dissolve based on Projects' unique fields (project name, length, pre/post AADT) and the Period category.

(Include length and pre AADT and post AADT so they're present in the output as we need those fields for crash rate calculation)

Take the "SUM" statistics for the crash count and severity/diagram counts to get 3-year totals.

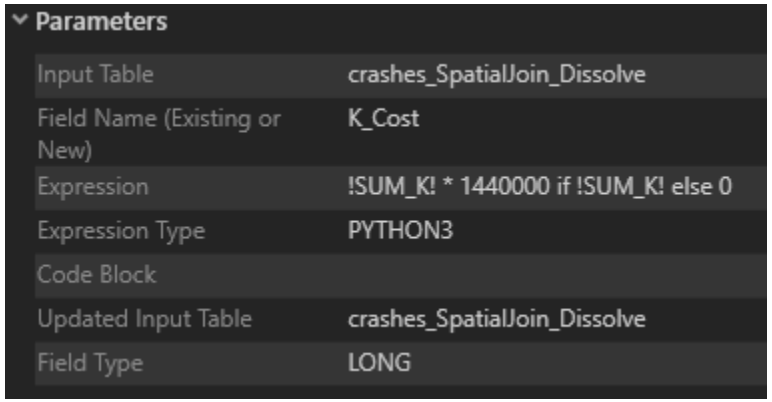


arcpy.management.Dissolve("crashes_SpatialJoin", "crashes_SpatialJoin_Dissolve", "Project;Length;AADT_Pre;AADT_Post;Period", "CrashCount SUM;K_or_A SUM;Ped_Bike SUM;K SUM;A SUM;B SUM;C SUM;PDO SUM;Bicycle SUM;Head_On_Sideswipe_Opposing SUM;Left_Turn SUM;Other SUM;Pedestrian SUM;Ran_Off_Road SUM;Rear_End SUM;Right_Angle SUM;Sideswipe_Same_Direction SUM", "MULTI_PART", "DISSOLVE_LINES")

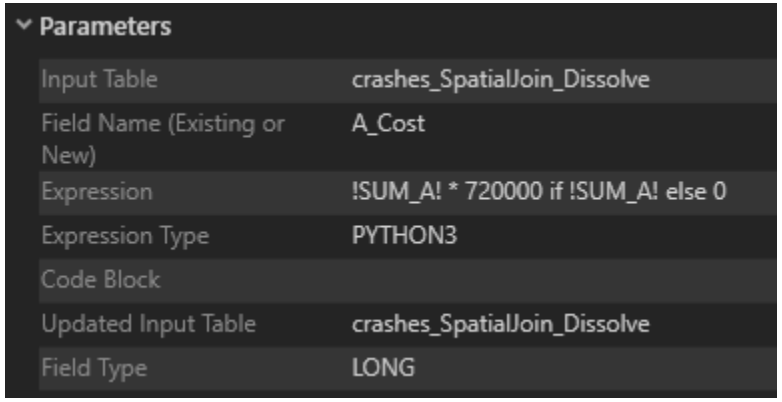
Calculate costs by severity

Severity costs obtained from [B/C worksheet]

Multiply 3-year severity totals by severity cost.

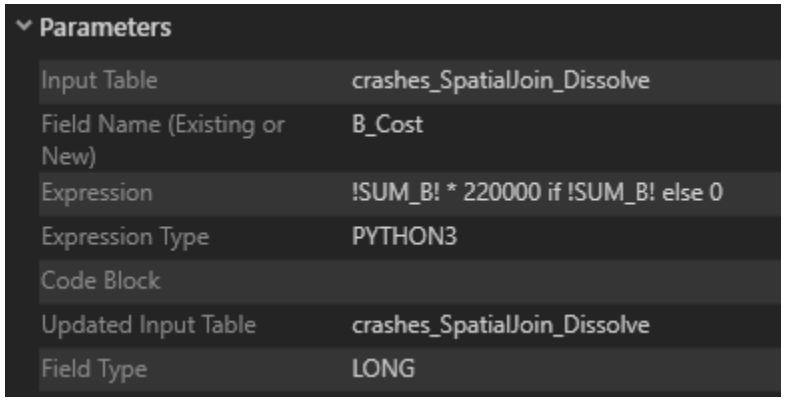



```
arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "K_Cost", "!SUM_K! * 1440000 if !SUM_K! else 0", "PYTHON3", '', "LONG")
```

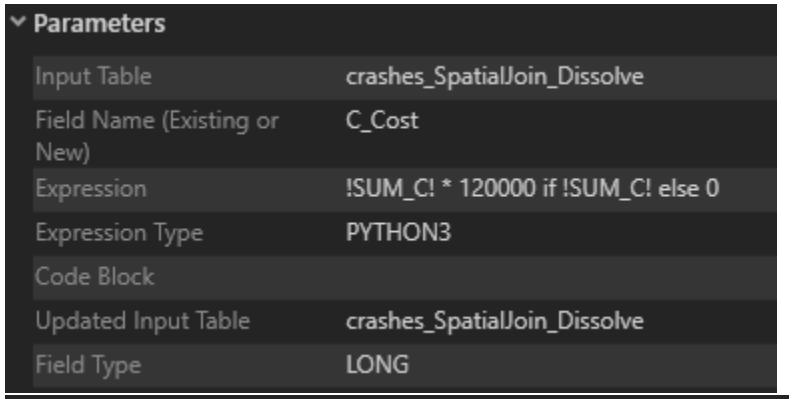



```
arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "A_Cost", "!SUM_A! * 720000 if !SUM_A! else 0", "PYTHON3", '', "LONG")
```

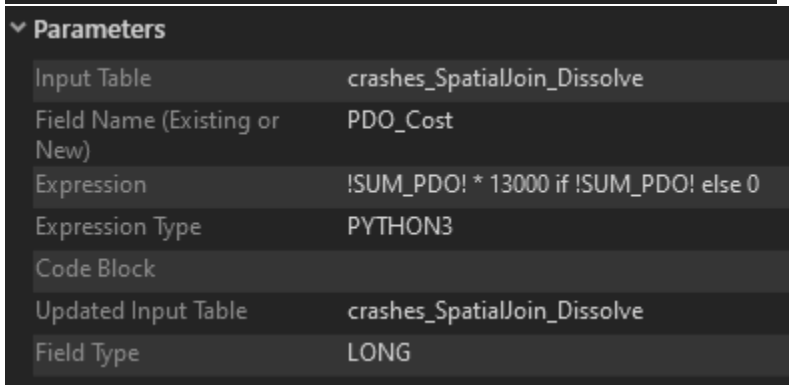
Calculate costs by severity (cont.)



arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "B_Cost", "!SUM_B! * 220000 if !SUM_B! else 0", "PYTHON3", '', "LONG")



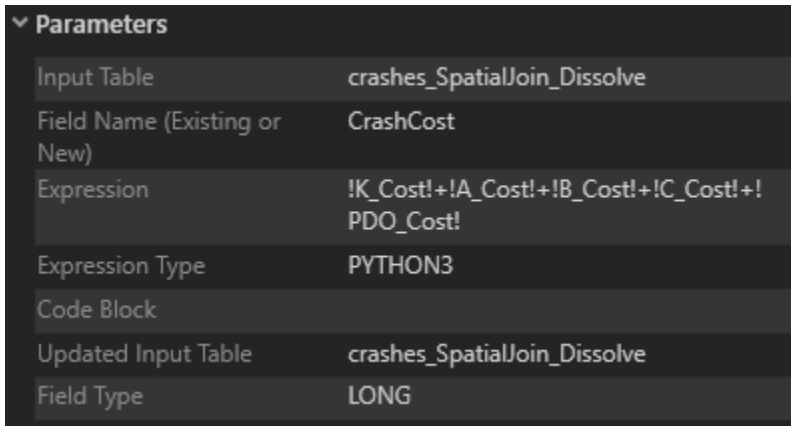
arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "C_Cost", "!SUM_C! * 120000 if !SUM_C! else 0", "PYTHON3", '', "LONG")



arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "PDO_Cost", "!SUM_PDO! * 13000 if !SUM_PDO! else 0", "PYTHON3", '', "LONG")

Calculate total crash cost

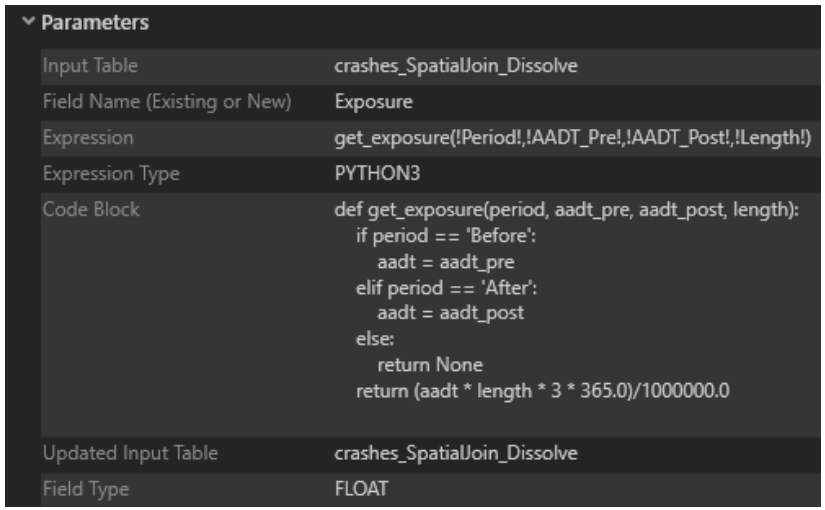
Add the severity cost columns to get a total cost per 3 years




```
arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "CrashCost", "!K_Cost!+!A_Cost!+!B_Cost!+!C_Cost!+!PDO_Cost!", "PYTHON3", '', "LONG")
```

Calculate Exposure field

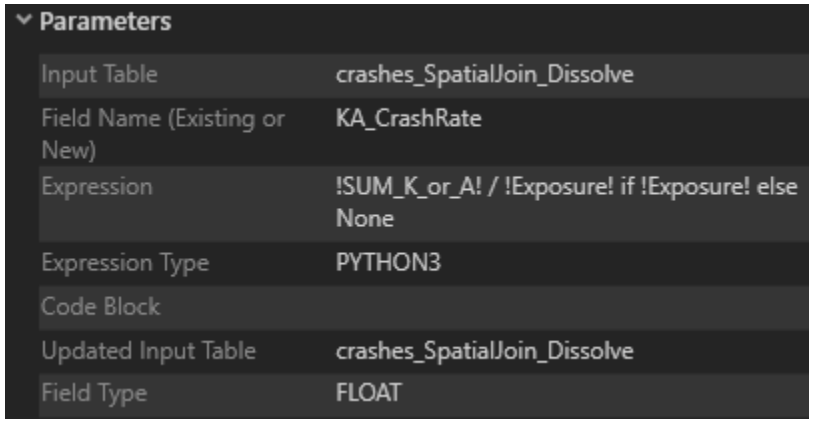
Calculate the project exposure (million vehicle miles)



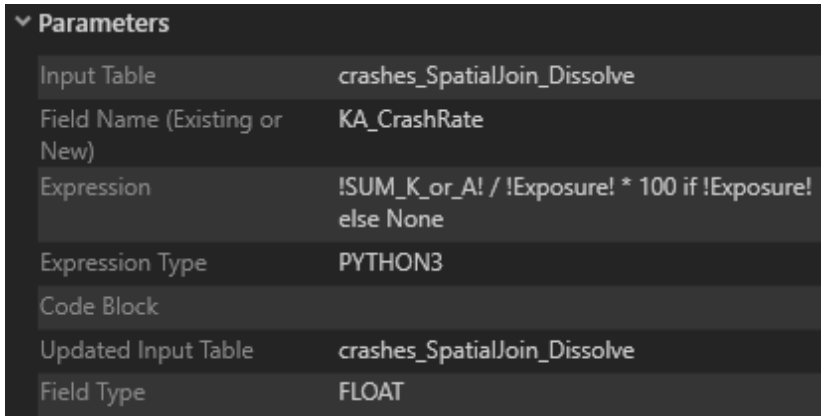

```
arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve",
"Exposure",
"get_exposure(!Period!,!AADT_Pre!,!AADT_Post!,!Length!)",
"PYTHON3", """def get_exposure(period, aadt_pre, aadt_post,
length):
  if period == 'Before':
    aadt = aadt_pre
  elif period == 'After':
    aadt = aadt_post
  else:
    return None
  return (aadt * length * 3 * 365.0)/1000000.0
  """, "FLOAT")
```

Calculate Crash Rate and Fatal/Serious Crash Rate

Divide total crashes by exposure for Crash Rate



arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "KA_CrashRate", "!SUM_K_or_A! / !Exposure! if !Exposure! else None", "PYTHON3", '', "FLOAT")



arcpy.management.CalculateField("crashes_SpatialJoin_Dissolve", "KA_CrashRate", "!SUM_K_or_A! / !Exposure! * 100 if !Exposure! else None", "PYTHON3", '', "FLOAT")

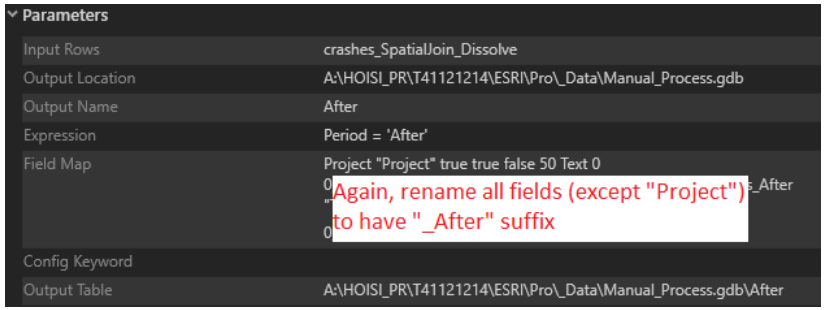
Separate Before records using Table to Table tool

Take only the Before records (using SQL expression) and export to a table. Also renamed the stat columns to include "_Before" suffix.

arcpy.conversion.TableToTable("crashes_SpatialJoin_Dissolve", r"A:\HOISI_PR\T41121214\ESRI\Pro_Data\Manual_Process.gdb", "Before", "Period = 'Before'", 'Project "Project" true true false 50 Text 0 0,First,#,crashes_SpatialJoin_Dissolve,Project,0,50;Total_Crashes_Before "Total_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_CrashCount,-1,-1;K_or_A_Crashes_Before "K_or_A_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_K_or_A,-1,-1;Ped_or_Bike_Crashes_Before "Ped_or_Bike_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Ped_Bike,-1,-1;K_Crashes_Before "K_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_K,-1,-1;A_Crashes_Before "A_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_A,-1,-1;B_Crashes_Before "B_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_B,-1,-1;C_Crashes_Before "C_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_C,-1,-1;PDO_Crashes_Before "PDO_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_PDO,-1,-1;Bicycle_Crashes_Before "Bicycle_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Bicycle,-1,-1;Head_On_Sideswipe_Opposing_Crashes_Before "Head_On_Sideswipe_Opposing_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Head_On_Sideswipe_Opposing,-1,-1;Left_Turn_Crashes_Before "Left_Turn_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Left_Turn,-1,-1;Other_Crashes_Before "Other_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Other,-1,-1;Pedestrian_Crashes_Before "Pedestrian_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Pedestrian,-1,-1;Ran_Off_Road_Crashes_Before "Ran_Off_Road_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Ran_Off_Road,-1,-1;Rear_End_Crashes_Before "Rear_End_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Rear_End,-1,-1;Right_Angle_Crashes_Before "Right_Angle_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Right_Angle,-1,-1;Sideswipe_Same_Direction_Crashes_Before "Sideswipe_Same_Direction_Crashes_Before" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_Sideswipe_Same_Direction,-1,-1;Crash_Cost_Before "Crash_Cost_Before" true true false 4 Long 0 0,First,#,crashes_SpatialJoin_Dissolve,CrashCost,-1,-1;Crash_Rate_Before "Crash_Rate_Before" true true false 4 Float 0 0,First,#,crashes_SpatialJoin_Dissolve,CrashRate,-1,-1;KA_Crash_Rate_Before "KA_Crash_Rate_Before" true true false 4 Float 0 0,First,#,crashes_SpatialJoin_Dissolve,KA_CrashRate,-1,-1', '')

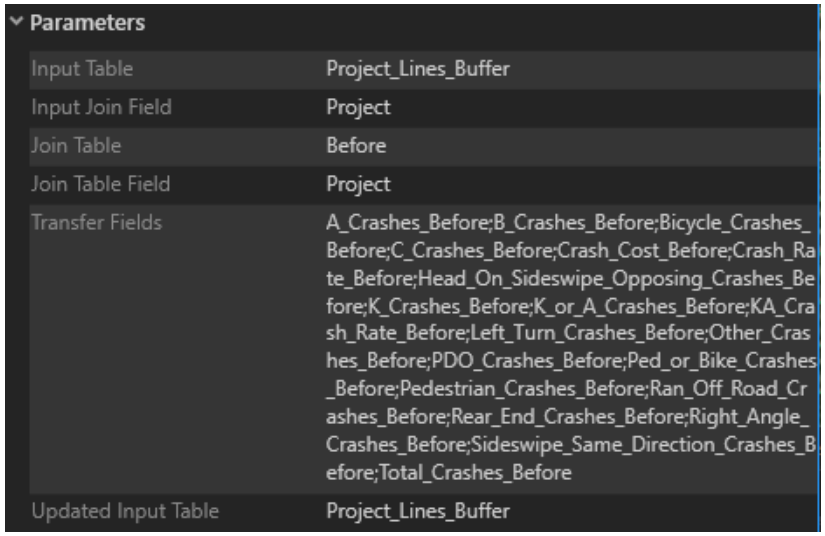
Separate After records using Table to Table tool

Take only the After records (using SQL expression) and export to a table. Also renamed the stat columns to include "_After" suffix.




```
arcpy.conversion.TableToTable("crashes_SpatialJoin_Dissolve",
r"A:\HOISI_PR\T41121214\ESRI\Pro\_Data\Manual_Process.gdb", "After", "Period = 'After'",
'Project "Project" true true false 50 Text 0
0,First,#,crashes_SpatialJoin_Dissolve,Project,0,50;Total_Crashes_After
"Total_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_CrashCount,-1,-1;K_or_A_Crashes_After
"K_or_A_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_K_or_A,-1,-1;Ped_or_Bike_Crashes_After
"Ped_or_Bike_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Ped_Bike,-1,-1;K_Crashes_After
"K_Crashes_After" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_K,-
1,-1;A_Crashes_After "A_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_A,-1,-1;B_Crashes_After "B_Crashes_After" true
true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_B,-1,-1;C_Crashes_After
"C_Crashes_After" true true false 8 Double 0 0,First,#,crashes_SpatialJoin_Dissolve,SUM_C,-
1,-1;PDO_Crashes_After "PDO_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_PDO,-1,-1;Bicycle_Crashes_After
"Bicycle_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Bicycle,-1,-
1;Head_On_Sideswipe_Opposing_Crashes_After
"Head_On_Sideswipe_Opposing_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Head_On_Sideswipe_Opposing,-1,-
1;Left_Turn_Crashes_After "Left_Turn_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Left_Turn,-1,-1;Other_Crashes_After
"Other_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Other,-1,-1;Pedestrian_Crashes_After
"Pedestrian_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Pedestrian,-1,-1;Ran_Off_Road_Crashes_After
"Ran_Off_Road_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Ran_Off_Road,-1,-1;Rear_End_Crashes_After
"Rear_End_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Rear_End,-1,-1;Right_Angle_Crashes_After
"Right_Angle_Crashes_After" true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Right_Angle,-1,-
1;Sideswipe_Same_Direction_Crashes_After "Sideswipe_Same_Direction_Crashes_After"
true true false 8 Double 0
0,First,#,crashes_SpatialJoin_Dissolve,SUM_Sideswipe_Same_Direction,-1,-
1;Crash_Cost_After "Crash_Cost_After" true true false 4 Long 0
0,First,#,crashes_SpatialJoin_Dissolve,CrashCost,-1,-1;Crash_Rate_After "Crash_Rate_After"
true true false 4 Float 0 0,First,#,crashes_SpatialJoin_Dissolve,CrashRate,-1,-
1;KA_Crash_Rate_After "KA_Crash_Rate_After" true true false 4 Float 0
0,First,#,crashes_SpatialJoin_Dissolve,KA_CrashRate,-1,-1', '')
```

Join the separate Before/After tables back to Project Line Buffers



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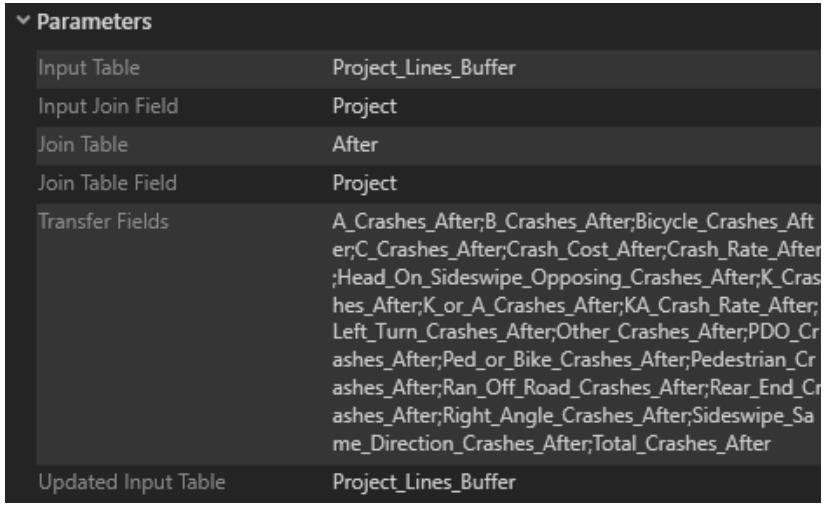

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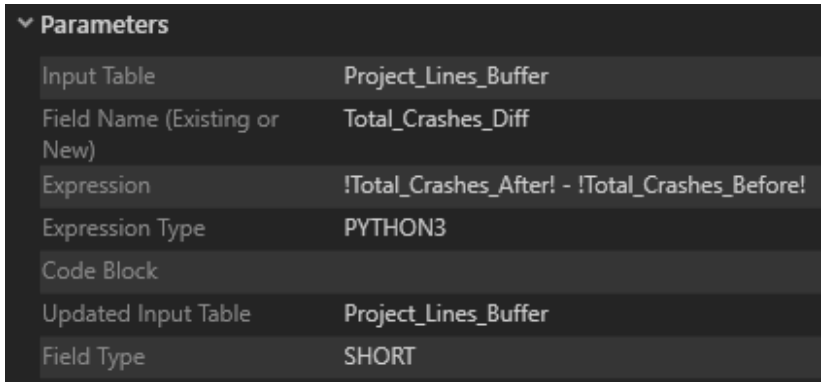
Calculate Difference fields



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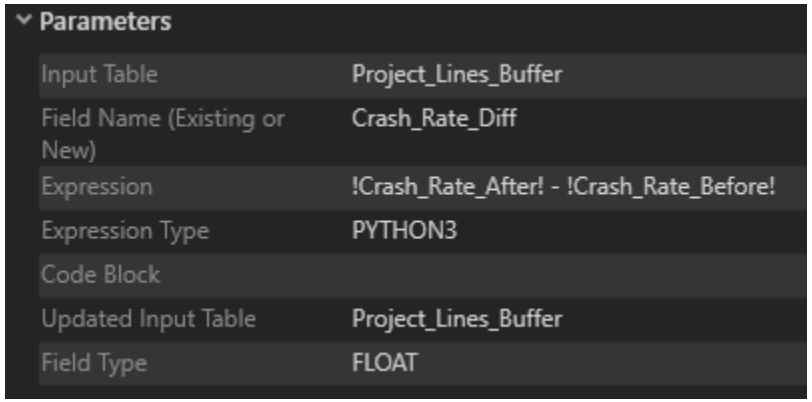

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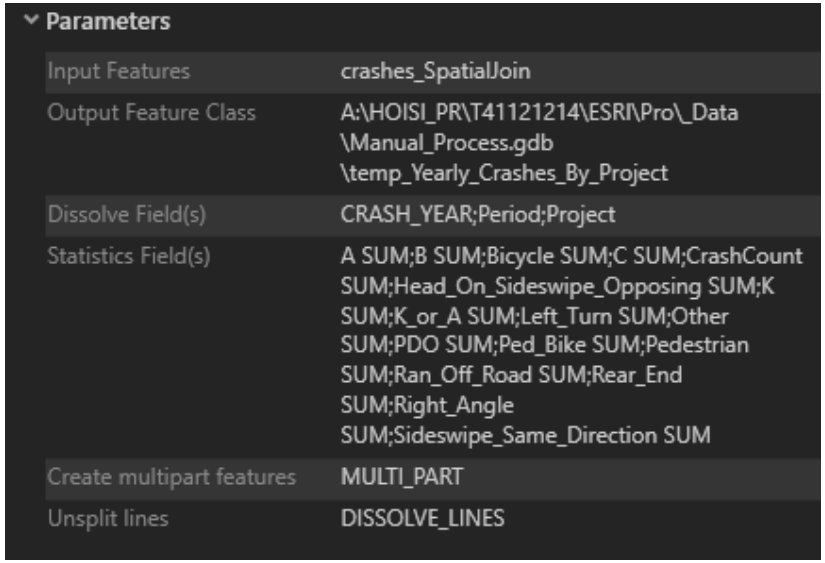
(and repeat as needed to create difference fields for each stat)

To create yearly crash counts, Dissolve based on crash year, period, and project

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SUM;Left_Turn SUM;Other SUM;PDO SUM;Ped_Bike
SUM;Pedestrian SUM;Ran_Off_Road SUM;Rear_End
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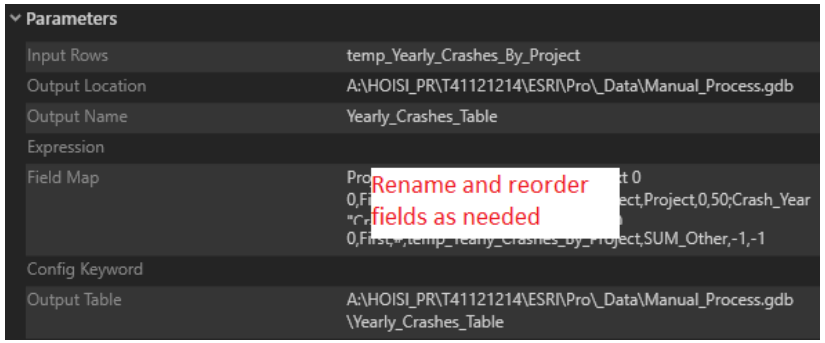
Table to Table to rename/reorder fields of Yearly Crash Counts

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Attachment D – Focus Group: Grant Writing Consultants

Discussion Item #1: Identify ways to simplify and streamline the application process.

Question 1a: From a consultant's perspective, what about the application process and submittal is most time consuming?

1. The group largely felt that the most time-consuming questions are associated with the 'Equity & Housing Performance' measures. Specific feedback included:
    a. Measure A: Socio-Economic Equity (Sub-Measure 1 - Equity Population Engagement): Responding to this question in 200 words can be very challenging for projects that have included a robust public engagement process. It is difficult to capture these events, as they may have occurred over the course of many years of planning. In addition, the group felt that this was somewhat redundant, as a similar question is also asked in the Risk Assessment Form. It should also be noted the online grant form allowed a response of up to 400 words, which was not realized by some applicants.
    b. Measure B: Affordable Housing (Part 2: Affordable Housing Access): Collecting and mapping the following information is a challenging task for many communities:
        i. Measure: Describe and map any affordable housing developments— planned, under construction or existing, within ½ mile of the proposed project. This measure requires the applicant to quantify the development stage, number of units, number of bedrooms per unit, and level of affordability using 2019 affordability limits. It also requires information on whether the affordability is guaranteed through funding restrictions (i.e. Low-Income Housing Tax Credit) or is unsubsidized, if housing choice vouchers are/will be accepted, and if there is a fair housing marketing plan required or in place.
        It is important to recognize not all of this information is available (e.g., planned development or units under construction) or can be shared with the general public. Metropolitan Council guidance did not make it clear on what can be shared publicly when responding to the measure, which may have created some inconsistencies in the type of responses and how those responses were scored.
        ii. Measure: Describe how the proposed project will improve or impact access for residents of the affordable housing locations within ½ mile of the project. This should include a description of improved access by all modes, automobiles, transit, bicycle and pedestrian access. Since residents of affordable housing are more likely not to own a private vehicle, more points will be provided to roadway projects that include other multimodal access improvements.

2. Measuring congestion reduction and air quality for the roadway applications is also a time-consuming and difficult to quantify. It requires judgement and analysis from a person with knowledge of traffic engineering and the use of traffic modeling software to develop a valid methodology. This cannot always be done in-house by the applicant (city or county) and typically requires the use of consulting services. This is especially true for projects (e.g., interchanges) that require a more complex approach/methodology.

    Regional Solicitation guidance allows the applicant to develop their own assumptions for measuring congestion reduction, while using approved traffic modeling software (i.e., Synchro). Given the magnitude of assumptions that can be made, the applicant will typically consult with Metropolitan Council staff to verify their assumptions prior to submitting their application. This can significantly slow down the application process and increase the amount of effort required for both the applicant and Metropolitan Council staff.

Question 1b: Are there any specific changes to the Regional Solicitation criteria or requirements that your client communities want to make to the application?

3. Collecting a comprehensive list of housing developments (under Measure B) is cumbersome and the guidance is unclear in how this data will be used in the scoring process. The group felt this measure seemed redundant with other measures that look at the community's housing performance score and the project's proximity to populations and employment centers.
4. The group provided feedback that the public engagement questions are redundant in the 'Equity & Housing Performance' section and 'Risk Assessment' form. It is also unclear how the projects are being scored against one another when the public engagement process and approach can vary greatly from one project to the next.
5. The congestion measure should be reevaluated to determine its ability to effectively measure a project's congestion benefits. Items to consider when reevaluating this measure include:
    a) This measure is not always applicable to certain types of projects. For example, modeling congestion for a new interchange or a project that reduces the roadway's capacity (e.g., four-lane to a three-lane conversion) can be at a disadvantage in terms of modeled congestion, but substantially increase safety along the interchange. Traffic models can produce results that show that these types of projects are making conditions worse. Therefore, a great deal of work is put in by the applicant to develop a methodology that is translated through a traffic model to demonstrate congestion benefits.
    b) Synchro modeling requires some assumptions to be made that vary greatly across project types (e.g., new grade separations, existing at-grade railroad crossings, and various existing traffic controls being improved). The fact that assumption variations exist adds to the cumbersome process of using this approach and further contributes to concerns for fair and transparent scoring of the measure.
    c) Create a new measure that utilizes new data sets (e.g. from the StreetLight© platform) that provide a more current depiction of existing conditions. This may help eliminate the cumbersome process in using synchro models to demonstrate project benefits.
    d) Create a new measure that better aligns with the region's Congestion Management Process (CMP).

Question 1c: Is the Regional Solicitation process clearly understood by applicants (e.g., eligibility, scoring criteria, and selection process)?

6. The 2020 application included new questions pertaining to affordable housing, equity, and public engagement. The group felt it may be unclear how these measures are being scored and the type of projects the Council is trying to fund when using these measures.
7. The applications include a range of measures, which makes it difficult to understand what Regional Solicitation funds are trying to achieve. The number of measures have "watered down" the purpose of Regional Solicitation. Metropolitan Council needs to be more transparent in articulating the type of projects it is trying to fund and how they align with the regional policy plans (e.g., Transportation Policy Plan). For example, if there is a greater emphasis to fund projects that achieve affordable housing and equity goals that should be explicitly noted.
8. Most agencies understand the application process, but are unfamiliar with the reasons behind the criteria and how the measures have been developed/modified over time.
    a. Those who are most familiar with the Regional Solicitation process have prepared applications under multiple Regional Solicitation cycles or have been actively involved with various committees (e.g., Transportation Advisory Committee and the TAC Funding & Programming Committee). Those who are not familiar with the Regional Solicitation process rely heavily on Council staff for information, while others may rely on grant writers (often consultants) to advise them on the process and how to prepare an application.
9. Most questions about the Regional Solicitation process occur after a project has been scored. Applicants are looking for more information on how their project score was determined by each measure and compare it to other submitted projects. This will assist in better understanding what Regional Solicitation is trying to fund and how applicants can improve their applications.
10. First-time applicants or recipients of Regional Solicitation funds are not always aware of the federal requirements tied to federal transportation funds. For example, an awarded project will need to provide some level of environmental documentation under the National Environmental Policy Act (NEPA). This type of documentation is sometimes overlooked. More thorough guidance from the Council on federal requirements would help ensure applicants do not jeopardize funding by failing to submit proper documentation.
11. It is not uncommon for an agency to submit a project based on the direction they've received from their elected boards (e.g., City Council or County Board), regardless of the project's ability to meet grant criteria. This finding may suggest more information on the Regional Solicitation process could be targeted/marketed towards elected officials (e.g., North Metro Mayors Association).

Discussion Item #2: Determine the "before" and "after" conditions for built roadway projects.

Question 2a: How should congestion benefits be measured by the Metropolitan Council?

12. The assumptions used to measure congestion benefits in an application can vary greatly from one project to another. Replicating the methodologies for each project can be difficult to achieve without obtaining the traffic modeling files used in the application. If the files cannot be obtained, it may require a traffic engineer to spend several days to construct a traffic model to replicate "before" conditions. It also requires a certain level of effort to develop new assumptions to model the "after" conditions, which may or may not actually reflect real-world conditions.
13. The group has suggested using StreetLight© data to provide a more accurate picture of "before" and "after" conditions. StreetLight data is an aggregate of location-based service records collected from cellphone providers, which is then used to monitor traffic flows. This data source and its outputs are considered a reliable source for tracking before & after conditions of vehicle traffic. StreetLight data is also expanding its database for bicycle and pedestrian metrics. However, pedestrian and bicycle data are considered to be too new to effectively quantify usage (see Attachment A). More information or discussion is needed to determine how this data can be used and made available to communities for the application process.

Discussion Item #3: Determine if projects that were denied funding through Regional Solicitation were still constructed.

Question 3a: How often are projects still being built without Regional Solicitation funds?

14. As previously noted, some projects are submitted for political reasons.
15. Many agencies rely on the Regional Solicitation as their first source of funding to help advance a project.
16. In many cases, projects not funded via the Regional Solicitation are still being programmed and built. In some cases, these projects are scaled back to reduce costs. This often means the project includes fewer design elements such as landscaping and multimodal components (e.g., trails). These amenities often contribute to a better pedestrian and bicycle experience.

Question 3b: How are communities deciding which projects to submit and if those projects will be competitive in securing Regional Solicitation funds?

17. Communities tend to be strategic in screening projects to determine if they will be competitive for Regional Solicitation funds. Common screening criteria include the project's proximity to populations and housing and if it is part of the RBTN. These measures are perceived to highly influence a project's score and its ability to receive funds.
18. Rural and suburban communities are commonly deciding not to submit projects because they believe they will not be competitive enough against projects from the core cities of Minneapolis and St. Paul based on the scoring criteria (e.g., population, housing, and job density). The group expressed that many rural and suburban communities believe that the Regional Solicitation scoring measures have the effect of prioritizing projects submitted by urban, densely populated communities at the expense of projects in suburban/rural areas.

Discussion Item #4: Determine the barriers that have prevented funded projects from being built on-time or altogether.

Question 4a: What are some common risks for delivering a project that has received Regional Solicitation funding (e.g., local funds, right-of-way, railroad, etc.)?

19. Many communities rely on Regional Solicitation as their first source of funding. Securing the remaining funds may be tied to larger funding initiatives (e.g., bonding and local partnerships) that presents risks in a project being delivered on time. However, very few projects have been withdrawn due to funding shortfalls (see Attachment C).
20. There are no other perceived risks associated with a project being delivered on time. It is assumed most applicants are aware of the project's risks and will not a submit project if it cannot be built within the programmed years.

Question 4b: How can the risk assessment criteria better capture these common risks?

21. Past research has determined that the point value assigned to the risk assessment measure is marginal and does not seem to influence a project's overall score. If this is the case, the group felt that the risk assessment measure may be better suited as qualifying criteria to ensure a project is "shovel ready." This revision could have the additional benefit of helping

Attachment E – Focus Group: Bicycle and Pedestrian Planners & Engineers

Discussion Item #1: Determine how the Metropolitan Council can measure the "Before" and "After" conditions for a built multiuse trail or pedestrian/bicycle facility.

Question 1a: What are some known data sets for measuring before & after bicycle/pedestrian usage?

1. There are limited bicycle/pedestrian usage data sets available to agencies, unless counts are collected by the agency or drawn from past planning or engineering studies.
2. The most reliable data sets for determining bicycle/pedestrian usage are collected in the field by using field staff, portable counters, or traffic cameras.
3. New data sources are becoming available to quantify the number of bicycle/pedestrian users and to pinpoint routes. These data sets are typically collected through people who have opted into mobile applications that track their movement (e.g., fitness applications). One data source is StreetLight© data, which is an aggregate of location-based services (LBS) records collected from cellphone providers.
4. The Metropolitan Council should consider using the Regional Travel Demand Model to demonstrate congestion benefits associated with multiuse trail or pedestrian/bicycle facilities at a regional level, if possible.

Question 1b: What are some of the benefits and challenges in using these data sets for measuring bicycle/pedestrian usage?

5. Collecting bicycle/pedestrian count data is essential in capturing seasonal trends, augmenting manual counts, communicating with stakeholders and the public and much more. This knowledge leads to data-driven decisions that inform project planning and impact the implementation of safer and more convenient walking and bicycling facilities.
    a. Not every community has the resources available to collect bicycle/pedestrian data. If the Metropolitan Council wants to collect before & after data, free resources (e.g., portable counters or access to StreetLight InSight © data) should be readily available to agencies.
    b. MnDOT provides a portable counter borrowing programs. Partner agencies, such as cities, counties, metropolitan planning organizations, regional development commissions, and active transportation advocacy organizations can borrow the automated short-duration counting equipment.
6. Findings from big data sets (e.g., StreetLight©) only capture those who have opted into mobile applications that tract their movement or own a cellphone. Not everyone owns a phone or takes them with during every trip. These data sets are fairly new and are still being beta tested; questions remain about their accuracy in measuring bicycle/pedestrian usage.

Question 1c: What is a reasonable timeframe for collecting before & after data to reflect patterns of use?

7. After data should represent a reasonable time after construction to reflect normalized bicycle/pedestrian usage patterns. One year after the project's opening is a reasonable timeframe.
8. In most cases, pre-construction data is not available because the project does not exist. Establishing a before condition for built projects can result in variety assumptions and methodologies.
9. A before & after analysis should consider the type of facility (e.g., off-road trail vs a bike lane) that can generate different type of users during different times of the day (e.g., recreational vs commuter). Collecting and interpreting before & after condition data should consider these differences.
10. Agencies should be encouraged to collect bicycle/pedestrian counts and submit them as part of their application. Requiring applicants to submit 'before' count information, along with requiring follow-up 'after' counts to Metropolitan Council will hopefully lead to a body of knowledge in a few years that can assist in selecting better projects in the future.
11. If the agency is awarded funds, they should be required to report the after conditions if the Metropolitan Council intends to monitor the before & after conditions of built projects.

Discussion Item #2 Identify ways to improve the "Potential Usage" criteria for the Multiuse Trail and Bicycle Facilities, and Pedestrian Facilities applications (see Question 2 in the application forms).

Question 2a: How can this criteria or methodology be improved?

12. Other factors need to be considered when interpreting the project's score based on its proximity to populations and employment centers. For example, there are critical connections that traverse through areas that cannot be developed (e.g., parks and natural resources areas). The project's location should be looked at more closely for land use constraints, while still measuring its ability to provide regional benefits (e.g., contributing to the RBTN) and provide critical connections to people and jobs a one-mile buffer.
13. In order to improve the "potential usage" criteria, the Metropolitan Council needs to determine the type of projects that will be considered a higher priority. The type of facility (e.g., off-road trail, sidewalk, and bikeways) and location in the region (e.g., urban, suburban, rural) will generate different user groups and types of usage. There needs to be greater transparency in the type of projects and its likely users (e.g., recreational based or commuter) the regional solicitation is trying to fund.

Question 2b: What are other factors (beyond employment and population within 1 mile of the project area) could be considered to better understand potential use of a trail or facility?

14. Consider adding criteria that evaluate a project's ability to improve the user's experience. Projects would be scored based on their ability to implement a low stress/high level of comfort facility suitable for pedestrians, bicyclists, and other non-drivers of all ages and abilities. This type of scoring criteria could also take into consideration the project's design elements to improve the user's safety and comfort level.
15. Additional Census data could be considered as part of the one-mile buffer analysis that looks at the area's household auto ownership (e.g., low vs. high auto ownerships). In theory, projects in an auto-dependent community would receive points if it is working towards a network that provides more options for biking and walking.

Question 2c: How should the criteria be used when measuring projects in different types of environments (e.g., rural vs. suburban vs. urban)?

16. A similar response was provided for Question 2a. The Metropolitan Council needs to be clearer on the type of projects the Regional Solicitation is trying to fund and its alignment with the Transportation Policy Plan (TPP). The type of facility (e.g., off-road trail, sidewalk, and bikeways) and location in the region (e.g., urban, suburban, rural) will generate different user groups and usage. Once this is identified, the criteria should be modified to achieve those objectives.
17. Expand the one-mile project area buffer for rural/suburban communities to be more competitive with urban projects.

Discussion Item #3: Identify ways to simplify and streamline the application process.

Question 3a: Can the application or submittal process be improved?

18. In general, the application and submittal process is easy to understand.
19. Many communities struggled in collecting data to respond to the 'Affordable Housing Access" question, as follows: Describe and map any affordable housing developments— planned, under construction or existing, within ½ mile of the proposed project. The applicant should note the development stage, number of units, number of bedrooms per unit, and level of affordability using 2019 affordability limits. Also note whether the affordability is guaranteed through funding restrictions (i.e. LIHTC, 4d) or is unsubsidized, if housing choice vouchers are/will be accepted, and if there is a fair housing marketing plan required or in place.

    a. Collecting a comprehensive list of housing developments was cumbersome and it is unclear ow this data was going to be used in the scoring process. This measure seemed redundant when considering other measures that look at the community's housing performance score and the project's proximity to populations and employment centers.

Question 3b: Is the Regional Solicitation process clearly understood by applicants (e.g., eligibility, scoring criteria, and selection process)?

20. The Metropolitan Council needs to be more transparent in articulating the type of projects it is trying to fund and how they align with the TPP. For example, if there is a greater emphasis in funding projects that contribute to the Regional Bicycle Transpiration Network (RBTN) or housing goals that should be explicitly noted.
21. Most applications are building for bicycles and pedestrians. Some applicants are connecting to transit amenities, so they can be 'multi-modal,' but often there isn't clear guidance on how applicants should respond. By nature, these networks are already multi-modal.
22. It is not clear how the affordable housing access and community engagement scores are being determined. The Council should consider adding transparency to how these measures are scored.

Discussion Item #4: Determine if projects that were denied funding through Regional Solicitation were still constructed.

Question 4a: How often are projects still being built without Regional Solicitation funds?

23. It is unclear if projects are still being built; however, it is clear that there is a lack of funding for all types of projects. This may account for the number of applications being submitted for federal funds.

Question 4b: How are communities deciding which projects to submit and if those projects will be competitive in securing Regional Solicitation funds?

24. In most cases, community priorities have been identified as part of a robust planning effort (e.g., comprehensive plans or community-wide transportation or pedestrian/bicycle system plans). These priorities may provide regional benefits and address critical needs in the community, but do not align with regional goals (e.g., the RBTN). This presents challenges in selecting projects to submit for federal transportation funds.
25. Some communities perceive the only way they can be competitive for federal transportation funds is if their project is part of the RBTN and within an urban setting. This has resulted in some communities being reluctant to apply for funds.
26. There are examples were projects are being submitted for political purposes, regardless of their perceived competitiveness.
27. Federal transportation funds are primarily dedicated to roadway projects. Therefore, communities are looking for ways to package together bicycle/pedestrian projects with roadway projects to compete in other funding categories (e.g., roadway expansion and modernization).

Discussion Item #5: Determine barriers that have prevented funded projects from being built on-time or built altogether.

Question 5a: What are some common risks for delivering a project that has received Regional Solicitation funding (e.g., local funds, right-of-way, railroad, etc.)?

28. There are no common risks that have been identified that would prohibit a bicycle/pedestrian project from being built.
29. Projects involving multiple jurisdictions (i.e., city, county and state) can sometimes be delayed when there are conflicts between varying design standards.

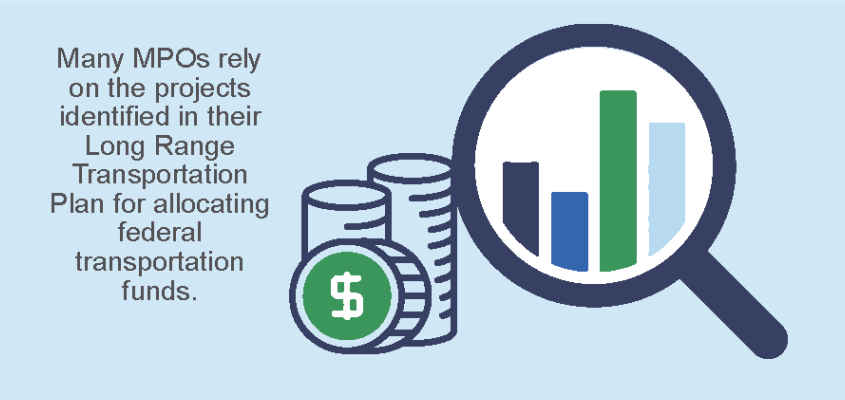
Question 5b: How can the risk assessment criteria better capture risks that will increase the likelihood that projects will withdraw at a later date?

30. In general, there is little perceived risk associated specifically with bicycle/pedestrian projects and there is no reason to modify the risk assessment criteria.

Attachment F – Bike and Pedestrian Usage Measure

Peer Review

A peer review was conducted to determine how other MPOs measure pedestrian/bicycle usage as part of their regional solicitation processes. To remain consistent, the MPOs selected for this Phase II peer review mirror those chosen for the Phase I study. The Phase I study identified three common approaches used by the MPOs to select projects for federal transportation funds. These approaches are important to understand when reviewing the Phase II peer review findings.



- **Long-Range Transportation Approach:** In this approach, a larger emphasis is placed on projects that have been identified in the MPO's long-range transportation plans. In most cases, these plans have gone through an extensive process to determine regional needs based on a number of factors (e.g., congestion, safety, and multimodal goals). The end result is a program of transportation investment priorities that have been vetted through a public engagement and approval process. This approach generally mirrors how the Regional Bicycle Transportation Network (RBTN) was developed.

  The list of priorities in the long-range transportation plan is used to inform the allocation of federal transportation funds. The allocation of funds is typically reviewed by a scoring committee or a formal review committee. In some cases (e.g., Dallas), a pot of funding is reserved for smaller projects through a separate solicitation process.
- **Geographic Distribution Approach:** Several MPOs use a funding formula that allocates federal transportation funds to sub-regions or priority areas. In general, the sub-regions are responsible for developing a list of priority projects for the MPOs approval. The sub-regions are encouraged to work together with the MPO to prioritize the list of projects that best serve regional needs. It is important to recognize there are potential hurdles at the state and federal level in using a "geographic distribution" approach in the allocation of federal transportation funds. The MPOs that have embraced this approach have typically passed special legislation that directly link investments to priority areas or goals.
- **Traditional Approach:** This is a "call for proposals" process similar to the Metropolitan Council's process. Projects that are selected for funding are still closely linked to regional goals and priorities identified in their regional policy plans or long-range transportation plans.

There are many different mechanisms that influence how an MPO distributes federal transportation funds. Influencing factors can range between their funding formulas, the amount of available funds, regional policies/priorities, or even state legislation that dictates how funds are appropriated. The Phase I study articulated these differences in greater detail. These different mechanisms have also influenced how an MPO scores and selects bicycle/pedestrian projects.

For the purpose of this study, a brief description of the peer MPOs' processes for allocating federal transportation funds is provided for context. The Phase II Peer Review primarily focused on the MPOs process for scoring and selecting bicycle/pedestrian projects, specifically looking at usage criteria.

North Carolina Capital Area Metropolitan Planning Organization (CAMPO): Raleigh, NC

CAMPO's project prioritization begins with the development of the region's Metropolitan Transportation Plan (MTP), which includes processes for project evaluation, prioritization, and selection for inclusion in the MTP. As such, inclusion in the MTP is a fundamental requirement for projects submitted by CAMPO into the Strategic Prioritization Process. The MTP project prioritization process includes quantitative criteria such as: delay reduction (travel time savings), cost-benefit/payback period calculations, multimodal network impacts, user benefits, safety, and environmental impacts, as well as qualitative criteria such as inclusion in local transportation plans, local priority, and coordination with regionally significant economic development projects.

CAMPO's solicitation process includes bicycle/pedestrian usage criteria that is scored based on the project's proximity to populations and activity centers. Projects are awarded additional points by taking the project's effectiveness score and dividing it by the project cost to determine its benefit/cost. The project's effectiveness score is based on the following factors:

- **Missing Link:** Both sides connect to existing bicycle/pedestrian facility.
- **Overcoming an Obstacle:** Project must create the crossing, not improve an existing crossing.
- **Connections:** The project is 0.25 mi to another mode/greenway or activity center (e.g., school, parks/rec, government facility, shopping center, high density res, etc.).
- **Proven Demand:** Serves a footpath (residential collector or higher) and within +/- 0.25 mile of existing or proposed transit service.

Other scoring factors include system connectivity, equity goals, reducing barriers, and access to destinations.

Denver Regional Council of Governments (DRCOG): Denver, CO

DRCOG has recently updated its process for determining what projects should be included in the Transportation Improvement Plan (TIP). This "dual model" process provides an opportunity to fund local priority projects, in addition to regional priority projects. DRCOG has also shifted away from a standard solicitation process. The new dual approach splits available funds into two allocations: a regional share and a sub-regional share (eight regions total). For both shares, a sub-regional forum is responsible for submitting projects, programs or studies for consideration by the DRCOG Board.

The DRCOG uses several scoring factors to determine a project's anticipated impact on pedestrian and bicycle usage:

- **Pedestrian Use**
  - Current weekday users.
  - Population and Employment within one mile for the year 2020 and 2040.
- **Bicycle Use**
  - Estimated additional weekday bicycle/pedestrian one-way trips on the facility after project is completed (opening year and 2040 estimate).
  - Estimated bicycle/pedestrian trips that will be diverted from different bicycle routes (on and off route facilities).
  - Number of bicycle/pedestrian trips produced that are replacing Single Occupancy Vehicle (SOV) trips.
  - Pounds of Green House Gas (GHG) emission reduced.

Metro Portland: Portland, OR

Metro's transportation funding process is known as the Regional Flexible Funds Allocation (RFFA). Three sets of policies help shape how Metro decides to allocate regional flexible funds each cycle:

1. Conditions attached to each of the federal funding sources.
2. Policies in the current Regional Transportation Plan and other key plans like the Regional Active Transportation Plan, the Regional Climate Smart Strategy, and Metro's Climate Change Action Plan.
3. Priorities specific to each flexible funding cycle, set by the Joint Policy Advisory Committee on Transportation and the Metro Council. Policy priority areas identified in the 2018 Regional Transportation Plan include advancing social equity, improving safety, implementing climate change strategies, and congestion mitigation.

Projects are primarily scored based on their ability to address the priority areas identified in the Regional Transportation Plan (i.e., social equity, safety, climate change, and congestion.) Metro Portland's solicitation process does not include any quantitative measures to determine a project's bicycle/pedestrian usage. Questions are open ended. The most direct question that pertains to bicycle/pedestrian usage includes a question on how a project will reduce vehicle trips or Vehicle Miles Traveled (VMT).

Metropolitan Transportation Commission (MTC): San Francisco, CA

The One Bay Area Grant Program (OBAG) is California's federal transportation program, which aligns with the state's climate laws and the Sustainable Communities Strategy by targeting funding to Priority Development Areas (PDAs), Priority Conservation Areas (PCAs), and climate initiatives while maintaining commitments to existing transportation priorities.

Before projects are ever identified in the MTP or the TIP they have gone through several iterations of review and refinement. Ideas for projects first emerge through planning efforts at the jurisdictional, transit operator, and regional levels. Some of the primary sources for projects are the county congestion management programs, countywide transportation plans, transit operator short-range transit plans or similar transit capital and service planning efforts, and the state highway planning process. These local and sub-regional planning efforts are then prioritized at a regional level through the long-range transportation plan.

Based on this process, there is no specific scoring criteria used to determine bicycle/pedestrian usage.

Southeast Michigan Council of Governments (SEMCOG): Detroit, MI

SEMCOG has partnered with its member governments to establish Federal-Aid Committees (FACs). There are eight FACs, one for each of SEMCOG's seven member counties and one for the City of Detroit. Each FAC is responsible for recommending a list of projects for the four-year TIP period based on regional policies, local needs, and funding constraints. Once this list of recommended projects is prepared, it is forwarded to SEMCOG for review, with approval from SEMCOG's Executive Committee. Projects submitted for the TIP are first reviewed for consistency with the 2040 Regional Transportation Plan's (RTP) project list, outcomes, and performance measures.

Scoring criteria is not available at this time. SEMCOG's most recent application deadline was October 14, 2020. Past criteria have not included bicycle/pedestrian usage measures. Instead, applicants must provide a written response on how their project will "promote a holistic and regional significant outcome" that aligns with SEMCOG's vision and 2045 RTP Guiding Principles, national Transportation Performance Measures, and regional plans. In general, projects are selected based on the following:

- Extend or enhance regional bicycle and pedestrian networks, corridors, and trails.
- Improve pedestrian access to public spaces, core services, and quality of life amenities.
- Utilize green infrastructure to improve the quality of water, air, and wildlife.
- Attract people to commercial areas and community amenities, such as downtowns, parks and civic centers.
- Implement complete streets principles that accomplish multiple outcomes, including traffic calming, increased safety, and promoting pedestrian and bicycle travel.

New York Metropolitan Transportation Commission (NYMTC): New York, NY

NYMTC maintains three geographically defined Transportation Coordinating Committees (TCCs): New York City, Long Island and the lower Hudson Valley. The TCCs function as localized planning forums in recommending projects for inclusion in the NYMTC TIP. Each TCC is allocated funds and can make amendments/administrative modifications to the TIP.

Project nomination and selection mostly comes at sponsor agency level. Based on this process, there is no specific bicycle/pedestrian criteria used in the selection process. Bicycle/pedestrian projects vary in nature but typically address congestion mitigation, air quality improvement, travel alternatives and inter-modal connectivity with other modes.

North Central Texas Council of Governments (NCTCOG): Dallas, TX

NCTCOG has moved away from a formal call for projects by solely focusing on priority projects identified in the long-range transportation plan. The list of projects is further prioritized based on urgency. This process has worked well for funding major projects (e.g., roads and transit), but has been less effective in funding smaller projects (e.g., intersection improvements) that provide low-cost/high-benefit solutions.

A “call for proposals” is still used for allocation of Transportation Alternative (TA) funds. Eligible projects under this call include on- and off-road pedestrian and bicycle facilities, shared-use paths, and related pedestrian and bicycle safety countermeasures.

Projects must demonstrate their ability to implement a low stress/high comfort facility suitable for pedestrians, bicyclists, and other non-drivers of all ages and abilities (see Attachment D). A low stress/high comfort facility is considered a wide sidewalk (minimum 5 feet in width) for pedestrians or a minimum 10 to 14 foot wide off-street shared-use path for both pedestrians and bicyclists, separated/protected bike lanes, or on-street bike lanes with a suitable design for bicyclists based on the context of the project location (e.g. projected traffic volumes, speeds, adjoining land uses, etc.). The project’s design must be consistent with relevant design guidelines and resources including AASHTO, NACTO, ITE, FHWA, and TxDOT.

Applicants must also address the following factors through a written narrative:

- Implements projects in areas with a high density of short trips by motor vehicles.
- Provides seamless connections to destinations and reduces barriers.
- Generates a high volume of people bicycling and walking in lieu of motor vehicle trips.
- Implements safety countermeasures that will improve safety at mid-block or intersection crossings, such as bicycle facilities.

Level of Traffic Stress (LTS) Analysis – Scoring Criteria Example

North Central Texas Council of Governments (NCTCOG): Dallas, TX

Safety and Design Improvements (4 points)

Safety and design improvements can improve stress levels for bicyclists and comfort levels for pedestrians. Examples of safety and design improvements include: at-grade rail crossing improvements, bulb-outs, speed humps, raised refuge islands/medians, sidewalk/roadway buffer on roads at 35 mph and over, reduced curb radii, etc. Projects can earn up to four points for incorporating safety measures. Points assigned based on the application of countermeasure(s) and the speed, volume, and configuration of the roadway. For example: one bulb-out alone along a corridor may provide minimal safety whereas providing multiple bulb-outs in combination with other traffic calming strategies may provide optimal safety conditions for people walking and/or biking.

- **4 points:** High speed/volume corridor (e.g., arterial or major collector) and project incorporates extensive safety measures to reduce modal conflicts.
- **2 points:** Low speed/volume corridor (e.g., minor collector or local) and project incorporates extensive safety measures to reduce modal conflicts.
- **1 point:** Project incorporates minimal safety measures.
- **Zero points:** Project does not incorporate safety measures.

Pedestrian-Scale Lighting (1 point)

Pedestrian-scale lighting can increase comfort, security, and safety. Projects can earn one point for including pedestrian-scale lighting. Note: overhead cobra-head lamps provide baseline standards for lighting the sidewalk, but this type of lighting does not enhance pedestrian safety.

- **1 point:** Project includes pedestrian-scale lighting along pedestrian/bicycle facility.
- **Zero points:** Project does not include pedestrian-scale lighting.

Crossing Treatments (4 points)

Design for intersections should reduce conflict between pedestrians/bicyclists and vehicles by heightening the level of visibility and indicating a clear right-of-way. Examples of crossing treatments include: pedestrian countdown timers, high visibility crosswalk markings and signs, raised crosswalks, Rectangular Rapid Flash Beacon (RRFB), Pedestrian Hybrid Beacon (PHB), bicycle intersection crossing markings, etc. Pedestrian and bicycle projects must have logical termini. Projects can earn up to four points for incorporating crossing treatments. Points are assigned depending on the application of countermeasure(s) and the speed, volume, and configuration of the roadway. For example: for a four-lane roadway with an AADT exceeding 9,000 at 40 mph, a marked midblock high visibility crosswalk alone is insufficient and the treatment should occur in conjunction with other substantial crossing improvements.

- **4 points:** High speed/volume corridor (e.g., arterial or major collector) and project incorporates extensive crossing treatments at intersections or uncontrolled locations.
  - 2 points: Low speed/volume corridor (e.g., minor collector or local) and project incorporates extensive crossing treatments at intersections or uncontrolled locations.
  - 1 point: Project incorporates minimal crossing treatments at intersections or uncontrolled locations.
- **Zero points: No crossing treatments where warranted.**

East-West Gateway Council of Governments (EWG COG): St. Louis, MO

EWG COG is a bi-state MPO. Projects identified in the TIP for federal transportation funds are prioritized and must be consistent with the EWG COG's priorities. In general, projects are prioritized at the state level by the DOTs from the two states. The DOTs are viewed as the technical advisors in selecting projects. The EWG COG generally does not select projects. Instead, the EWG COG works with the DOTs to ensure the projects are consistent with the long-range transportation plan. New ideas or projects may be submitted to the DOTs for consideration; however, no formal application process is in place.

Larger emphasis is placed on bicycle/pedestrian projects that incorporate a design/facility type (e.g., off- road trail) that enhances the pedestrian and bicyclist level of comfort. For example, does the project implement a low stress/high level of comfort facility suitable for pedestrians, bicyclists, and other non-drivers of all ages and abilities? For purposes of their application, a low stress/high comfort facility is considered a wide sidewalk (minimum 5 feet in width) for pedestrians or a minimum 10-14 foot wide off-street shared-use path for both pedestrians and bicyclists, separated/protected bike lanes, or on street bike lanes with a suitable design for bicyclists based on the context of the project location (e.g. projected traffic volumes, speeds, adjoining land uses, etc.). Such project design must be consistent with relevant Design Guidelines and resources including AASHTO, NACTO, ITE, FHWA, and TxDOT.

Level of Traffic Stress (LTS) Analysis – Scoring Criteria Example

East-West Gateway Council of Governments (EWG COG): St. Louis, MO

Pedestrian facilities with a high level of comfort will earn points under these criteria:

- **24 points:** Project corrects existing sidewalk deficiencies (deficiencies = fair/poor sidewalk conditions, existing width < 5', cross slopes > 2%, etc.) or new 5' (min) sidewalks (residential) or 8' (min) sidewalks (commercial) on both sides of road.
- **16 points:** Project corrects existing sidewalk deficiencies (deficiencies = fair/poor sidewalk conditions, existing width < 5', cross slopes > 2%, etc.) or new 5' (min) sidewalks (residential) or 8' (min) sidewalks (commercial) on one side of COLLECTOR or LOCAL road.
- **14 points:** Project corrects existing sidewalk deficiencies (deficiencies = fair/poor sidewalk conditions, existing width < 5', cross slopes > 2%, etc.) or new 5' (min) sidewalks (residential) or 8' (min) sidewalks (commercial) on one side of ARTERIAL road.
- **Zero points:** Project does not satisfy the above.

Active transportation projects can include pedestrian facilities, bicycle facilities, or both. If a sponsor proposes both pedestrian and bicycle facilities, the scores for each facility type will be averaged. Pedestrian facilities with a high-level of comfort will earn points under this metric:

- **24 points:** Physically protected bike lanes or 10' to 14' shared-use path (minimum); OR 16 points for 8' to < 10' shared-use path.
- **18 points:** Buffered bike lanes on roads at 40 mph or less; OR 14 points for buffered bike lanes on roads at 45 mph.
- **16 points:** Bicycle boulevard incorporating directional markings and wayfinding signage on roads at 25 mph or less.
- **12 point**s: Conventional bike lanes on roads at 30 mph or less; OR 6 points for conventional bike lanes on roads at 35 mph.
- **Zero points:** Project does not satisfy the above OR project proposes a high-stress bicycle facility (zero points will be included in facility type average).

Other scoring factors include system connectivity, safety benefits, pedestrian-scale lighting, and access to destinations (e.g., environmental justice areas, cultural destinations, transit, schools and community resources).

Baltimore Metropolitan Council (BALTOMETRO): Baltimore, MD

The selection process is strongly influenced by the state and region's long-range planning documents. The TIP is a translation of recommendations from the BALTOMETRO Maximize2040 and the State Consolidated Transportation Program. Both plans include a list of specific capacity improvements, system preservation projects, and operational initiatives.

The TIP is updated on an annual basis in January with approval in July. BALTOMETRO holds an open call for new projects, which lasts about a month and a half. BALTOMETRO works with sponsors to make sure information is accurate and consistent with regional plans. The list of requests is fairly minimal based on the long-range planning process used to identify regional needs in Maximize2045 and the State Consolidated Transportation Program. New requests are considered and must address the following factors:

- **Accessibility:** Degree to which a project delivers safety and accessibility benefits for all modes of transportation (e.g., ADA improvements and improved bike facilities).
- **Proximity:** The projects population (per mile benefit) to the total population and Environmental Justice (EJ) population.
- **Economic Prosperity:** Points are assigned depending on the project's location relative to Priority Funding Area (PFA).
- **Economic Prosperity:** Points are assigned depending on the project location relative to Sustainable Community.

Puget Sound Regional Council (PSRC): Seattle, WA

At the start of each funding cycle, the PSRC's Executive Board adopts a Policy Framework to guide the selection of projects that support the region's growth strategy and transportation plan. Regionally significant projects must be explicitly listed in the regional long-range plan before being listed in the TIP and are subject to further review before they can proceed to implementation. Regional significance is currently defined as a major capacity investment on the Metropolitan Transportation System (MTS), and applies to all modes including public transportation projects.

Each project undergoes a comprehensive review by PSRC staff to ensure it meets the following requirements:

- Projects must be in, or be consistent with, the region's long-range metropolitan transportation plan.
- Projects must demonstrate that the funds being programmed are secured or there are reasonable expectations to acquire those funds.
- If an existing or proposed roadway project is using federal funds, the roadway must also be part of the federally classified roadway system.
- Projects are also evaluated to determine if they are incorporated in the current air quality conformity finding; projects cannot be included in the TIP until this step has been completed. The modeling for air quality conformity of the TIP occurs once a year, during the annual update to the TIP.

New projects are submitted through an application process. The application process includes questions that pertain to bicycle/pedestrian usage:

- Describe the current bicycle/pedestrian usage in the project area. If known, provide information on the shift from single occupancy vehicles.
- What is the expected increase in bicycle/pedestrian usage from the project? If known, provide information on the shift from single occupancy vehicles
- What is the average bicycle trip length?
- What is the average pedestrian trip length?

Attachment G – Crash Modification Factor Guidance

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MEMORANDUM

Date: December 16th, 2020

To: Derek Leuer, P.E. -MnDOT

From: Ross Tillman, P.E.

Chloe Weber, EIT

Subject: Regional Solicitation Before and After Study Phase II: HSIP CMF Guide
Project No.: T41.121214

Depending on staffing at various agencies who may apply for HSIP funds, the level of expertise in terms of safety analysis widely varies. In addition, there are times when two applications for a similar project will utilize different CMFs with varying levels of anticipated crash reductions. Based on these factors, there is a desire to simplify the process as well as consolidate a list of CMFs for use to the extent possible. Certain projects will always require further research and analysis using the Highway Safety Manual or CMF Clearinghouse, but a simple guide could satisfy the needs for most other projects.

Our team began by collecting the 2016 and 2018 HSIP project information. Frequency of CMFs utilized was determined as a starting point to understand which CMFs to include in an overall guide. See **Table 1**.

Table 1: CMFs applied per category, from 2016 and 2018 application data

CMF Applied per Category											
Lighting Improvement or Installation	Frequency	Roundabout Improvement or Construction	Frequency	Signal Improvements or Construction	Frequency	Turn Lane Construction	Frequency	Pedestrian Improvements	Frequency	Roadway Construction	Frequency
578	5	227	3	1414	3	3948	2	175	3	8111	1
192	1	228	3	1419	1	3950	1	4123	3	1967	4
193	1	229	1	1420	6	253	1			6942	1
433	3	207	1	1428	4	255	3			2265	3
		211	1	1485	3	268	2			2276	3
		230	1	2334	2	272	2			2841	2
		206	4	1993	3	287	2			6703	2
		210	1	4140	1	583	1			1516	1
		225	1	4177	3	8431	1				
		4699	1	8790	1						
		4700	2	5272	6						
		4927	1	6858	2						
				7684	3						
				7690	3						
				3072	1						
				8824	2						

Ultimately, the team incorporated all the used CMFs into the guide based on relevancy and overall effort. This information was sorted by CMF to include and compare the details of the CMFs used in those years' HSIP applications. These details include the value of the CMF, the standard error, if it is listed in the HSM, the star rating, crash type, and crash severity. These details differentiate one CMF from the next and allow applicants to find the CMF that best fits the scenario of the project being applied for. From

there, counterpart CMFs (rural vs. urban, for example) were added from the CMF Clearinghouse to round out the options one might want to consider when choosing a CMF for an HSIP application. The guide was split into two parts to differentiate between CMFs that apply to all/property damage only crashes and those that are focused on injury crashes only.

Lastly, the team developed a simple step by step list for use of the guide and application of CMFs, intended to go along with the guides in future HSIP applications as an attachment. This list walks users through the categories in the guide, as well as highlights specific measures to be aware of when choosing a CMF for a project.

Steps for using the CMF guides and applying CMFs:

1. Look through the project types and sub-types that may be applicable to the project
2. Consider additional qualifiers that may help fit the CMF to the project (often, these are existing conditions of what is to be improved)
3. Choose which area type the project exists in (Urban, Rural, Suburban, etc.)
4. Consider the crash types and crash severities
5. Select a CMF for use that best fit the project as well as context of the area. Some projects may require the use of multiple CMFs to best represent the improvements, although the use of more than two is not recommended for most HSIP projects
6. Ensure you are applying the CMF to the correct crash severities and types. CMFs that cover all severities and types should be used with caution
7. Ensure that the crashes utilized match the timeframe/conditions of the application. Use whole calendar years

See the attached CMF guide information which could be appended to future HSIP solicitation packets.

CMF Guide (All-Severity and Property Damage Only Crashes)

Project Type	Additional Qualifiers	Area Type	CMF	Value	Adjusted Standard Error	Star Rating	In HSM?	Crash type	Crash Severity
Pedestrian									
Median Construction	Marked, Uncontrolled Pedestrian Crossing	Urban/Suburban	175	0.54	0.48	3	No	Veh/Ped	All
Median Construction	Uncontrolled Pedestrian Crossing, Marked or Unmarked	Urban/Suburban	8800	0.742	NA	4	No	All	All
High Visibility Crosswalk	High Visibility Crosswalk	Urban	4123	0.6	NA	2	No	Veh/Ped	All
Install Shared Path	No Share Path Present	Urban	9250	0.75	NA	3	No	Veh/Bicycle	All
Install Bike Lanes	No Bike Facilities Present	Urban	2159	1.05	NA	3	No	All	All
Install Bike Lanes	No Bike Facilities Present	Urban	4658	0.855	NA	3	No	Veh/Ped	All
Reduced Conflict Intersections*									
RCUT	Previously Signalized or Stop Controlled	All	10382	0.8	NA	4	No	All	All
RCUT	Previously Two Way Stop Controlled	All	10384	0.42	NA	4	No	All	All
J-Turn	Previously Two Way Stop Controlled	Rural	5555	0.652	NA	4	No	All	All
Intersection									
Turn Lane	Install Left Turn Lane	Urban	3950	0.8	NA	3	No	All	PDO
Turn Lane	Install Left Turn Lane	Rural	7853	0.69	NA	2	No	All	All
Turn Lane	Left Turn Lane on One Major Approach	Rural	253	0.56	0.07	4	Yes	All	All
Turn Lane	Left Turn Lane on Both Major Approaches	Rural	268	0.52	0.04	5	Yes	All	All
Turn Lane	Two Way Left Turn Lanes	Rural	583	0.64	0.04	5	No	All	All
Turn Lane	Improve Angle of Channelized Right Turn Lane	Not Specified	8431	0.937	0.397	4	No	Right Turn, Other	All
Single Lane Roundabout	Originally Stop Controlled	All	227	0.56	0.05	5	Yes	All	All
Single Lane Roundabout	Originally Stop Controlled	Rural	229	0.29	0.05	5	Yes	All	All
Single Lane Roundabout	Originally Stop Controlled	Rural	207	0.42	0.13	4	No	All	All
Single Lane Roundabout	Originally Stop Controlled	Urban	206	0.28	0.11	4	No	All	All
Single Lane Roundabout	Originally Signalized, Stop Controlled, and Non-Controlled	Rural	9333	0.48	NA	3	No	Other	All
Single Lane Roundabout	Originally Signalized	All	225	0.52	0.06	4	Yes	All	All
Single Lane Roundabout	High Speed	Rural	4699	0.26	NA	4	No	All	All
Multi-Lane Roundabout	Originally No Control, Yield, TWSC, AWSC, or Signal Control	All	4926	1.062	NA	4	No	All	All
Signal Head	Add Signal (Additional Primary Head)	Urban	1414	0.72	NA	3	No	All	All
Signal Head	Add Signal (Additional Primary Head)	Urban	1419	0.65	NA	2	No	Angle	All
Signal Head	Add Signal (Additional Primary Head)	Urban	1416	0.69	NA	3	No	All	PDO
Signal Head	Convert Signal From Pedestal-Mounted to Mast Arm	Not Specified	1420	0.51	NA	3	No	All	All
Signal Head	Convert Signal From Pedestal-Mounted to Mast Arm	All	1428	0.26	NA	3	No	Angle	All
Signal Head	Add Signal (One Over Each Approach Lane)	Urban	1485	0.54	NA	2	No	Angle	All
Signal Head	Replace 8" Red with 12"	Not Specified	2334	0.97	NA	3	No	All	All
Signal Phasing	Leading Pedestrian Interval	Urban	1993	0.413	NA	3	No	Veh/Ped	All
Intersection Traffic Control	Change Permissive Left to Protected or Protected/Permissive	Urban	4140	0.58	NA	2	No	All	All
Intersection Traffic Control	Change Protected/Permissive to Flashing Yellow Arrow	Urban	4177	0.806	NA	4	No	Left Turn	All
Intersection Traffic Control	Install Pedestrian Countdown Timer	Not Specified	8790	0.912	NA	4	No	All	All
Intersection Traffic Control	Install Pedestrian Countdown Timer	Not Specified	5272	0.3	NA	4	No	Veh/Ped	All
Intersection Traffic Control	Install Adaptive Traffic Signal Control	Urban/Suburban	6858	0.79	NA	4	No	All	All
Intersection Traffic Control	Change from Permissive Only to Flashing Yellow Arrow	Not Specified	7684	0.598	NA	2	No	Left Turn	All
Intersection Traffic Control	Change from Protected Only to Flashing Yellow Arrow	Not Specified	7690	0.901**	NA	4	No	All	All
Intersection Traffic Control	Change Number of Traffic Signal Cycles Per Hour on Arterial with Signal Coordination From X to Y	Urban/Suburban	3072	e^-0.0444(Y-X)	NA	3	No	Rear End	All
Advanced Technology and ITS	Install Red-Light Indicator Lights	Not Specified	8824	0.713	NA	4	No	Other	All
Access Management	Create Directional Median Openings to Allow Left-Turns and U-Turns	Not Specified	1516	0.49	NA	2	No	All	All
Roadway									
Lighting	Illumination	Not Specified	496	0.69	0.36	3	No	All	PDO
Lighting	Highway Lighting	All	193	0.83	0.07	4	Yes	Nighttime	PDO
Wet-Reflective Pavement Markings	Previously Standard Markings	Not Specified	8111	0.538	NA	4	No	Run Off Road	All
Median	Install Cable Median Barrier (High Tension)	Not Specified	1967	0.04	0.06	3	No	Cross Median, Frontal and Opposing Direction Sideswipe, Head On	All
Install Centerline and Shoulder Rumble Strips	No Existing Rumble Strips	Rural	6942	0.653	NA	4	No	All	All
Improve Pavement Friction	Increase Skid Resistance	All	2265	0.589	0.216	3	No	All	All
Improve Pavement Friction	Increase Skid Resistance	All	2276	0.304	0.086	3	No	Rear End	All
Road Diet	Previously Four Lane Undivided	Suburban	2841	0.53	NA	4	No	All	All
Road Diet	Previously Four Lane Undivided	Urban	5553	0.748	NA	4	No	All	All
Shoulder Treatments									
Widen Shoulder	Previously Narrow Paved Shoulder	Rural	6703	0.67	NA	4	Yes***	Fixed Object, Head on, Run Off Road, Sideswipe	PDO

*Minnesota study underway

**Results in Minnesota have indicated an increase in crashes

***See section 13.4.2.4 in the HSM for additional shoulder CMF information

CMF Guide (Injury Crashes)

Project Type	Additional Qualifiers	Area Type	CMF	Value	Adjusted Standard Error	Star Rating	In HSM?	Crash type	Crash Severity
Pedestrian									
Median Treatment for Ped/Bike Safety	Install Various Treatments Such as Fencing, Planters, Pedestrian Islands	Urban	9121	0.91	NA	4	No	All	K, A, B
Install Sidewalk	No Exisitng Sidewalk	Urban	9240	0.41	NA	2	No	Veh/Bicycle	K, A
Install Bike Lanes	No Bike Facilities Present	Urban	4660	0.946	NA	3	No	All	K, A, B, C
Reduced Conflict Intersections*									
J-Turn	Previously Two Way Stop Controlled	Rural	5559	0.14	NA	2	No	All	A
Intersection									
Turn Lane	Install Left Turn Lane	Urban	3948	0.79	NA	3	No	All	K, A, B, C
Turn Lane	Install Left Turn Lane	Rural	7852	0.73	NA	3	No	All	K, A, B, C
Turn Lane	Left Turn Lane on One Major Approach	Rural	255	0.45	0.1	4	Yes	All	K, A, B, C
Turn Lane	Left Turn Lane on Both Major Approaches	Rural	272	0.42	0.04	5	Yes	All	K, A, B, C
Turn Lane	Right Turn Lane on One Major Approach	All	287	0.77	0.08	4	Yes	All	K, A, B, C
Lighting	Provide Intersection Illumination	Not Specified	433	0.62	0.13	4	Yes	Nighttime	A, B, C
Single Lane Roundabout	Originally Stop Controlled	All	228	0.18	0.04	5	Yes	All	A, B, C
Single Lane Roundabout	Originally Stop Controlled	Rural	211	0.18	0.16	4	No	All	A, B, C
Single Lane Roundabout	Originally Stop Controlled	Rural	230	0.13	0.04	5	Yes	All	A, B, C
Single Lane Roundabout	Originally Stop Controlled	Urban	210	0.12	0.14	4	No	All	A, B, C
Single Lane Roundabout	High Speed	Rural	4700	0.11	NA	4	No	All	A, B, C
Multi-Lane Roundabout	Originally No Control, Yield, TWSC, AWSC, or Signal Control	All	4927	0.367	NA	4	No	All	K, A, B, C
Single or Multi-Lane Roundabout	Originally TWSC	All	4931	0.65	NA	4	No	All	K, A, B, C
Roundabout	Originally AWSC	All	4933	0.544	NA	3	No	All	K, A, B, C
Low Speed Roundabout	Originally No Control, Yield, TWSC, AWSC, or Signal Control	All	5228	0.473	NA	4	No	All	K, A, B, C
Roadway									
Lighting	Illumination	Urban	578	0.69	0.07	4	No	All	A, B, C
Lighting	Illumination	All	571	0.31	0.36	3	No	All	K
Lighting	Highway Lighting	All	192	0.72	0.06	4	Yes	Nighttime	A, B, C
Median	Install Cable Median Barrier (High Tension)	Rural	8214	0.47	NA	3	No	Other	K, A
Shoulder Treatments									
Widen Shouler	Previously Narrow Paved Shoulder	Urban	6705	0.74	NA	3	No	Fixed Object, Head on, Run Off Road, Sideswipe	A, B, C

*Minnesota study underway

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