

The logo for TrafficIQ WARRANTS, featuring a stylized grid of orange and green dots to the left of the text "TrafficIQ" in a large, bold, sans-serif font, with "WARRANTS" in a smaller, all-caps, sans-serif font below it.

FULL USER GUIDE

Signal Warrants · Multi-Way Stop Control · AWSC
Signalized LOS · TWSC · Multimodal LOS

Version 1.0

Introduction

This document describes how to use TrafflQ, Rhythm Engineering's web-based intersection analysis platform, to run traffic control warrant analyses and intersection level-of-service (LOS) analyses from turning movement count (TMC) data. It is intended for traffic professionals engaged in evaluating intersection control in their jurisdiction.

TrafflQ implements the signal warrant procedures of MUTCD 11th Edition Chapter 4C (all nine warrants), the Multi-Way Stop Control warrants of MUTCD Sections 2B.12–2B.17, and the Highway Capacity Manual 7th Edition intersection procedures for signalized (Chapter 19), two-way stop (Chapter 20) and all-way stop (Chapter 21) control, along with a multimodal roll-up across auto, pedestrian, bicycle and queue-storage results. This guide walks click by click from creating projects and loading count data through running each analysis module, interpreting its results, and generating and sealing the resulting reports. The formulas and thresholds each module applies are summarized in the module chapters, exactly as documented in the application's methodology dialogs.

The screenshots in this guide were captured from the TrafflQ live environment using a demonstration intersection ("Main St & 1st Ave"); your projects, data and version banner will differ.

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Version 1.0

Updated: July 2026

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Chapter 1. Pre-requisites

TraffIQ is a web-based application. Before starting an analysis, make sure the following are in place:

- A TraffIQ user account for your organization, with your email address and password. Accounts and roles (for example, Org Admin) are provisioned for your organization; contact Rhythm Engineering if you need access.
- A current web browser (Chrome, Edge or Firefox). No local installation is required.
- Turning movement count (TMC) data for the intersection under study - either a GameChanger direct data ingest, other TMC counting unit export, a CSV file, or counts you can key in or paste manually. All analysis modules run from 15-minute interval TMC data covering up to 24 hours.
- For engineering-judgment items (crash history, sight distance, school crossings, grade crossings), input the supporting field data and crash records from your jurisdiction.

TraffIQ implements the signal warrant and multi-way stop control procedures of the MUTCD 11th Edition (2023) and the intersection level-of-service procedures of the Highway Capacity Manual (HCM) 7th Edition, Chapters 19, 20 and 21. The relevant reference for every input and result is shown directly in the application - in tooltips, in helper text and in the View Methodology dialog of each module.

Chapter 2. Getting Around TrafflQ

2.1. Getting access to TrafflQ

There are two ways to get a TrafflQ account:

Signing up as a new organization

If your firm or agency does not use TrafflQ yet, the first user registers the organization and automatically becomes its first Organization Admin:

1. Open the TrafflQ address in your browser. On the Sign in screen, click Create an organization.
2. On the "Create an organization" form, enter the Organization name (for example, "ABC Engineering"), your First name and Last name, your Work email and a Password (at least 12 characters).
3. Tick "I understand and want to create a new organization." and click Continue.
4. Verify your email: TrafflQ sends a 6-digit code to the address you entered. Type it on the "Verify your email" screen and click Verify (use Resend code if it expires).
5. You land in your new organization as its first Organization Admin. Before anyone can create sealable studies, purchase and assign licenses (Sections 2.5.3 and 2.5.5) and invite your team members (Section 2.5.4). 30-day evaluation period is available to test the analysis modules.

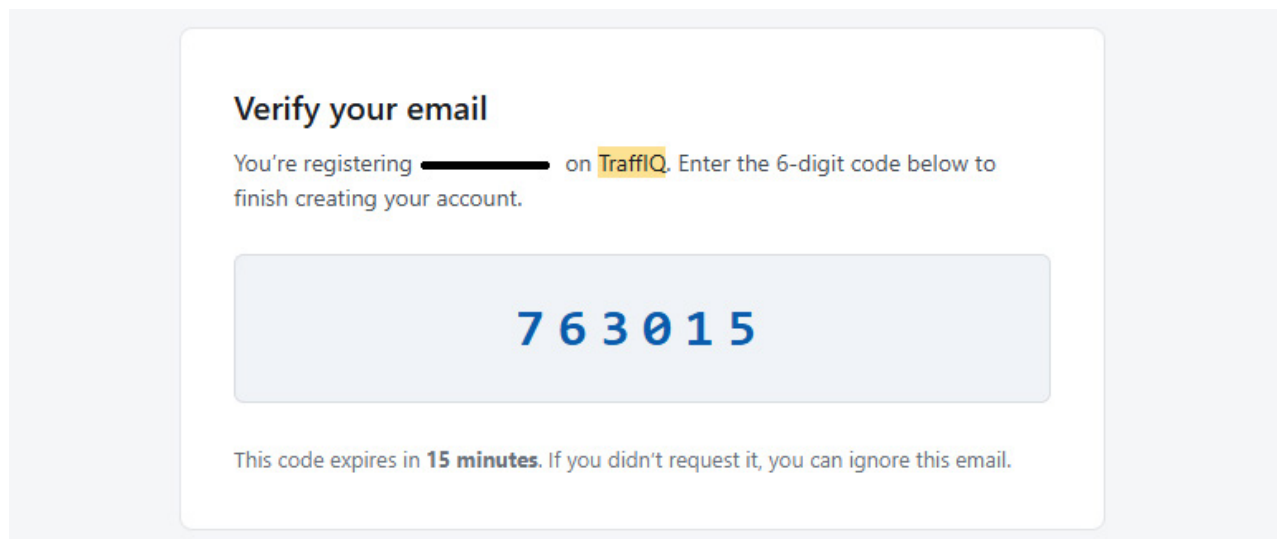


Figure 1. The sign-up verification email with the 6-digit code.

Being invited to an existing organization

If your organization already uses TrafflQ, an Organization Admin invites you from Team Members (Section 2.5.4). You receive an invitation email containing a one-time link; the link opens TrafflQ where you set your password and join the organization. After that, sign in normally with your email and the password you chose. If the link has expired, ask your admin to re-send the invitation from the Pending invites tab.

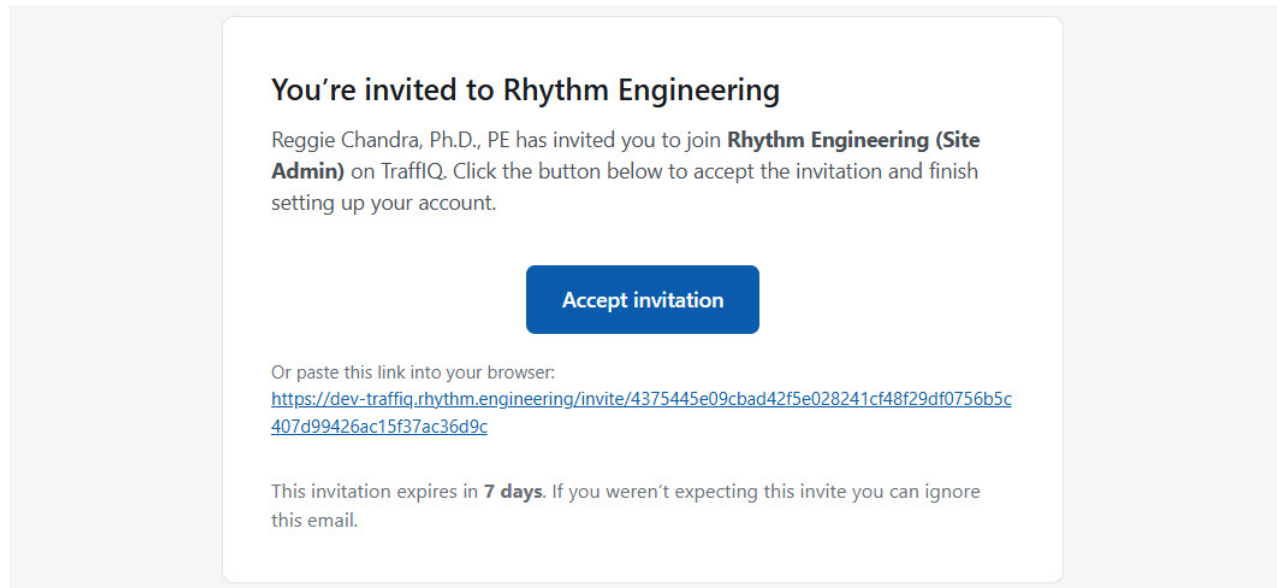


Figure 2. The invitation email with the one-time join link.

2.2. Logging in

Open your organization's TrafflQ address and sign in with your Email and Password on the "Sign in to continue" screen. Use **Forgot your password?** to email yourself a reset link if needed - you can also trigger a reset later from your own Account dialog (Section 2.5.1). After signing in you land on the Products screen. Your role badge (for example, Org Admin) is shown in the top bar; use Logout in the top-right corner to end the session.

2.3. The Products screen

The Products screen is the home page of TrafflQ. Each card is one analysis module; click a card (or the matching entry in the left sidebar) to open that module's studies page.

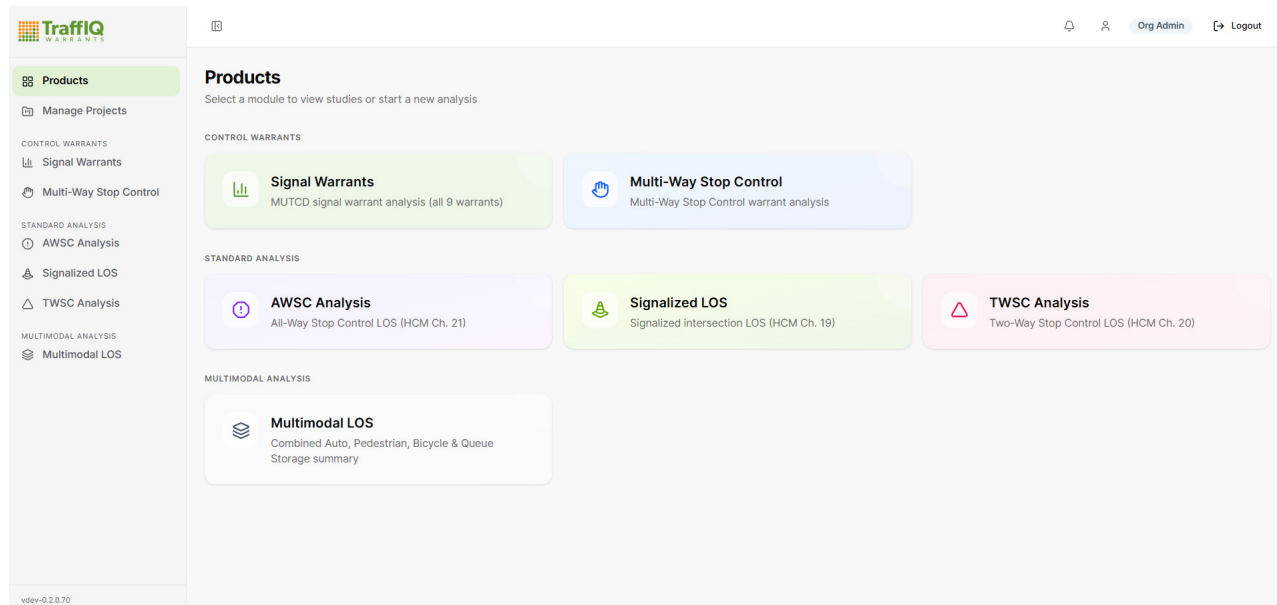


Figure 3. The Products screen. Modules are grouped into Control Warrants, Standard Analysis and Multimodal Analysis.

- **Signal Warrants** - MUTCD signal warrant analysis (all 9 warrants, W1–W9).
- **Multi-Way Stop Control** - Multi-Way Stop Control (MWSC) warrant analysis, MUTCD Sections 2B.12–2B.17.
- **AWSC Analysis** - All-Way Stop Control level of service (HCM Chapter 21).
- **Signalized LOS** - Signalized intersection level of service (HCM Chapter 19).
- **TWSC Analysis** - Two-Way Stop Control level of service (HCM Chapter 20).
- **Multimodal LOS** - combined Auto, Pedestrian, Bicycle and Queue Storage summary across studies.

2.4. System controls



Figure 4. Top-bar controls: View Methodology, notifications, account menu, role badge and Logout.

- **View Methodology** - opens the methodology reference for the module you are in (see Section 4.6). The content changes with the module: MUTCD Chapter 4C for Signal Warrants, MUTCD 2B for Multi-Way Stop Control, HCM chapters for the LOS modules.

- **Notifications (bell)** - system alerts, for example when a study is sealed.
- **Account menu (person icon)** - your profile and all organization administration pages (Section 2.5).
- **Role badge** - shows your role (Organization Admin appears as “Org Admin”); Logout ends the session.
- **Collapse sidebar** - the icon at the top-left collapses the navigation sidebar to maximize working space.
- The application version (for example, vdev-0.2.0.69) is shown at the bottom of the sidebar.

2.5. Account and organization settings

Click the person icon in the top bar to open the account menu. It shows the signed-in user’s name and email, followed by Account (your own profile) and - for Organization Admins - the five organization administration pages: Organization, Licenses, Team Members, Billing and Payments.

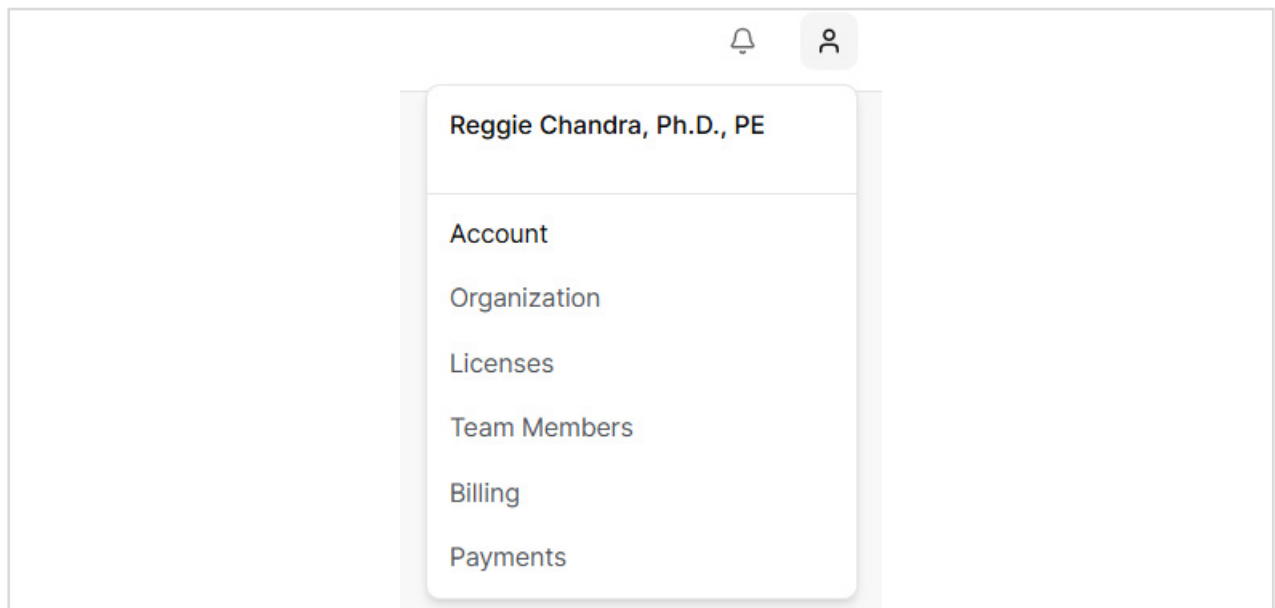


Figure 5. The account menu.

2.5.1. Account - profile, PE licenses and password

Edit User

First Name: Reggie Last Name: Chandra, Ph.D., PE

Role: Organization Admin

PE Licenses
One license per state — state, number, and expiry are all required. Used when sealing reports; an expired license can't be selected to seal.

License #: 123456

State: Missouri (MO) Expires: Sep 1, 2026

+ Add license

Password
Set a new password directly, or email yourself a reset link. [Send reset email](#)

New password: Leave blank to keep current

Confirm new password: Re-enter new password

Signed you out of all other sessions; this tab stays signed in.

Cancel Save Changes

Figure 6. The Account (Edit User) dialog: name, role, PE licenses and password management.

- **Name and role** - your first and last name as they appear on reports, and your Role (assigned by an admin; you cannot change your own role).
- **PE Licenses** - one license per state; state, number and expiry are all required. These are the licenses offered when sealing reports (Section 4.5) - an expired license can't be selected to seal, so keep the expiry dates current. Use + Add license for additional states and the trash icon to remove one.
- **Password** - set a new password directly (Confirm it; changing the password signs you out of all other sessions, while the current tab stays signed in), or click Send reset email to email yourself a reset link instead.
- Click Save Changes to apply, or Cancel to discard.

2.5.2. Organization - workspace and report branding

The Organization page shows the workspace record: organization name, state default (pre-selected in new-project forms), billing email, subscription tier and subscription status. Click Edit to change the name, state default or billing email; subscription tier and status are managed by the site administrator (Rhythm).

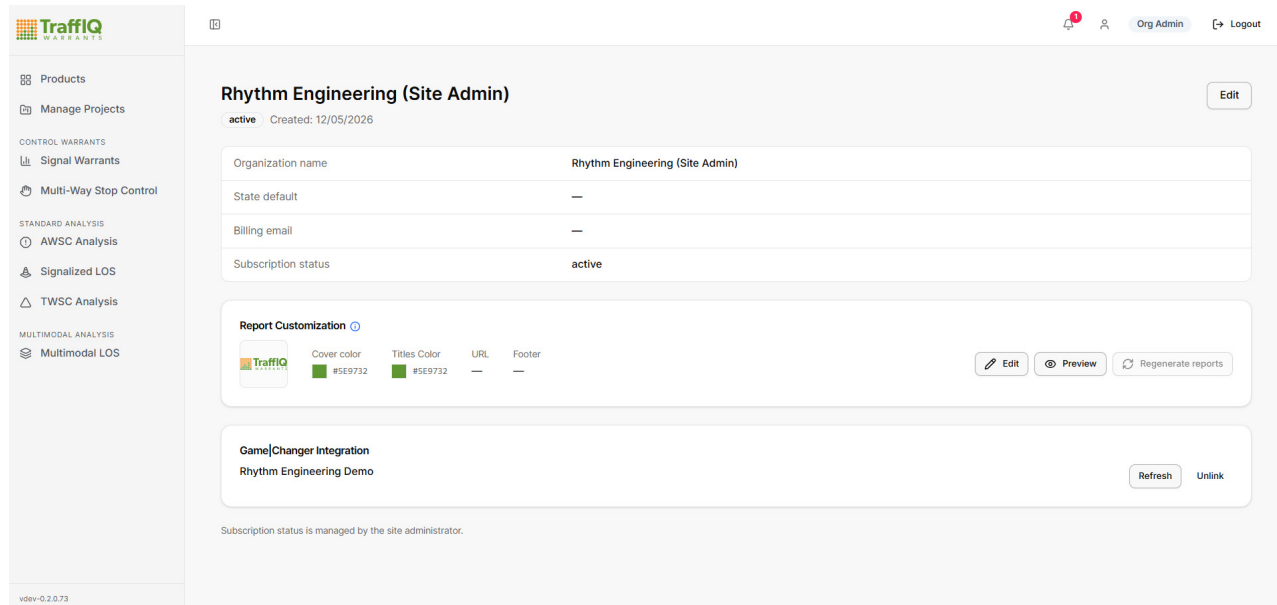


Figure 7. The Organization page: workspace details, Report Customization and the GameChanger Agency link.

Two organization-wide integrations live here as well:

- **Report Customization** - branding applied to generated PDF reports: logo (shown top-right on the cover and in each page header; PNG/JPEG, at least 200 px, up to 512 KB), cover color, titles color, website URL (printed on the cover) and an optional footer line for every content page. Edit opens a dialog with a live report preview; Preview renders a sample; Regenerate reports re-issues existing reports with the new branding. Keep sufficient contrast so reports stay easy to read.
- **Game|Changer Integration** - links the TraffIQ organization to your Game|Changer traffic data collection unit, so intersections can be linked and TMC data pulled directly (Section 3.3). Refresh re-syncs the linked unit; Unlink disconnects it.

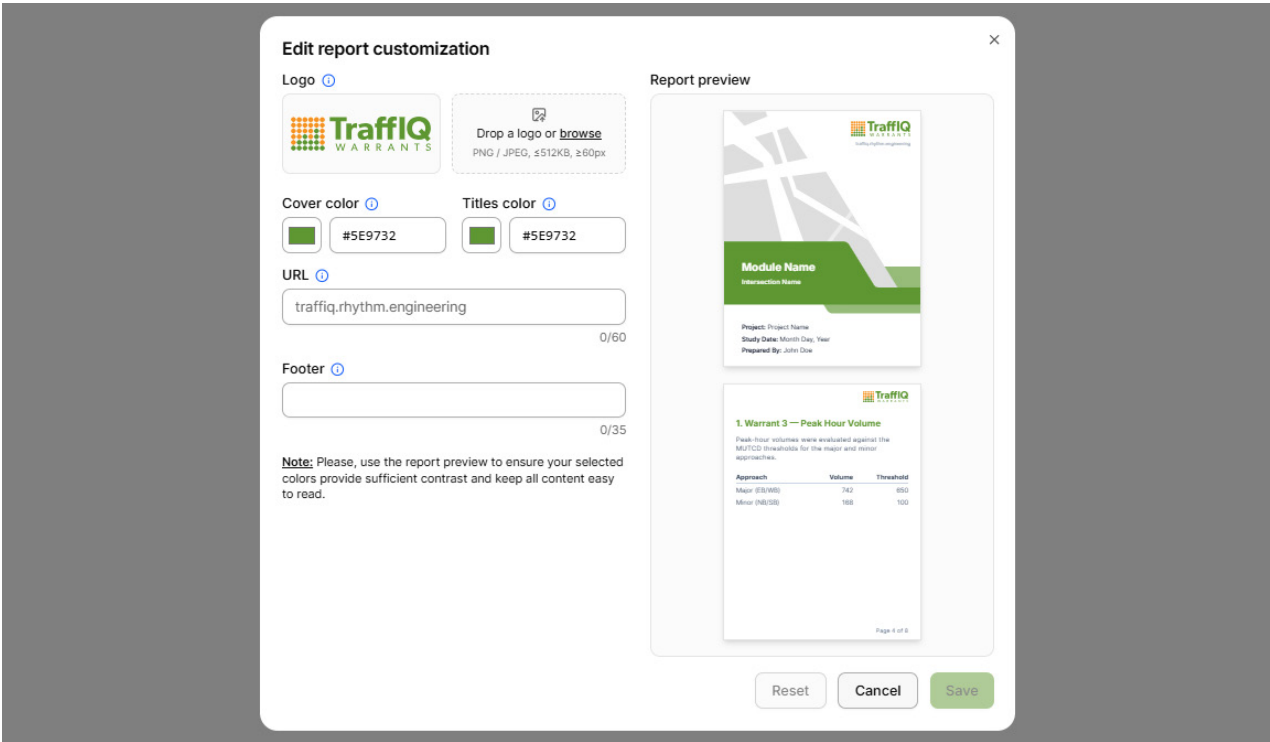


Figure 8. Edit report customization: logo, colors, URL and footer, with a live report preview.

2.5.3. Licenses

Licenses control who can create and edit work in each product. The Licenses page lists every license the organization owns with its product, kind (paid or free), status (assigned or unassigned), assignee, expiry date and source (for example Credit Card, Purchase Order, or Site Admin Grant).

- Products
- Manage Projects
- CONTROL WARRANTS
 - Signal Warrants
- Multi-Way Stop Control
- STANDARD ANALYSIS
 - AWSC Analysis
 - Signalized LOS
 - TWSC Analysis
- MULTIMODAL ANALYSIS
 - Multimodal LOS

Licenses

+ Buy more

StatusAll statusesKindAll kinds☐ Include archived

Product	Kind	Status	Assignee	Expires	Source	Actions
TraffIQ	paid	unassigned	—	23/07/2027	Credit Card	<button>Assign</button> <button>Archive</button>
TraffIQ	PO pending	unassigned	—	23/07/2027	Purchase Order	<button>Assign</button> <button>Archive</button>
TraffIQ	paid	unassigned	—	17/07/2027	Credit Card	<button>Assign</button> <button>Archive</button>
TraffIQ	paid	assigned	Reggie Chandra, Ph.D., PE	17/07/2027	Purchase Order	<button>Unassign</button>
TraffIQ	free	assigned	—	31/12/2059	Site Admin Grant	<button>Unassign</button>

1-5 of 5Rows: 10

Org AdminLogout

Page 1 of 1

Figure 9. The Licenses page with filters, the license table and per-license actions.

- **Assign / Unassign** - attach a license to a team member or free it up for someone else. A license does nothing until it is assigned to a person.
- **Archive** - retires an unassigned license from the list (use Include archived to see archived ones).
- **Buy more** - jumps to Billing (Section 2.5.5) to purchase additional licenses.
- **Filters** - narrow the table by status, kind or product.

2.5.4. Team Members - users and invitations

The Team Members page (“Users & invitations”) manages who is in the organization. The Users tab lists every user with name, email, role, active status and creation date. Roles: Organization Admin (full access to the settings in this section) and standard users; Site Admin identifies Rhythm-side administrators. From the Actions column you can Edit a user (same dialog as Section 2.5.1, including their role and PE licenses), Deactivate them, or delete them; your own row’s controls are disabled so you cannot lock yourself out.

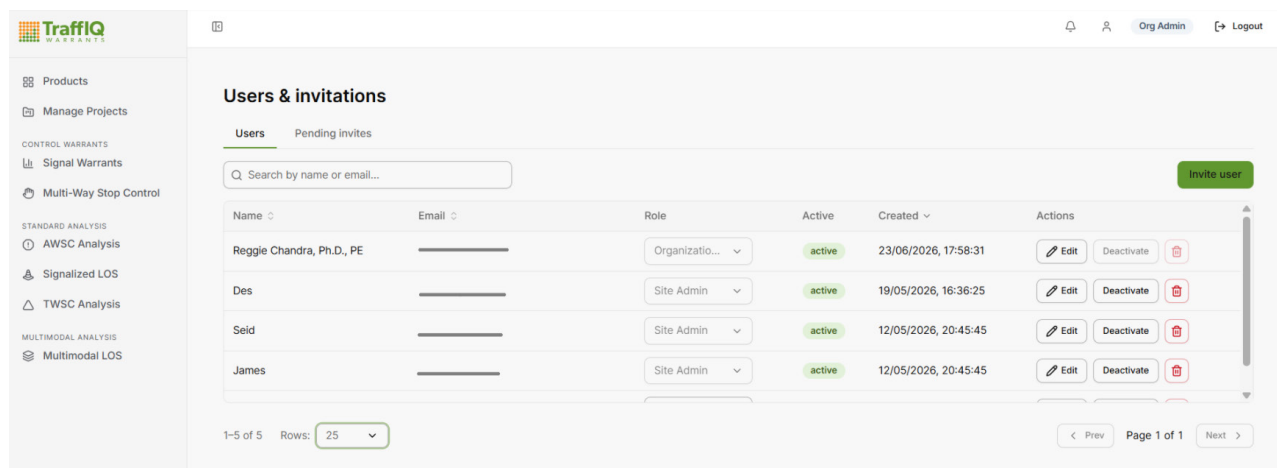


Figure 10. Users & invitations - the Users tab.

1. To add a user, click Invite user (top right).
2. Enter their Email in the “Invite a teammate” dialog and click Send invite. They’ll get an email with a one-time link to set a password and join the organization.
3. Track outstanding invitations on the Pending invites tab (email, expiry and actions to re-send or revoke). Once accepted, the person appears on the Users tab - then assign them a license (Section 2.5.3) and, if they will seal reports, have them record their PE license under Account.

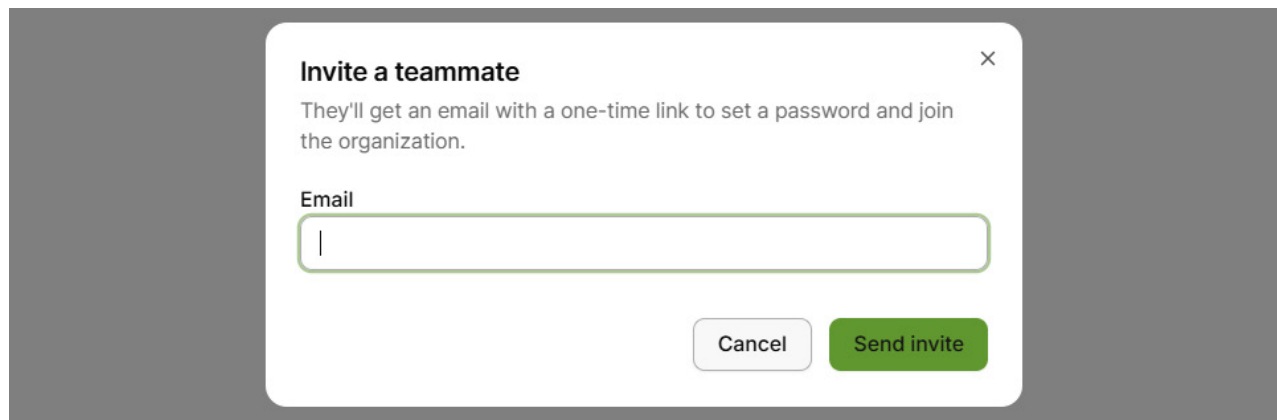


Figure 11. The Invite a teammate dialog.

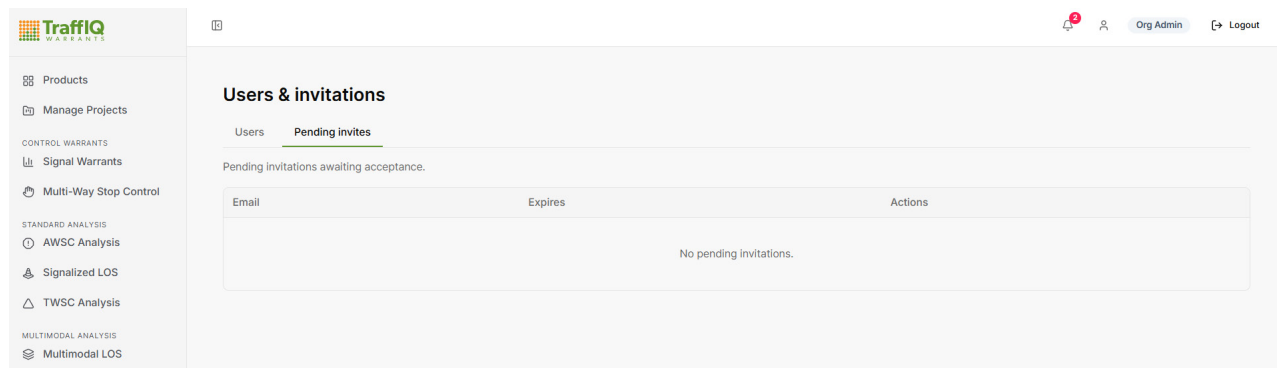


Figure 12. The Pending invites tab.

2.5.5. Billing - buying and extending licenses

The Billing page ("Buy / extend licenses") is the purchasing workflow: add licenses for any module to the cart - new licenses, renewals/extensions, or both - and pay for everything in one charge or one Purchase Order invoice.

Buy / extend licenses
Add licenses for any module to your cart — new modules, extensions, or both — and pay for everything in one charge or one PO invoice.

1 purchased license is not assigned yet
A license does nothing until it is assigned to a person. Until you assign it, nobody in your organization can create or edit work with it — including you. [Assign license now](#)

Modules

TraffIQ
Warrants, Signals, Stops, LOS

[Renew](#) [New](#)

US\$1,000.00 / year

Pick the licenses to renew. Soonest-expiring are listed first.

☐ hristina@rhythmtraffic.com	360d left
☐ (unassigned)	361d left
☐ said.saydahmed@gmail.com	12216d left

Years
1

Est. total: US\$0.00

[Renew license](#)

Cart

Payment method
[Card](#) [PO](#)

Coupon code (optional)
 [Add](#)

Enter a code and click Add to validate and apply a discount.

Billing email (required)
hristina@rhythmtraffic.com (you)

Total **US\$0.00**

[Continue to payment](#)

Figure 13. Buy / extend licenses: module cards on the left, the cart with Card / PO payment on the right. Note the warning shown while a purchased license remains unassigned.

- Each module card shows the annual rate and toggles between Renew (extend existing licenses - soonest-expiring are listed first) and New (add licenses). The initial fee is charged once and includes the first year; the subscription then renews annually. Set Years to renew or prepay multiple years at the annual rate.
- Cart - choose the Payment method (Card via Stripe checkout, or PO to receive an invoice), optionally apply a Coupon code, and confirm the required Billing email, then Continue to payment.
- A yellow banner reminds you when purchased licenses are still unassigned - “a license does nothing until it is assigned to a person”; click Assign license now to jump straight to the assignment.

2.5.6. Payments

The Payments page lists every checkout started for the organization: date, who initiated it, billing email, method (card or PO), status (paid, pending, cancelled), the licenses or bundles purchased, and the total amount paid. Download the Invoice for any completed payment; pending PO rows also offer Pay and Quote. A pending card payment started in error can be cancelled (the record is kept) or deleted; PO invoices cannot be cancelled from TraffIQ, once Stripe has issued them.

2.6. Studies pages and data hierarchy

Every analysis module opens with a studies page - a tree of all analyses of that type across your projects. TraffIQ organizes work in a fixed hierarchy:

Project -> Intersection -> TMC Data Entry (count set) -> Study

- A project groups intersections (typically by corridor, client or task order) and carries the State and the MUTCD edition used by its analyses.
- **An intersection stores the location attributes** - street names, orientation, legs, lanes, speeds, distances - that feed the warrant engines (Chapter 3).
- A TMC Data Entry (also called a count set) is one day of count data for that intersection. Entries are labeled collection date · agency · origin system, for example “2026-07-21 · Rhythm Engineering · Manual Entry”.
- A study is one saved run of an analysis. Each re-run of an analysis is saved as a new study, so the full history is kept. A study’s status is Complete, or Sealed once a PE seals it (Section 4.5).

Warrants Met	Status	Date	
3/9 W2 W3 W5	Sealed	21/07/2026, 10:18:07	Download Delete
2/9 W2 W3	Sealed	20/07/2026, 15:27:33	Download Delete
E 13th St x Grand Blvd (E 13th St & Grand Blvd) 1 TMC Data Entry · 2 studies			
E 13th St x Walnut St 1 TMC Data Entry · 1 study			
Project 1 1 intersection · 1 TMC Data Entry · 1 study			
Test 1 intersection · 1 TMC Data Entry · 1 study			
User Guide Demo 1 intersection · 1 TMC Data Entry · 1 study			
Main St & 1st Ave (Main St & 1st Ave) 1 TMC Data Entry · 1 study			
2026-07-21 · Rhythm Engineering · Manual Entry 1 study			
2/9 W2 W5	Complete	22/07/2026, 07:57:10	Delete

Figure 14. A studies page with the tree expanded to study level. Sealed studies from a Game|Changer count set are shown at top; a Complete (unsealed) manual-entry study below. Study rows show warrants met (with W-chips), status, date, and download/delete actions.

TIP: The chips in the “Warrants Met” column (for example 3/9 · W2 W3 W5) let you compare runs at a glance without opening each study.

2.7. Tooltips

Almost every input field, section header and result column in TrafflQ carries a small blue information icon. Hover the icon to see what the field does, which MUTCD or HCM provision it implements, and how the engine uses it. The tooltips are the fastest way to answer “what does this input change?” while you work; this guide reproduces the key ones in each module chapter.

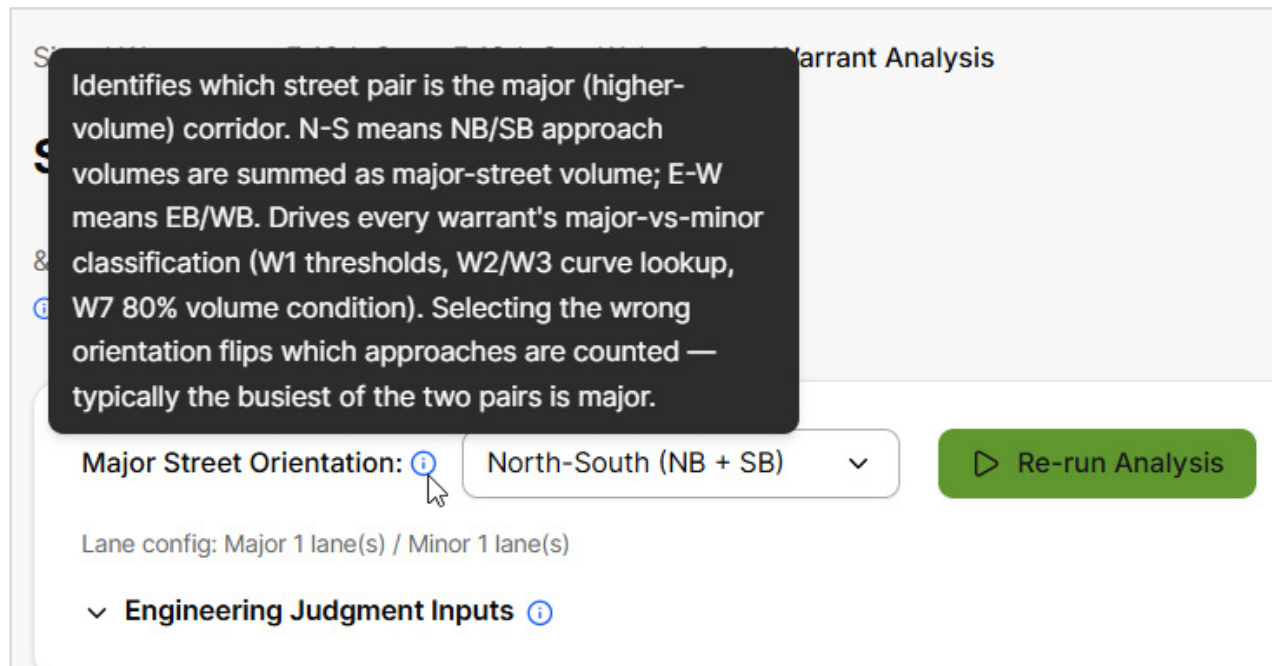


Figure 15. Hovering the information icon next to a field shows its full engineering context - here, Major Street Orientation on the Signal Warrant dashboard.

Chapter 3. Projects, Intersections and Traffic Data

3.1. Manage Projects

Click Manage Projects in the sidebar to administer projects and intersections outside of any analysis.

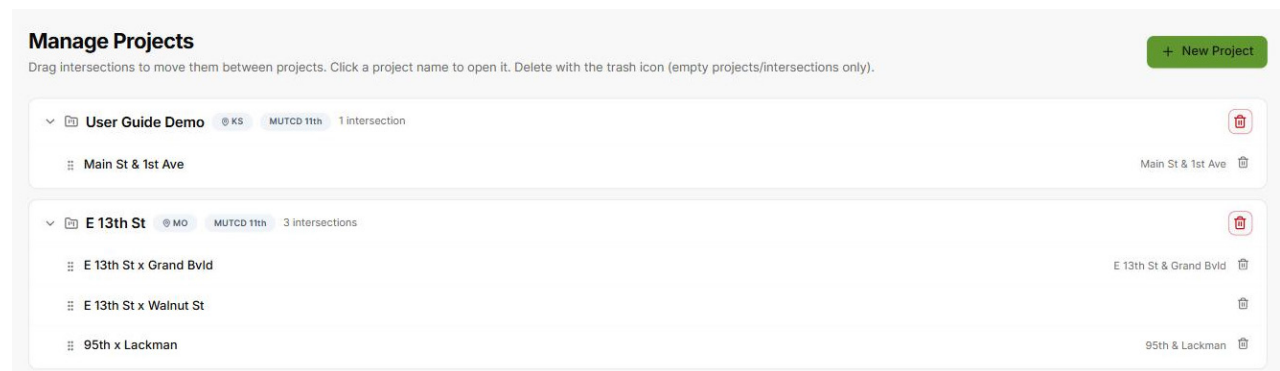


Figure 16. Manage Projects. Each project card shows its State, MUTCD edition and intersections.

- Create a project with + New Project (top right).
- Drag intersections by the handle at the left of their row to move them between projects.
- Click a project name to open it; click the pencil to rename.
- **Delete projects or intersections with the trash icon** - allowed for empty projects/intersections only, so you cannot destroy studies by accident.

Opening a project shows its intersections with major/minor street, area and speed limit columns, plus + Add Intersection.

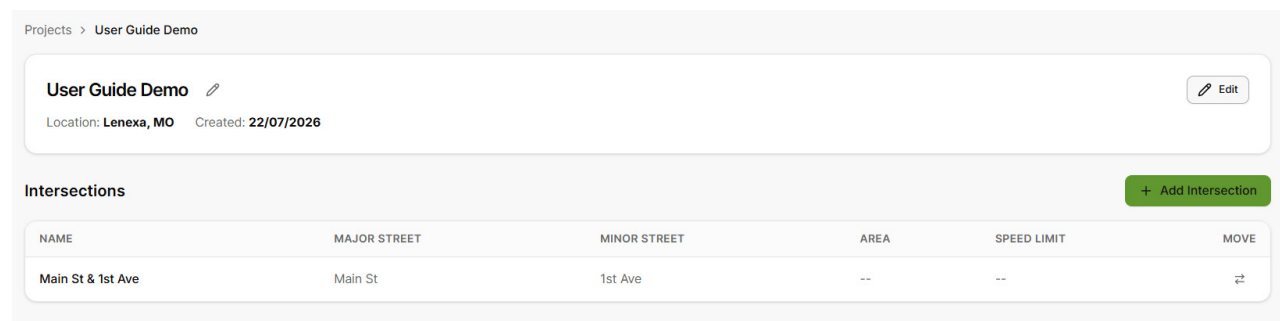


Figure 17. A project page. The State and creation date are shown at top; intersections are listed below.

3.2. The intersection record

Click an intersection to open its record. These attributes are entered once per intersection and are used by every analysis that references it - several MUTCD decisions (reduction factors, curve selection, warrant applicability) are driven from here rather than from the analysis screen.

The screenshot shows a web form for an intersection record. At the top, there's a section labeled 'INTERSECTION' with a 'Name' field containing 'Main St & 1st Ave' and an 'Edit' button. Below this are four main sections: 'IDENTIFICATION', 'SPEED', 'GEOMETRY', and 'ROUTES'. Each section contains several fields with values and edit icons. For example, 'IDENTIFICATION' includes 'Major Street' (Main St), 'Minor Street' (1st Ave), 'Legs' (4), 'Area Type' (--), 'Major Street Orientation' (North-South), and 'Population' (--). 'SPEED' includes 'Speed Limit' and '85th % Speed', both set to '--'. 'GEOMETRY' includes 'Major Street Lanes' (1), 'Minor Street Lanes' (1), 'Distance to Grade Crossing' (--), and 'Distance to Nearest Signal' (--). 'ROUTES' includes 'On Designated Route' (No) and 'Major Routes Intersection' (No).

Figure 18. The intersection record: Identification, Speed, Geometry and Routes sections. Click Edit to change any value.

Click Edit to open the form. The table below summarizes each field and exactly how the warrant engine uses it (from the in-app tooltips):

FIELD	HOW IT IS USED
Major Street Orientation	Determines which approach pairs are summed as the major-street total (NB+SB if North-South, EB+WB if East-West). Required for volume warrants W1–W3. Defaults to North-South.
Legs	3 or 4 intersection legs. Affects Warrant 7 crash thresholds and the HCM geometry logic in the LOS modules.
Area Type	Urban, Suburban or Rural. Selects the School Crossing pedestrian table set; the engine treats only Rural as a separate path (Urban and Suburban share tables).
Population	Community population. Below 10,000, the reduced (70%) volume thresholds apply to Warrants 1–3. If left blank the engine assumes 50,000 (no reduction). MUTCD §4C.01.
Speed Limit / 85th % Speed	The engine uses max(Speed Limit, 85th % Speed); above 40 mph the 70% thresholds apply to Warrants 1–3 (Warrant 4 uses its own 35 mph rule). MUTCD §4C.01.

Major / Minor Street Lanes	1 or 2+ approach lanes. Selects the volume curve column for Warrants 2–3 (Figures 4C-1–4C-4), the Warrant 1 threshold row, and the school-crossing table.
Distance to Nearest Signal	Used by Warrants 4, 5 and 6. Under 300 ft adds a “may not qualify as isolated” warning (300-ft rule); 1,000 ft or greater means Warrant 6 does not apply.
Distance to Grade Crossing	Used only by Warrant 9; the proximity condition is met at 140 ft or less.
On Designated Route	Whether the major street is on a designated signal-coordination route. Warrant 6 fails if it is not.
Major Routes Intersection	Whether this is the intersection of two or more major routes - required for Warrant 8 to apply.

INTERSECTION

Name

Main St & 1st Ave

Cancel Save

IDENTIFICATION

Major Street

Main St

Minor Street

1st Ave

Major Street Orientation ⓘ

North-South (NB + SB) ▼

Legs

4 ▼

Area Type ⓘ

Urban ▼

Population ⓘ

SPEED

Speed Limit (mph) ⓘ

85th % Speed ⓘ

GEOMETRY

Major Street Lanes (approach) ⓘ

1 lane ▼

Minor Street Lanes (approach) ⓘ

1 lane ▼

Distance to Nearest Signal (ft) ⓘ

Distance to Grade Crossing (ft) ⓘ

ROUTES

On Designated Route ⓘ

No ▼

Intersection of Major Routes ⓘ

No ▼

Figure 19. The intersection edit form. Values you leave blank fall back to the documented engine defaults.

3.3. Game|Changer intersection linkage

If your agency collects data with Rhythm’s Game|Changer devices, link the TraffIQ intersection to the corresponding Game|Changer intersection with the Link to Game|Changer button on the intersection record. Once linked, Game|Changer becomes available as a count-set source, and TMC data can be pulled directly instead of being imported by file.



Figure 20. GameChanger Intersection Linkage and the TMC Data Entry list on the intersection record.

3.4. TMC Data Entries

TMC data is stored on the TMC Data Entry, not on the individual analysis. Load the data once - by Game|Changer pull, CSV import or manual entry - and every analysis (Signal Warrants, MWSC, AWSC, Signalized, TWSC) runs against that entry sees the same data. Create additional entries for new count dates; existing studies keep pointing at the entry they were run from.

3.5. Manual TMC data entry

From the intersection record, click the TMC Data Entry button on an entry (or + New TMC Data Entry) to open the data grid:

The screenshot shows the "TMC Data Entry" grid. At the top, there's a header with "TMC Data Entry", a date selector "Date: Jul 21, 2026", and buttons for "Edit details", "Import CSV", and "Save Data". Below the header is a tip: "Tip: You can paste tab-separated data from a spreadsheet. Click any cell and paste (Ctrl+V / Cmd+V) to fill the grid." The table has columns for "Time", "Northbound", "Southbound", "Eastbound", "Westbound", "Pedestrians", "Bicycles", "U-Turns", and "Total". The rows show 15-minute intervals from 12:00 AM to 3:00 AM, with hourly totals. The data is as follows:

Time	Northbound			Southbound			Eastbound			Westbound			Pedestrians				Bicycles				U-Turns				Total
	NB L	NB T	NB R	SB L	SB T	SB R	EB L	EB T	EB R	WB L	WB T	WB R	NB Ped	SB Ped	EB Ped	WB Ped	NB Bike	SB Bike	EB Bike	WB Bike	NB U	SB U	EB U	WB U	
12:00 AM	2	12	2	2	11	1	1	2	1		1														35
12:15 AM	3	14	2	2	11	2	1	2	1		1														39
12:30 AM	3	14	2	2	12	2	1	2	1		1														40
12:45 AM	3	12	2	2	11	1	1	2	1		1														36
00:00 Total	11	52	8	8	45	6	4	8	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	150
1:00 AM	2	11	1	2	8	1	1	1			1														28
1:15 AM	2	12	2	2	10	1	1	1	1		1														33
1:30 AM	2	12	2	2	11	1	1	1	1		1														34
1:45 AM	2	11	1	2	9	1	1	1	1		1														30
01:00 Total	8	46	6	8	38	4	4	4	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	125
2:00 AM	2	10	1	2	7	1	1	1			1														26
2:15 AM	2	11	1	2	9	1	1	1	1		1														29
2:30 AM	2	11	2	2	9	1	1	1	1		1														30
2:45 AM	2	10	1	2	8	1	1	1	1		1														27
02:00 Total	8	42	5	8	33	4	4	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	112
3:00 AM	2	11	1	2	8	1	1	1	1		1														28

Figure 21. The TMC Data Entry grid: 15-minute rows with automatic hourly totals, and column groups for vehicle movements, pedestrians, bicycles and U-turns.

1. Set the collection Date at the top (the info icon explains how the date is used in study labels).
2. Enter counts per 15-minute interval. Columns are grouped by approach - Northbound, Southbound, Eastbound, Westbound with L / T / R movements - followed by Pedestrians, Bicycles and U-Turns per approach.
3. Or paste from a spreadsheet: copy a tab-separated block, click any cell and press Ctrl+V (Cmd+V on Mac) to fill the grid.
4. Use Edit details to change the entry's date, source, agency or weather; use Import CSV to load a file into this entry (Section 3.6).
5. Click Save Data. Hourly total rows recalculate as you type.

3.6. Importing CSV data

Import CSV is available both on the TMC Data Entry grid and directly on every analysis dashboard. TrafflQ auto-detects the file format:

- **GameChanger TMC export ("TMC Overview")** - columns Time, NBL, NBT, NBR, SBL, SBT, SBR, EBL, EBT, EBR, WBL, WBT, WBR, with optional NBU, SBU, EBU, WBU U-turn columns (missing U-turn columns default to 0).
- **GameChanger Ped-Bike export** - pedestrian and bicycle counts, which populate the pedestrian-dependent warrants (W4/W5) and the ped/bike LOS analyses.
- **TrafflQ internal format** - header interval_start, nb_left, nb_thru, nb_right, sb_left, ..., wb_right, nb_ped, sb_ped, eb_ped, wb_ped, nb_bike, sb_bike, eb_bike, wb_bike. One file can carry vehicle, pedestrian and bicycle data together.

Timestamps must include the date (for example 2026-07-21T07:00:00, "2026-07-21 07:00" or "7/21/2026 7:00"). Time-only values such as "07:00" are rejected with "unparseable timestamp". Data is expected in 15-minute intervals - 96 intervals for a full 24-hour day. If fewer are supplied the analysis still runs, and a Data Quality note (for example "Only 92 intervals provided (expected 96 for 24 hours)") is attached to the results and the report.

1. Click Import CSV. The Import CSV Data dialog opens.
2. Drag one or more CSV files onto the drop zone, or click it to browse. You can drop a TMC file and a Ped-Bike file together.
3. Click Analyze. TrafflQ parses the files and reports the detected format, any warnings, and errors line by line.

4. **Review the Review Import Data screen** - detected format badge, data category chips (vehicle / pedestrian / bicycle), interval count, date, time range and an hourly preview table.
5. Click Import N Intervals to write the data into the count set (or Back to fix the file and re-analyze).

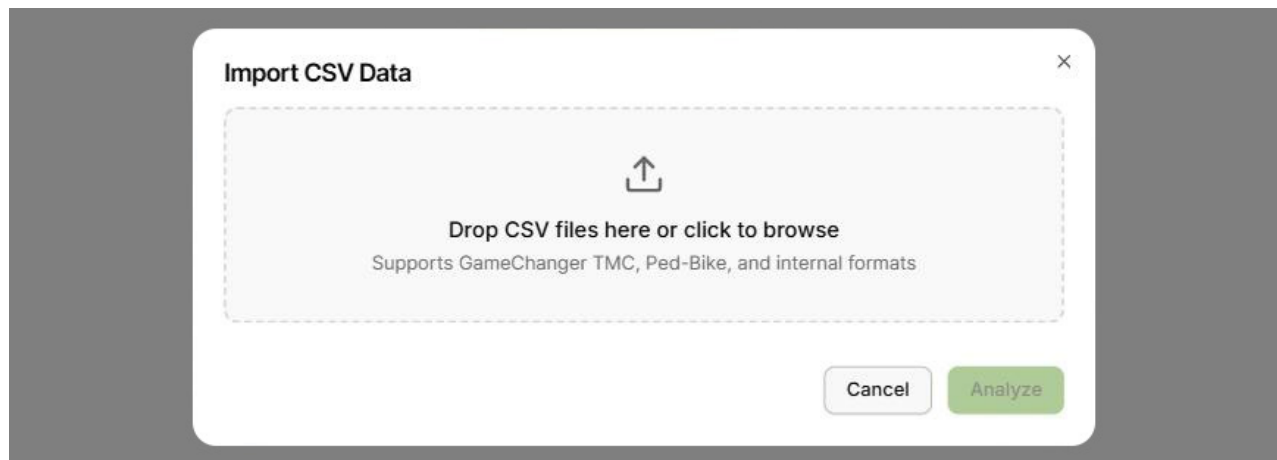


Figure 22. The Import CSV Data dialog.

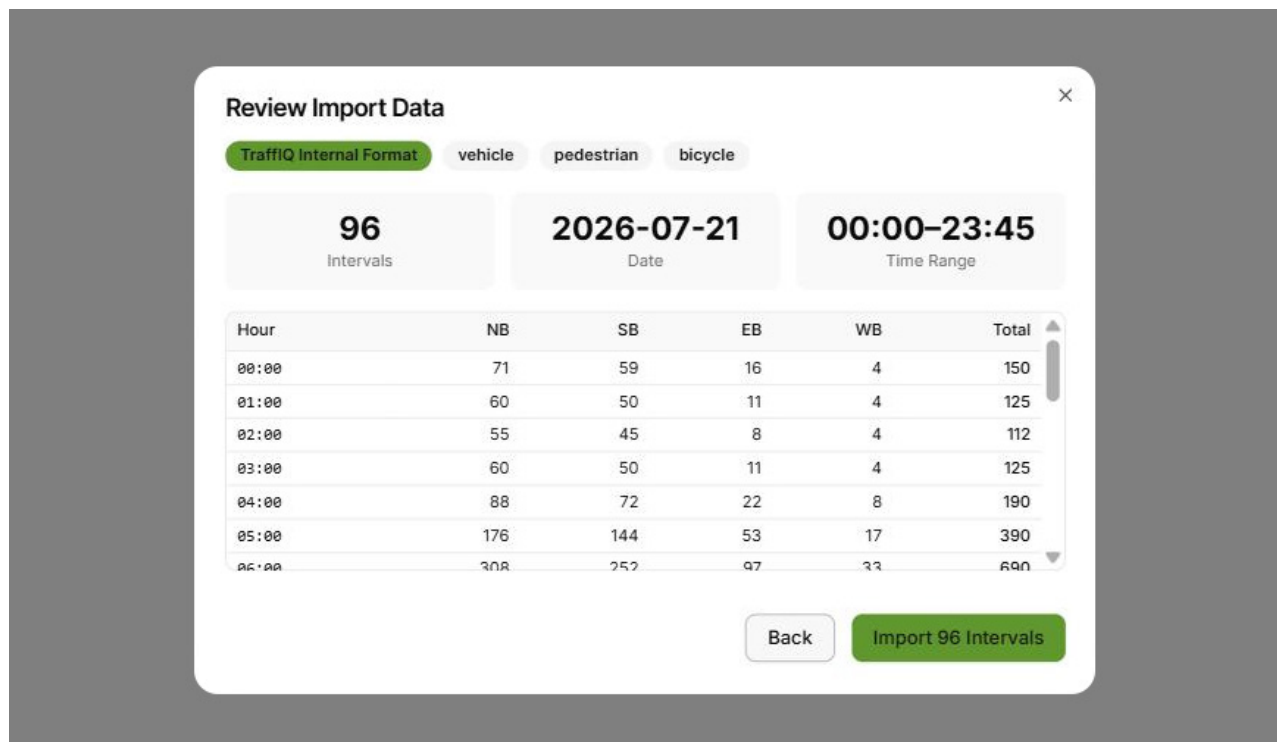


Figure 23. The Review Import Data step before committing the import.

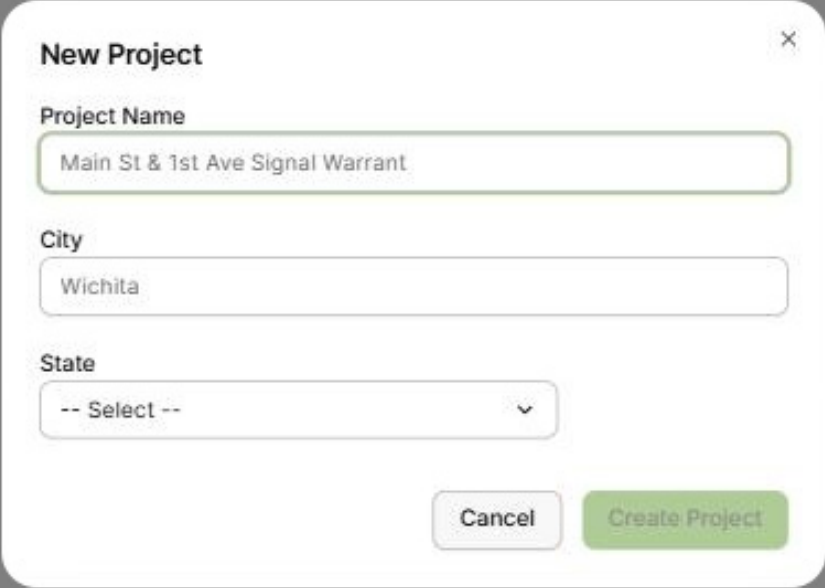
Chapter 4. Starting a Study - the Common Workflow

All five analysis modules share the same workflow: set up the project, intersection and TMC Data Entry once under Projects; select the three in the + New Study dialog; run the analysis; review results; generate a report. This chapter covers the shared steps once - the module chapters then focus on their specific inputs and outputs.

4.1. Set up in Projects first

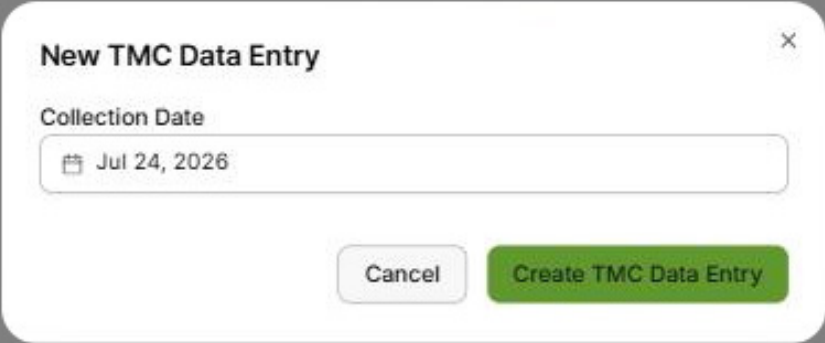
A study always hangs off the Project - Intersection - TMC Data Entry hierarchy (Section 2.6), and those records are created in Manage Projects - the + New Study dialog only selects existing ones. If your project, intersection and count data are already in place, skip to Section 4.2.

1. Click Manage Projects in the sidebar and click + New Project. Enter the Project Name, City and State, then click Create Project. The project card shows its location and MUTCD edition as chips; an "Incomplete location" chip warns when the city or state is still missing.
2. Click the project name to open it, then click + Add Intersection. Besides the Name and the Major and Minor Street, the New Intersection form already captures the record fields that drive the engines - Legs, Area Type, Population, Speed Limit, 85th % Speed and Distance to Nearest Signal (each explained by its tooltip and in Section 3.2). Click Create Intersection; anything you skip can be completed later with Edit on the intersection record.
3. Open the intersection and click + New TMC Data Entry. Only the Collection Date is asked for; the entry is created with Source: Manual Entry (change the source, collection agency and weather afterwards with Edit details on the data grid - Section 3.5).
4. Load the counts: click the entry's TMC Data Entry button to open the grid, then type, paste or Import CSV the day's data (Sections 3.5 and 3.6).



A dialog box titled "New Project" with a close button (X) in the top right corner. It contains three input fields: "Project Name" with the text "Main St & 1st Ave Signal Warrant", "City" with the text "Wichita", and "State" with a dropdown menu showing "-- Select --". At the bottom right are two buttons: "Cancel" and "Create Project".

Figure 24. + New Project: name, city and state.



A dialog box titled "New TMC Data Entry" with a close button (X) in the top right corner. It contains one input field: "Collection Date" with a calendar icon and the text "Jul 24, 2026". At the bottom right are two buttons: "Cancel" and "Create TMC Data Entry".

Figure 25. + New TMC Data Entry: only the collection date is needed at creation.

Figure 26. The New Intersection form: identification, speed and geometry fields are captured at creation and can be refined later from the intersection record.

TMC Data Entry			+ New TMC Data Entry
2026-07-24	Source: Manual Entry	TMC Data Entry	
2026-07-21	Source: Manual Entry	TMC Data Entry	

Figure 27. The TMC Data Entry list on the intersection record: open the grid with the TMC Data Entry button; the trash icon deletes an entry.

4.2. The New Study dialog

1. Open the module from the Products screen or sidebar and click + New Study (top right of the studies page).
2. Select the Project, the Intersection and the TMC Data Entry, in that order - each list becomes available once its parent is chosen. Entries are labeled collection date · agency · origin system.
3. Click Open Analysis. The module's analysis dashboard opens for that TMC Data Entry.

The dialog creates nothing - if the project, intersection or TMC Data Entry you need is not listed, follow its Projects link (or Manage Projects) to set the item up first, then come back. Selecting an entry that already has studies is allowed: the dashboard opens at the pre-run state and running adds a new study for that entry. To revisit an existing run instead, open it from the studies page (Section 4.4).

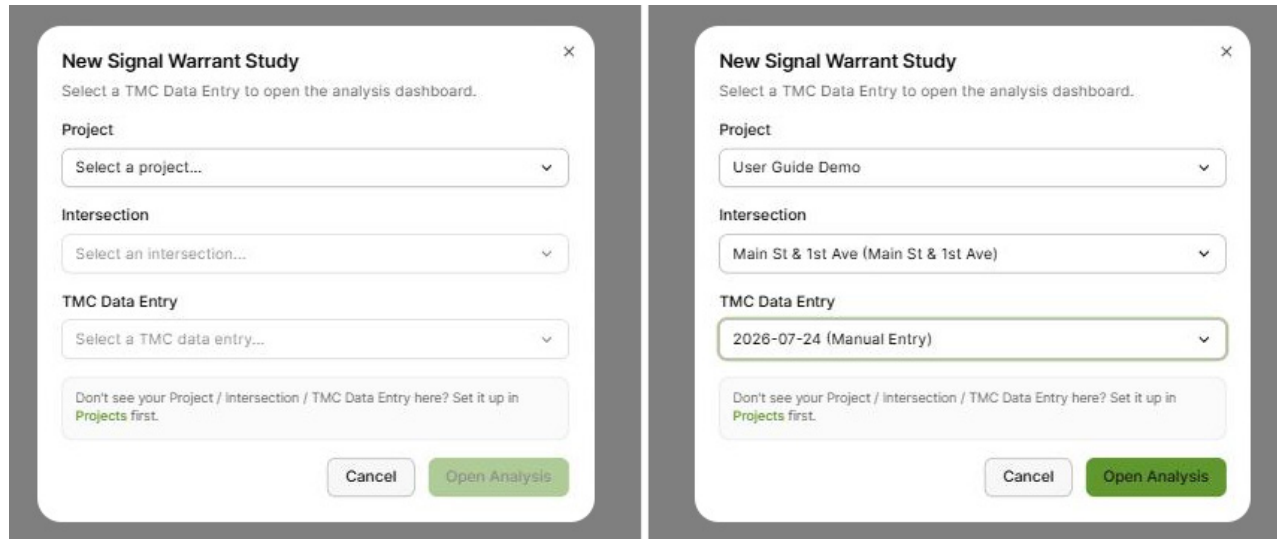


Figure 28. The New Study dialog is a picker over the existing hierarchy.

Figure 29. All three selected - Open Analysis becomes available.

4.3. The analysis dashboard: run, re-run, save as new run

Every dashboard has the same skeleton: a breadcrumb (module › project › intersection › analysis), the intersection name with the project's MUTCD edition, a toolbar with the module's global inputs plus Import CSV and the green Run button, and the module's input sections below. The line under the toolbar summarizes the lane configuration read from the intersection record. If the TMC Data Entry is still empty, Import CSV is available right here; once data has been imported, the Source CSV file name is shown under the page title.

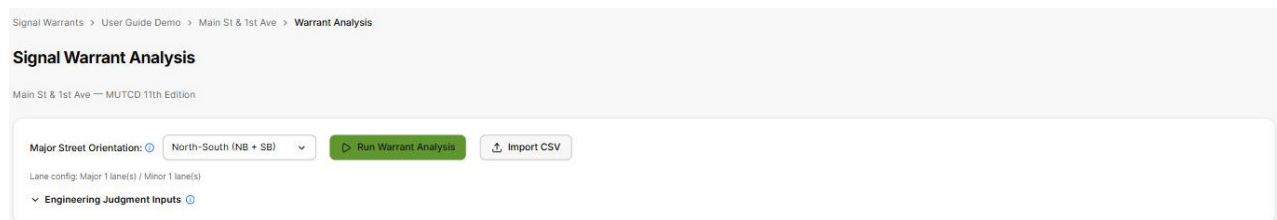


Figure 30. The dashboard before the first run (Signal Warrants shown): the module input, Run Warrant Analysis, Import CSV, the lane-config line and the collapsed Engineering Judgment Inputs.

- Click the Run button (for example Run Warrant Analysis) to compute. The first run creates a study - the study id is appended to the page address and shown beside the results banner - and the Run button becomes Re-run Analysis.
- Re-run Analysis recomputes into the same study after you change inputs or data; Save as new run creates a separate study so you can keep before/after variants side by side.
- After the first run the toolbar also gains Generate Report (Section 4.5).
- Studies stay editable (status Complete) until they are sealed (Section 4.6).

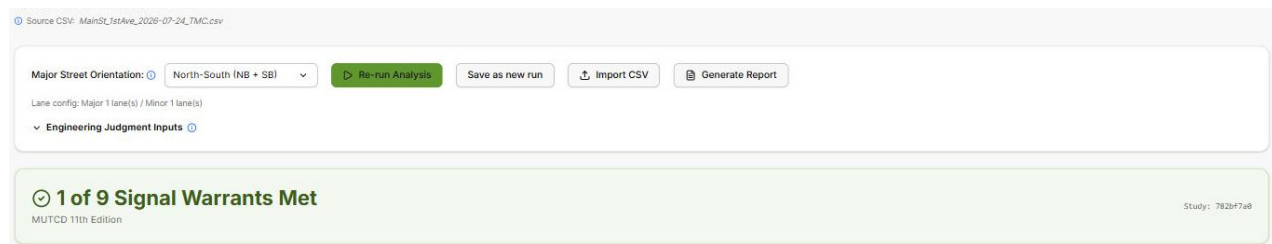


Figure 31. After a run: the Source CSV note under the title; Re-run Analysis, Save as new run and Generate Report in the toolbar; the results banner with the study id.

4.4. Run history on the studies page

Every run is kept. Each module's studies page groups studies by Project - Intersection - TMC Data Entry; a study row shows the module's result summary (for Signal Warrants, warrants met with W-chips), the Status (Complete or Sealed) and the run date and time. Click a row to reopen that exact study on the dashboard. Rows carry a trash icon to delete a study; sealed rows offer download and delete of the sealed report instead. A TMC Data Entry appears in this tree once it has at least one study.

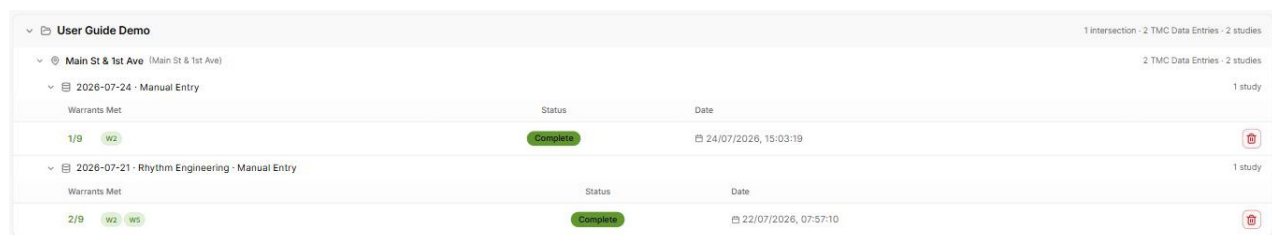


Figure 32. Run history for one intersection: two TMC Data Entries, each with its studies. Click a row to reopen the study.

4.5. Generating reports

After a run, click Generate Report in the toolbar:

1. Check the Preparer Name (pre-filled from your account).
2. **Optionally add Engineer Conclusions** - free-text findings and recommendations that are printed in the report.
3. Click Generate Report and wait for “Report generated. It has not been sealed.” (PDF generation takes a few seconds; the Report ID is displayed.)
4. Click Download to save a draft PDF for review, or Seal Report to commit and download the sealed final (Section 4.6), or Done to close.

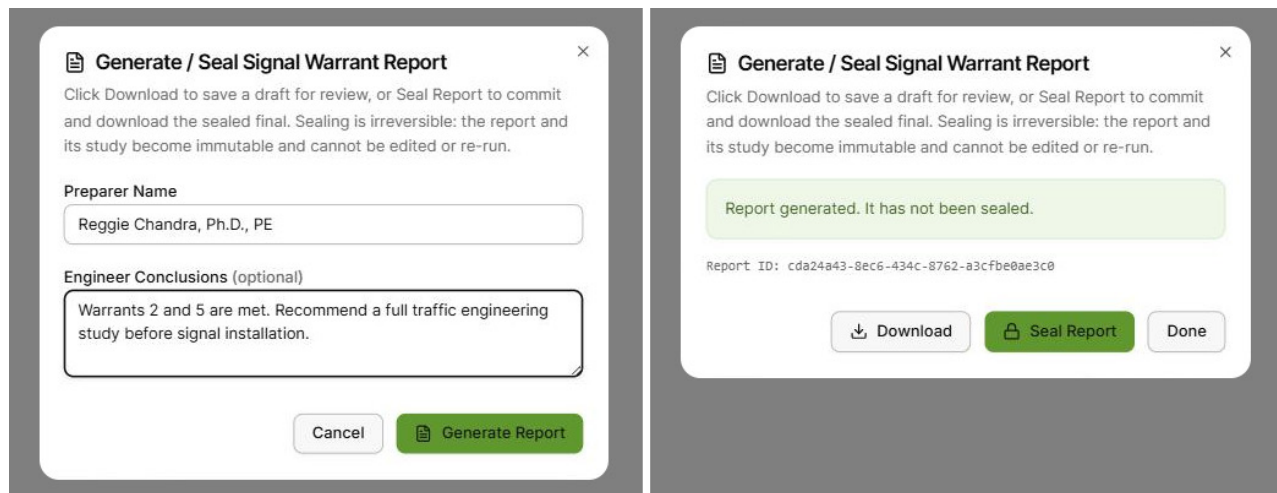


Figure 33. Generate / Seal Report: preparer and optional engineer conclusions.

Figure 34. After generation: Download a draft, Seal Report, or Done.

4.6. Sealing studies (PE seal)

Sealing is TraffIQ’s record-of-authorship mechanism for professional engineers. Sealing is irreversible: the report and its study become immutable - editing data, re-running the analysis and generating further reports are disabled, and the banner on the study names the sealing PE, license number, license state and seal date. The sealed report remains downloadable at any time from Download Sealed Report in the toolbar, and the study row on the studies page shows the Sealed status.

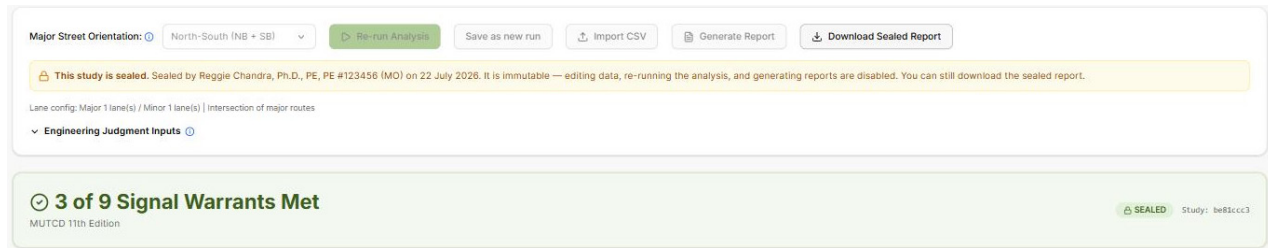


Figure 35. A sealed study: the banner identifies the sealing PE and date; Re-run Analysis, Import CSV and Generate Report are disabled; Download Sealed Report - and Save as new run - stay available.

To continue working from a sealed study's data, use Save as new run - the sealed study is preserved untouched and you get a new, editable study.

4.7. View Methodology

The View Methodology button (top bar) opens a module-specific reference dialog: the governing MUTCD/HCM sections, conditions, threshold tables, key equations, the analysis process, and - for the LOS modules - the engine's scope, validation notes and known limitations. It also notes that the MUTCD edition is set at the project level and flows through all warrant calculations. It is the authoritative in-app description of exactly what the engine computes, and a convenient citation source when writing study memos.

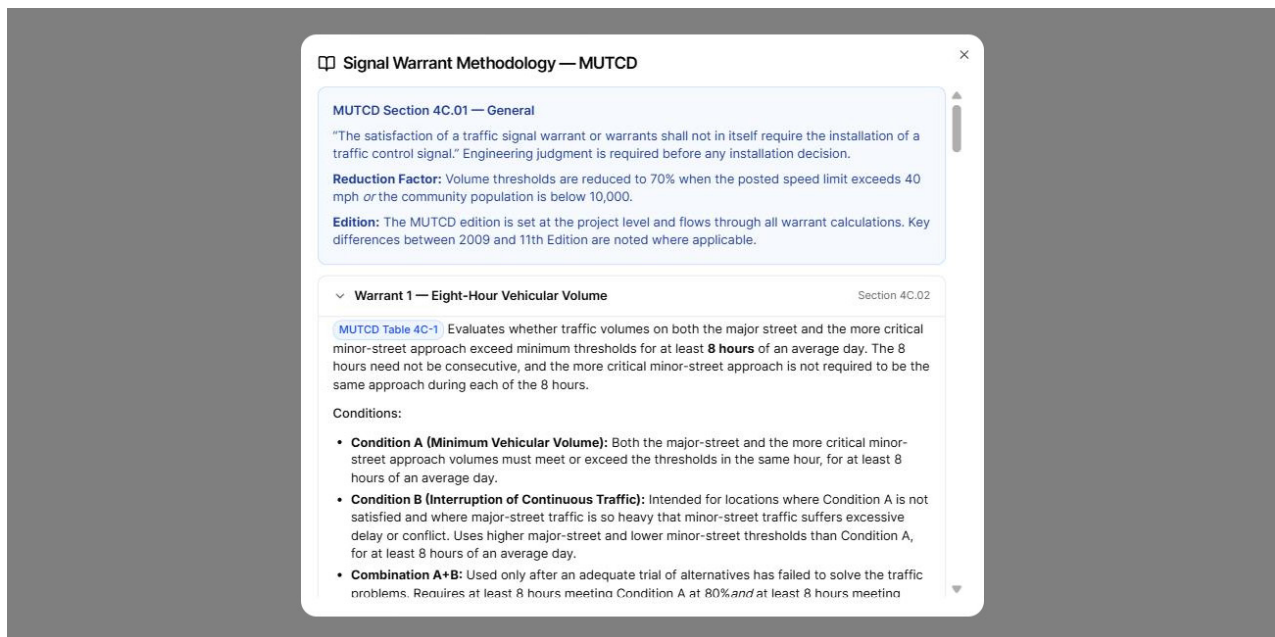


Figure 36. The Signal Warrant methodology dialog with Warrant 1 expanded.

Chapter 5. Signal Warrant Analysis (MUTCD W1-W9)

5.1. Overview

The Signal Warrants module evaluates all nine MUTCD traffic signal warrants from a single 24-hour TMC data set plus a short list of engineering-judgment inputs. The MUTCD edition is set at the project level and flows through all calculations; key differences between the 2009 and 11th Editions are handled by the engine (most visibly in Warrant 7).

#	WARRANT	SECTION	BASIS
1	Eight-Hour Vehicular Volume	4C.02	Table 4C-1, Conditions A / B / Combination
2	Four-Hour Vehicular Volume	4C.03	Figures 4C-1 / 4C-2 curves
3	Peak Hour	4C.04	Figures 4C-3 / 4C-4 curves
4	Pedestrian Volume	4C.05	Figures 4C-5 – 4C-8
5	School Crossing	4C.06	Gap study + 20 schoolchildren/hr
6	Coordinated Signal System	4C.07	Platooning; 1,000-ft spacing
7	Crash Experience	4C.08	2009: 5 crashes; 11th Ed: Tables 4C-2–4C-5
8	Roadway Network	4C.09	1,000 vph entering; major routes
9	Intersection Near a Grade Crossing	4C.10	Figures 4C-9 / 4C-10; Tables 4C-6–4C-8

Two MUTCD-level provisions apply across the volume warrants and are driven from the intersection record (Section 3.2): the 70% reduction factor (posted or 85th-percentile speed above 40 mph, or population below 10,000) and the lane configuration (1×1, 2+×1, 1×2+, 2+×2+) that selects threshold rows and curves. The MUTCD advisory is quoted on every result: satisfying a warrant does not by itself require installing a signal - engineering judgment governs.

5.2. The analysis dashboard

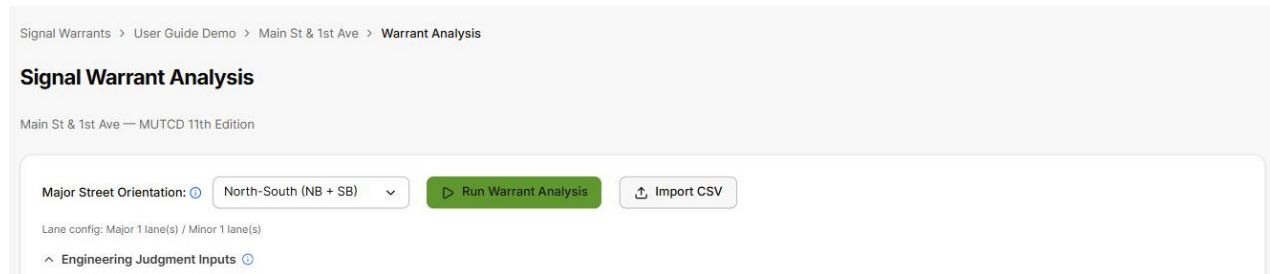


Figure 37. A new Signal Warrant Analysis before data import: Major Street Orientation, Run Warrant Analysis, Import CSV, lane configuration line and the collapsed Engineering Judgment Inputs.

- **Major Street Orientation** - identifies which street pair is the major (higher-volume) corridor; N-S sums NB/SB as the major-street volume, E-W sums EB/WB. It drives every warrant's major-vs-minor classification (W1 thresholds, W2/W3 curve lookup, W7 80% volume condition). Selecting the wrong orientation flips which approaches are counted - typically the busiest pair is major.
- **Lane config line** - read from the intersection record (for example "Major 1 lane(s) / Minor 1 lane(s)"), plus "Intersection of major routes" when set.
- **Import CSV** - loads TMC data into this count set (Section 3.6).
- **Run Warrant Analysis** - computes all nine warrants; after the first run the toolbar also offers Save as new run and Generate Report.

5.3. Engineering Judgment Inputs

Expand Engineering Judgment Inputs to provide the items that cannot come from TMC data. Only the warrants that need operator input appear here - W1 (combination), W4, W5, W6, W7, W8 and W9; Warrants 2 and 3 are computed entirely from the count data and the intersection record. Each subsection's information icon cites its MUTCD section.

▼ WARRANT 1 — COMBINATION A+B ⓘ

☐ Adequate trial of alternatives has been attempted

▼ WARRANT 4 — PEDESTRIAN VOLUME ⓘ

☐ Slow pedestrian crossing speed (< 3.5 fps) — apply 50% ped threshold reduction

▼ WARRANT 5 — SCHOOL CROSSING ⓘ

Schoolchildren per Hour (highest crossing hour) Are Adequate Gaps Available?

☐ Signal would not restrict progression (overrides 300-ft rule)

▼ WARRANT 6 — COORDINATED SIGNAL SYSTEM ⓘ

Street Type Adjacent Signals Inadequate? Proposed Provides Progression?

Figure 38. Engineering Judgment Inputs - Warrants 1, 4, 5 and 6.

- **Warrant 1** - Combination A+B: check “Adequate trial of alternatives has been attempted” only when less-restrictive measures have genuinely been tried and failed. Conditions A and B themselves are computed automatically; the Combination A+B finding (→8 hours each at the 80% columns) is only reported met when this box is checked.
- **Warrant 4** - Pedestrian Volume: the single input is the 50% slow-pedestrian factor (15th-percentile crossing speed below 3.5 ft/s), which halves the pedestrian thresholds. The 70% reduction for W4 uses its own 35 mph / population rule and is applied automatically from the intersection record.
- **Warrant 5** - School Crossing: enter Schoolchildren per Hour during the highest crossing hour (leave blank if not applicable; the MUTCD minimum is 20), assess Are Adequate Gaps Available? (the MUTCD criterion: fewer adequate gaps than minutes in the crossing period means gaps are inadequate), and - if a signal exists within 300 ft - check the progression override only when the proposed signal would not restrict progressive movement. If the schoolchildren count or the gap assessment is missing, the warrant reports REQUIRES ENGINEERING JUDGMENT.
- **Warrant 6** - Coordinated Signal System: set Street Type (Two-Way / One-Way), whether Adjacent Signals are Inadequate for platooning, and (two-way only) whether the Proposed signal Provides Progression. The warrant should not be applied where resulting signal spacing would be under 1,000 ft; the designated-route prerequisite comes from the intersection record.
- **Warrant 7** - Crash Experience: check the adequate-trial attestation, choose the 2009 Edition or 11th Edition method, and (11th Edition) enter the four crash counts - 1-year and 3-year, all-severity and fatal+injury. Only angle crashes (one vehicle on major, one on minor) and pedestrian crashes at the intersection qualify; thresholds come from Tables 4C-2–4C-5 by lane configuration and legs.

- **Warrant 8** - Roadway Network: flag weekend count data (switches from the weekday Condition A to weekend Condition B) and record whether 5-Year Projections Meet W1/W2/W3 (needed for Condition A only).
- **Warrant 9** - Grade Crossing: Trains per Day, % High-Occupancy Buses, % Tractor-Trailer Trucks, Approach Lanes at Crossing (selects Figure 4C-9 for 1 lane or 4C-10 for 2+), the flashing-light-signals checkbox, and the optional “Apply adjustment factors” checkbox - MUTCD makes the Table 4C-6/7/8 factors opt-in (“may be multiplied”); leave it unchecked to compare raw minor-street volume to the curve.

The screenshot shows a web-based form for inputting engineering judgment data. At the top, there are three dropdown menus: 'Street Type' (set to 'Two-Way'), 'Adjacent Signals Inadequate?' (set to 'Not evaluated'), and 'Proposed Provides Progression?' (set to 'Not evaluated').

WARRANT 7 — CRASH EXPERIENCE

- ☐ Adequate trial of alternatives has been attempted
- ☐ 2009 Edition ☒ 11th Edition
- Four input fields for crash thresholds: '1-Year Angle + Ped Crashes (All Severities)', '1-Year Fatal + Injury Angle + Ped Crashes', '3-Year Angle + Ped Crashes (All Severities)', and '3-Year Fatal + Injury Angle + Ped Crashes'. All are currently set to '0'.
- Thresholds are from Tables 4C-2 (1-year) and 4C-3 (3-year), determined by lane configuration and number of intersection legs. Only angle crashes (one vehicle on major, one on minor) and pedestrian crashes at the intersection qualify.

WARRANT 8 — ROADWAY NETWORK

- ☐ Count data is from a weekend (Saturday/Sunday)
- 5-Year Projections Meet W1/W2/W3? dropdown menu set to 'Not evaluated'.

WARRANT 9 — GRADE CROSSING

- Trains per Day dropdown menu set to '1'.
- % High-Occupancy Buses dropdown menu set to '0%'.
- % Tractor-Trailer Trucks dropdown menu set to '0% to 2.5%'.
- Approach Lanes at Crossing dropdown menu set to '1 lane'.
- ☒ Grade crossing has flashing-light signals
- ☐ Apply adjustment factors to minor-street volume (optional)

Figure 39. Engineering Judgment Inputs - Warrants 6 through 9.

5.4. Running the analysis and reading results

1. Import TMC data (Import CSV) if you want to merge or replace data, and set any engineering-judgment inputs.
2. Click Run Warrant Analysis. The summary banner reports “N of 9 Signal Warrants Met - MUTCD 11th Edition” with the study id.
3. **Review the Data Quality Notes box (if present)** - for example, fewer than 96 intervals provided.
4. Work down the warrant table: each row shows the warrant, its status - MET, NOT MET or REQUIRES JUDGMENT - and a Details chevron.

- Expand Details on any warrant to see exactly why: condition chips (for example “Condition A - 3/8 hours met”) and the hour-by-hour table with the thresholds applied to each rolling one-hour window.

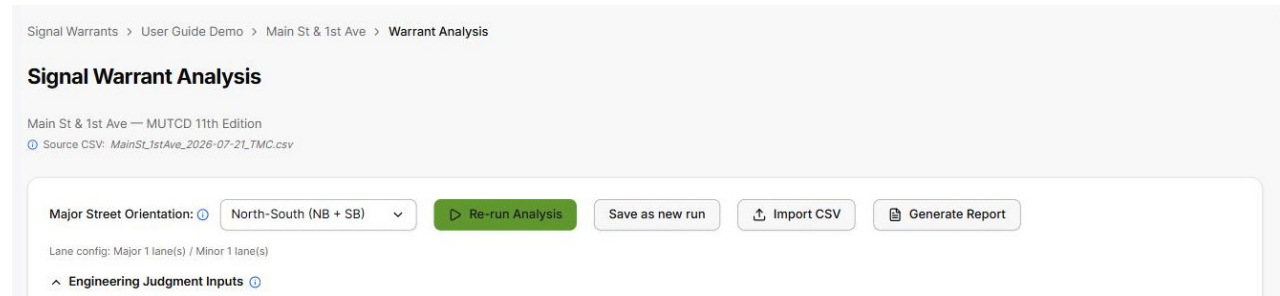


Figure 40. After a run: Source CSV under the title, Re-run Analysis, Save as new run, Import CSV and Generate Report; engineering-judgment values (here Warrant 5) are kept with the study.

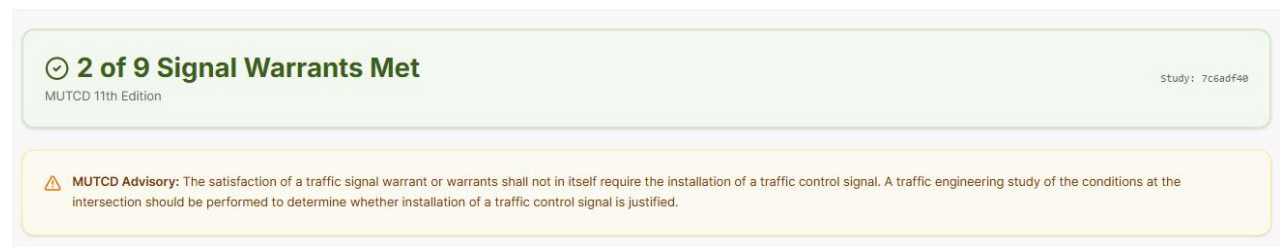


Figure 41. The results summary banner and the MUTCD advisory.

#	WARRANT	STATUS	DETAILS
1	Eight-Hour Vehicular Volume	NOT MET	▼
2	Four-Hour Vehicular Volume	MET	▼
3	Peak Hour	NOT MET	▼
4	Pedestrian Volume	NOT MET	▼
5	School Crossing	MET	▼
6	Coordinated Signal System	NOT MET	▼
7	Crash Experience (11th Edition)	NOT MET	▼
8	Roadway Network	NOT MET	▼
9	Intersection Near Grade Crossing	REQUIRES JUDGMENT	▼

Figure 42. The warrant results table with per-warrant status chips.

The detail tables use rolling one-hour windows in 15-minute steps (00:00–01:00, 00:15–01:15, ... - 93 windows in a 24-hour day), so the warrants are evaluated on true peak hours rather than clock hours. For the curve-based warrants the applicable minor-street threshold is interpolated from the MUTCD figure at each window's major-street volume and shown alongside the observed volumes.

Hour	Label	Major Vol	Minor Vol	Qualifies	Threshold
0	00:00-01:00	130	16	No	
1	00:15-01:15	125	14	No	
2	00:30-01:30	120	13	No	
3	00:45-01:45	115	12	No	
4	01:00-02:00	110	11	No	
5	01:15-02:15	108	11	No	
6	01:30-02:30	105	10	No	
7	01:45-02:45	102	9	No	
8	02:00-03:00	100	8	No	
9	02:15-03:15	102	8	No	
10	02:30-03:30	105	9	No	

Figure 43. Warrant 2 details: condition and lane-configuration chips, then each rolling hour with major/minor volumes, the interpolated Figure 4C-1 threshold and whether the hour qualifies.

5.5. Warrant reference

The following summarizes the criteria exactly as implemented (View Methodology –Signal Warrant Methodology). All volumes are vehicles per hour (vph); “major” is both approaches combined, “minor” is the higher-volume single approach for the hour.

Warrant 1 - Eight-Hour Vehicular Volume (§4C.02, Table 4C-1)

Met if, for at least 8 hours of an average day (not necessarily consecutive; the critical minor approach may change by hour), Condition A (minimum vehicular volume) or Condition B (interruption of continuous traffic) is satisfied. Combination A+B additionally requires 8 hours of each condition at the 80% columns and the adequate-trial attestation. With the reduction factor, the 70% columns (or $56\% = 70\% \times 80\%$ for the combination) apply. 100% thresholds:

LANES (MAJ×MIN)	COND A (MAJOR/ MINOR)	COND A 70%	COND B (MAJOR/ MINOR)	COND B 70%
1×1	500 / 150	350 / 105	750 / 75	525 / 53
2+×1	600 / 150	420 / 105	900 / 75	630 / 53
1×2+	500 / 200	350 / 140	750 / 100	525 / 70
2+×2+	600 / 200	420 / 140	900 / 100	630 / 70

Warrant 2 - Four-Hour Vehicular Volume (§4C.03, Figures 4C-1/4C-2)

Each rolling hour's (major, minor) point is compared to the curve for the lane configuration; the warrant is met when 4 or more hours plot above it. Figure 4C-1 is the 100% set; 4C-2 the 70% set. The published middle curve covers both 2+×1 and 1×2+; curve floors apply (4C-1: 80 vph for a 1-lane minor / 115 vph for 2+; 4C-2: 60 / 80). Thresholds are linearly interpolated between the curve's major-volume breakpoints.

Warrant 3 - Peak Hour (§4C.04, Figures 4C-3/4C-4)

Intended for unusual cases (office complexes, industrial plants) where minor-street traffic suffers undue delay for at least one hour. The peak rolling hour's point must plot above the applicable curve (floors - 4C-3: 100/150; 4C-4: 75/100). If Warrant 3 is the only warrant met, MUTCD recommends an actuated signal. The alternative delay-based criterion (4+ vehicle-hours on a 1-lane approach, 5+ on 2 lanes) needs stopped-delay data that a standard TMC count does not contain.

Warrant 4 - Pedestrian Volume (§4C.05, Figures 4C-5–4C-8)

Condition A: for 4 hours, the (major-street vph, pedestrians/hr crossing the major street) point plots above Figure 4C-5 (4C-7 at 70%). Condition B: any one hour above Figure 4C-6 (4C-8 at 70%). The 50% slow-pedestrian checkbox halves the pedestrian thresholds; W4's own reduction applies above 35 mph (not 40) or in small communities. The 300-ft rule disqualifies locations near existing signals or STOP control unless progression would not be restricted.

Warrant 5 - School Crossing (§4C.06)

Requires at least 20 schoolchildren per hour in the highest crossing period and fewer adequate gaps than minutes in that period, subject to the 300-ft rule. Consider other remedial measures

first (warning signs and flashers, school speed zones, crossing guards, grade separation). Missing inputs give **REQUIRES ENGINEERING JUDGMENT** (shown as **NOT EVALUATED** in reports).

Warrant 6 - Coordinated Signal System (§4C.07)

One-way street: met when adjacent signals are too far apart to provide necessary platooning. Two-way street: adjacent signals do not provide necessary platooning and the proposed and adjacent signals will collectively provide progressive operation. Not applicable where resulting spacing would be under 1,000 ft.

Warrant 7 - Crash Experience (§4C.08)

All three conditions must be met: (A) adequate trial of alternatives has failed; (B) crash counts meet the threshold - 2009 Edition: 5 or more signal-correctable crashes in 12 months; 11th Edition: any one threshold from Tables 4C-2/4C-3 (standard) or 4C-4/4C-5 (reduced, speed >40 mph or population <10,000); and (C) volumes reach 80% of Warrant 1 Condition A or B, or 80% of Warrant 4, for any 8 hours (56% with the reduction factor). Standard thresholds (all lane configurations):

PERIOD	LEGS	ALL SEVERITY	FATAL + INJURY
1 year	4-leg	5	3
1 year	3-leg	4	3
3 years	4-leg	6	4
3 years	3-leg	5	4

Warrant 8 - Roadway Network (§4C.09)

Applies only at the intersection of two or more major routes (from the intersection record). Condition A (weekday): total entering volume of at least 1,000 vph in the peak hour and 5-year projections meeting Warrant 1, 2 or 3. Condition B (weekend): at least 1,000 vph total entering for any 5 hours of a Saturday or Sunday - enabled by the weekend-data checkbox.

Warrant 9 - Intersection Near a Grade Crossing (§4C.10)

Both conditions are required: proximity (grade crossing within 140 ft of the stop or yield line - from the intersection record) and volume (peak-railroad-hour minor-street volume above the Figure 4C-9 / 4C-10 curve, the distance D snapped to the nearest published curve of 30,

50, 70, 90, 110, 130 ft - e.g. $D = 95$ ft compares to the 90-ft curve). The Table 4C-6/7/8 rail-frequency, bus and truck factors apply only when the adjustment checkbox is on. Per MUTCD, W9 is intended for use when no other warrant is met; flashing-light signals are a post-installation requirement rather than a pre-condition.

5.6. Reports and sealing

Generate Report produces the signal warrant report PDF (warrant-by-warrant findings, data tables, data-quality notes, preparer and engineer conclusions). Download a draft for review, then Seal Report when a PE is ready to commit the study - see Sections 4.4 and 4.5. Warrants left as REQUIRES ENGINEERING JUDGMENT are printed as NOT EVALUATED in the report.

Chapter 6. Multi-Way Stop Control (MUTCD 2B.12–2B.17)

6.1. Overview

The Multi-Way Stop Control module evaluates the five MWSC warrants of the MUTCD 11th Edition, Sections 2B.13–2B.17. Unlike the signal warrants, a single criterion met is sufficient: if any one warrant is met, multi-way stop control is warranted. Volumes come from the same count sets as the other modules; in the 11th Edition, both major- and minor-street totals count vehicles + pedestrians + bicycles (2009 counted vehicles only on the major street).

6.2. Creating the study and entering inputs

New Stop Control Study ×

Select a TMC Data Entry to open the analysis dashboard.

Project

User Guide Demo ▼

Intersection

Main St & 1st Ave (Main St & 1st Ave) ▼

TMC Data Entry

2026-07-21 — Rhythm Engineering (Manual Entry) ▼

Don't see your Project / Intersection / TMC Data Entry here? Set it up in [Projects](#) first.

Cancel Open Analysis

Figure 44. New Stop Control Study - the same Project / Intersection / Count Set selection used by every module; count sets are shared between modules.

Major Street [?](#)

N-S (NB/SB) [Import CSV](#) [Run Analysis](#)

MWSC Engineering Inputs — MUTCD 11th Sections 2B.12–2B.17

MWSC-Correctable Crashes in 12 Months (Warrant A)

0

How to collect: Obtain crash reports from the jurisdiction's crash records system (e.g., state DOT or local police). Count only crashes susceptible to correction by multi-way stop installation (right-angle, turning, and pedestrian crashes — exclude rear-end and sideswipe same-direction). Use the most recent 12-month period. Threshold: 4-leg $\geq 5/12$ mo or $\geq 6/36$ mo; 3-leg $\geq 4/12$ mo or $\geq 5/36$ mo (fatal+injury).

Sight Distance on Minor Approaches (Warrant B)

Inadequate — restricted sight distance

How to collect: Measure intersection sight distance (ISD) per AASHTO "A Policy on Geometric Design of Highways and Streets" (Green Book), Exhibit 9-55. At each minor-street approach, position an observer at the decision point (typically 14.5 ft from the edge of the major-street travel lane, at 3.5 ft eye height) and measure the available sight distance to approaching vehicles (object height 3.5 ft) in both directions along the major street. Compare to the minimum ISD required for the major-street design speed. If any approach falls below the minimum, sight distance is inadequate.

Signal Warrant Already Met? (Warrant C)

No — signal warrant not met

Has a signal warrant analysis been performed and at least one warrant met? If yes, MWSC may serve as an interim measure while signal installation is arranged.

Other Factors Present? (Warrant E)

No — no unusual conditions

How to evaluate: Per MUTCD Section 2B.17, consider factors including: (a) an unusually high number of left-turn conflicts; (b) a residential neighborhood or school area where traffic from multiple directions needs to be controlled for safety; (c) locations with high pedestrian or bicycle crossing activity not captured by other warrants; (d) unusual geometric conditions (e.g., offset or skewed legs) that create confusion about right-of-way. Document the specific conditions observed in the field that justify engineering judgment.

Figure 45. MWSC Engineering Inputs - MUTCD 11th Sections 2B.12–2B.17. Each input carries a “How to collect” note.

- **Major Street** - N-S or E-W; identifies the free-flow corridor for the Warrant D volume check.
- **MWSC-Correctable Crashes in 12 Months (Warrant A)** - count only crashes susceptible to correction by multi-way stop control (right-angle, turning and pedestrian; exclude rear-end and same-direction sideswipe) from the most recent 12 months of your jurisdiction's crash records. Thresholds: 4-leg $\rightarrow 5/12$ mo or $\rightarrow 6/36$ mo; 3-leg $\rightarrow 4/12$ mo or $\rightarrow 5/36$ mo.
- **Sight Distance on Minor Approaches (Warrant B)** - assess intersection sight distance per the AASHTO Green Book (Exhibit 9-55): observer at the decision point (about 14.5 ft from the edge of the major-street travel lane, 3.5 ft eye height) sighting 3.5-ft objects both ways along the major street; compare with the minimum ISD for the design speed. Select Adequate or Inadequate (Inadequate on any approach meets the warrant).
- **Signal Warrant Already Met? (Warrant C)** - if a signal warrant analysis has been performed and at least one warrant is met, MWSC may serve as an interim measure while signal installation is arranged.
- **Other Factors Present? (Warrant E)** - per §2B.17: unusually high left-turn conflicts, residential neighborhood or school areas needing multi-directional control, high pedestrian/bicycle crossing activity, or confusing geometry (offset or skewed legs). Document the field conditions that justify the judgment.

6.3. Results

1. Click Run Analysis. The banner reports Multi-Way Stop Control: WARRANTED or NOT WARRANTED, with the MUTCD edition and the detected peak hour.
2. Expand TMC Data (“How CSV counts feed the MWSC criteria”) to verify the source file, interval coverage, selected peak-hour window and the aggregated major/minor street totals (volume, pedestrians, bicycles). MWSC evaluates aggregated street totals, not per-movement values.
3. **Read the five warrant cards** - A Crash Experience, B Sight Distance, C Transition to Signal Control, D 8-Hour Volume, E Other Factors - each MET or NOT MET with its evidence line (for example “0/5 (12mo), 0/6 (36mo)” or “5/8 hrs”).
4. **Check the Warrant D** - Hourly Volume Detail table: each rolling hour’s major and minor totals against the thresholds, with pass flags and the hours selected toward the 8-hour requirement.

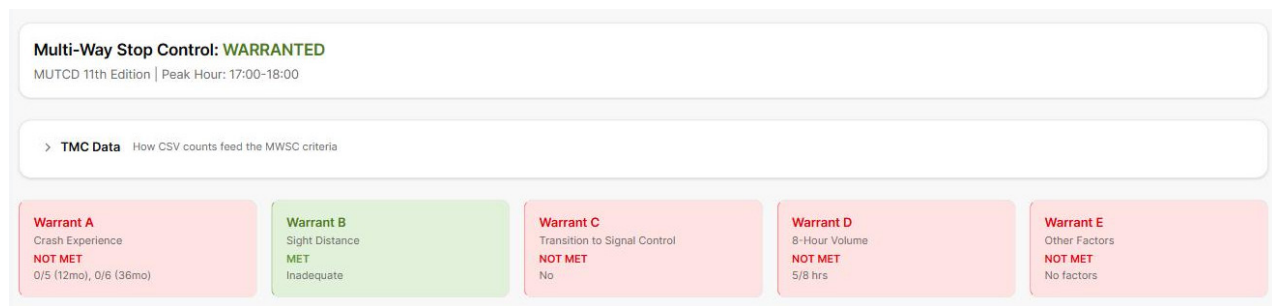


Figure 46. MWSC results: WARRANTED banner, TMC Data panel and the five warrant cards (here Warrant B - Sight Distance is met).

Hour	Label	Major Vol	Minor Vol	Major Threshold	Minor Threshold	Major Pass	Minor Pass	Selected
0	00:00-01:00	130	20	300	200	No	No	No
1	00:15-01:15	125	18	300	200	No	No	No
2	00:30-01:30	120	17	300	200	No	No	No
3	00:45-01:45	115	16	300	200	No	No	No
4	01:00-02:00	110	15	300	200	No	No	No
5	01:15-02:15	108	15	300	200	No	No	No
6	01:30-02:30	105	14	300	200	No	No	No
7	01:45-02:45	102	13	300	200	No	No	No
8	02:00-03:00	100	12	300	200	No	No	No

Figure 47. Warrant D hourly volume detail (thresholds Major ≥ 300 and Minor ≥ 200 units/hr).

6.4. Methodology summary

- **Warrant A** - Crash Experience (§2B.13): 4-leg → 5 crashes/12 mo or → 6/36 mo; 3-leg → 4/12 mo or → 5/36 mo; either period suffices.
- **Warrant B** - Sight Distance (§2B.14): insufficient sight distance on one or more minor approaches; qualitative engineering judgment.
- **Warrant C** - Transition to Signal Control (§2B.15): interim MWSC while an already-warranted signal is arranged.
- **Warrant D** - 8-Hour Volume (§2B.16): 8 or more of the 93 rolling hours with major → 300 units/hr and minor → 200 units/hr (units = vehicles + pedestrians + bicycles in the 11th Edition). If the 85th-percentile speed exceeds 40 mph the thresholds drop to 70%: 210 / 140.
- **Warrant E** - Other Factors (§2B.17): qualitative assessment as described above.

Multi-Way Stop Control Methodology — MUTCD

MUTCD Multi-Way Stop Control Warrants (11th Edition, 2023) — If any single criterion is met, multi-way stop control is warranted.

11th Edition (2023) — Sections 2B.13–2B.17 Warrants A–E

Five warrants; any one met = MWSC warranted.

Warrant A — Crash Experience [Section 2B.13](#)

Intersection Type	12-Month Threshold	36-Month Threshold
4-leg	≥ 5 crashes	≥ 6 crashes
3-leg	≥ 4 crashes	≥ 5 crashes

Either the 12-month or 36-month threshold being met is sufficient.

Warrant B — Sight Distance [Section 2B.14](#)

Insufficient sight distance on one or more minor-street approaches. Qualitative assessment — requires engineering judgment.

Warrant C — Transition to Signal Control [Section 2B.15](#)

Interim measure while a traffic signal (already warranted) is being arranged. Requires engineering judgment input.

Warrant D — 8-Hour Volume [Section 2B.16](#)

8 or more hours where major ≥ 300 units/hr AND minor ≥ 200 units/hr.

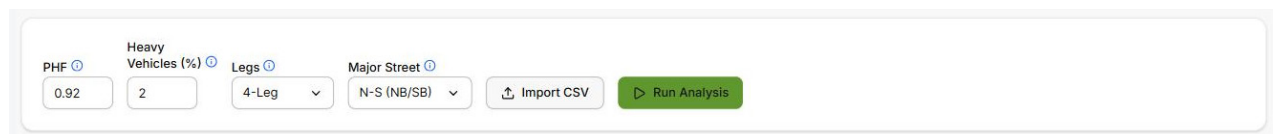
- Speed factor: If 85th percentile > 40 mph → thresholds × 70% (major ≥ 210, minor ≥ 140)

Figure 48. The MWSC methodology dialog summarizes all five warrants and the volume thresholds.

Chapter 7. AWSC Analysis - All-Way Stop LOS (HCM Ch. 21)

7.1. Overview and inputs

The AWSC module computes intersection, approach and lane level of service for an all-way stop using the HCM 7th Edition Chapter 21 iterative departure-headway method: every approach competes for service based on conflict probabilities determined by the utilization of the opposing approaches. Peak-hour movement volumes are extracted automatically from the count set.



The screenshot shows a user interface for entering AWSC inputs. It includes four input fields: 'PHF' with a value of 0.92, 'Heavy Vehicles (%)' with a value of 2, 'Legs' with a dropdown menu set to '4-Leg', and 'Major Street' with a dropdown menu set to 'N-S (NB/SB)'. To the right of these fields are two buttons: 'Import CSV' and 'Run Analysis'.

Figure 49. AWSC inputs: PHF, Heavy Vehicles %, Legs, Major Street, plus Import CSV and Run Analysis.

- **PHF** - peak hour factor (0.50–1.00, default 0.92): converts hourly volumes to flow rates, $v = V / \text{PHF}$ (Eq 21-12).
- **Heavy Vehicles (%)** - trucks, buses, RVs (default 2%): adds $1.7 s \times P_{\text{HV}}$ to the base saturation headway (Exhibit 21-12), reducing capacity on every lane group.
- **Legs** - 4-leg or 3-leg (T): sets the geometry group per Exhibit 21-11 and which conflict cases apply.
- **Major Street** - display and aggregation labeling only; AWSC capacity has no major/minor priority (all approaches yield equally).

7.2. Results

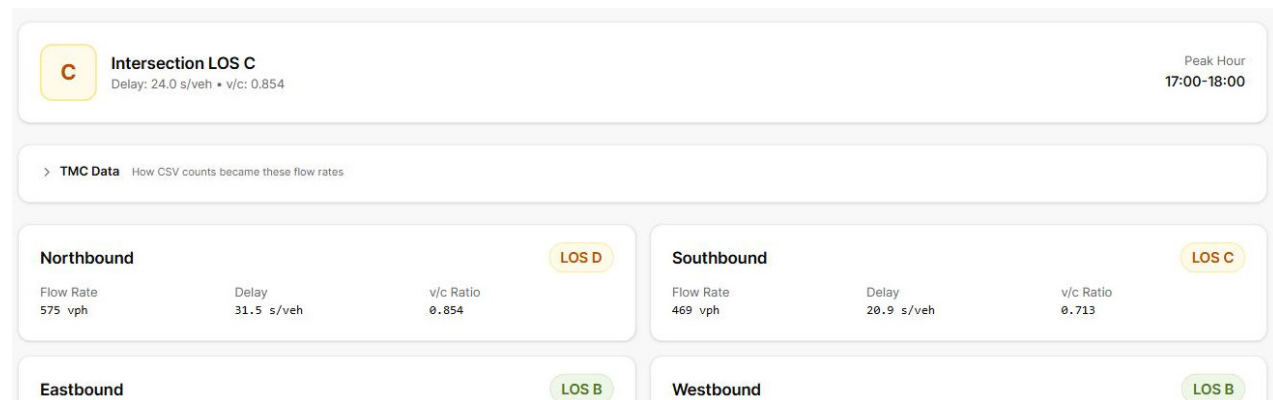


Figure 50. AWSC results: intersection LOS banner (delay and v/c), TMC Data panel, and per-approach cards.

The banner shows the intersection LOS with average control delay (s/veh) and the worst v/c ratio, plus the peak hour used. Approach cards report flow rate, delay, v/c and LOS; the Summary table lists all approaches and the volume-weighted intersection total. LOS letters follow Exhibit 21-8 (A ≤ 10 s to F > 50 s); at lane level, v/c above 1.0 is LOS F regardless of delay.

7.3. Calculation Audit

Expand Calculation Audit ("HCM Ch. 21 step-by-step") for the per-lane verification table - flow, capacity, service time t_s , departure headway h_d , v/c, delay and 95th-percentile queue - with each column tied to its HCM equation (hover the column headers). The same data is stored with the study for inclusion in reports. The engine iterates the departure headway (initial 3.2 s, up to 30 cycles, 0.1 s convergence), then capacity = $3600 / h_d$, delay per Eq 21-30 and Q95 per Eq 21-33.

Summary									
Approach	Flow (vph)			Delay (s/veh)		v/c Ratio		LOS	
Northbound	575			31.5		0.854		LOS D	
Southbound	469			20.9		0.713		LOS C	
Eastbound	179			12.5		0.322		LOS B	
Westbound	60			10.7		0.113		LOS B	
Intersection	1283			24.0		0.854		LOS C	

Calculation Audit HCM Ch. 21 step-by-step									
Approach	Lane	Flow (vph) ⓘ	Capacity ⓘ	t_s (s) ⓘ	h_d (s) ⓘ	v/c ⓘ	Delay (s) ⓘ	Q95 ⓘ	LOS
Northbound	LTR	575.0	673.4	3.35	5.35	0.854	31.5	9.8	D
Southbound	LTR	468.5	656.9	3.48	5.48	0.713	20.9	6.0	C
Eastbound	LTR	179.3	557.1	4.46	6.46	0.322	12.5	1.4	B
Westbound	LTR	59.8	527.2	4.83	6.83	0.113	10.7	0.4	B

Hover column headers for HCM equation references. t_s = service time (time to process one vehicle), h_d = departure headway (inverse of capacity). Capacity = 3600 / h_d. The same data is stored with the study for inclusion in reports.

Figure 51. Approach summary and the expanded Calculation Audit with HCM equation references.

Pedestrian and bicycle modes at AWSC intersections have no quantitative HCM methodology (Chapter 21 discusses them qualitatively only) - the methodology dialog's "Not Implemented" section quotes the HCM on this, and the Multimodal summary marks those columns not applicable for AWSC sources.

Chapter 8. Signalized LOS (HCM Ch. 19)

8.1. Overview and global inputs

The Signalized LOS module implements HCM 7th Edition Chapters 19 and 31: control delay $d = d + d + d$ (uniform, incremental, initial-queue), protected / permitted / protected-permitted left turns, the full set of saturation-flow adjustment factors, pedestrian and bicycle LOS, and queue analysis. It is the most configurable module; sensible defaults are provided throughout.

Figure 52. Global inputs: Control Type, PHF, Base Saturation Flow, Major Street, CAV % and CBD Area.

- **Control Type** - Pretimed (your phase greens feed the delay equation directly), Actuated (the engine runs the full HCM Ch. 31 Section 2 phase-duration procedure - queue service, green extension, gap-out), or Coordinated (Section 2 with the cycle pinned to the coordination plan and Step P balancing).
- **Peak Hour Factor** - $v = V / PHF$ (Eq 19-7); default 0.92.
- **Base Sat Flow** - s per Exhibit 19-11: 1,900 pc/h/ln for metropolitan areas of 250,000+ population, 1,750 otherwise. Feeds $s = s \times f_w \times f_{HVg} \times f_p \times f_{bb} \times f_a \times f_{LU} \times f_{LT} \times f_{RT}$ (Eq 19-8).
- **Connected/Autonomous Vehicles (%)** - future-condition lever per Exhibits 31-64/65/66; leave 0 for present-day analysis.
- **CBD Area** - reduces saturation flow by 10% for downtown conditions.

8.2. Signal Timing

Signal Timing Cycle: 112s

2-Phase 4-Phase Protected LT 8-Phase NEMA Cycle Override (s) auto

Phase	Green (s)	Yellow (s)	All-Red (s)	Total (s)	Walk Time (s)	Ped Clearance (s)
Phase 1	15	4	1	20.0	0	0
Phase 2	35	4	1	40.0	0	0
Phase 3	12	4	1	17.0	0	0
Phase 4	30	4	1	35.0	0	0

+ Add Phase

Figure 53. Signal Timing: phase presets, cycle badge, per-phase green/yellow/all-red and pedestrian Walk / Ped Clearance columns.

- **Presets** - 2-Phase, 4-Phase Protected LT, 8-Phase NEMA - seed the phase table; add or delete phases as needed. The computed cycle (sum of phase totals) is shown as a badge.
- For Pretimed control the greens are your inputs; for Actuated they become read-only computed values; for Coordinated the cycle is pinned to the plan.
- **Cycle Override (s)** - leave on "auto" to use the phase-table cycle; enter a value only for sensitivity testing against a fixed cycle.
- **Walk Time (s)** - pedestrian WALK interval (MUTCD 4E.06 minimum 7 s); **Ped Clearance (s)** - flashing DON'T WALK, crossing distance ÷ 3.5 ft/s. Leave 0 on phases without pedestrian service.

8.3. Lane Configuration

Northbound Arrival Type AT-3

Show Advanced + Add Lane Group

Movement	Lanes	Phase	LT Mode	Width	Grade%	HV%	Parking/hr	Bus/hr
Left Only	1	Ph 1	Protected	12	0	2	0	0
Through + Right	2	Ph 2	Protected	12	0	2	0	0

Figure 54. Lane Configuration - one panel per approach with Arrival Type and one row per lane group.

Each approach panel defines its lane groups: Movement (Left Only, Through + Right, ...), Lanes, assigned Phase, LT Mode (Protected / Permitted / Prot-Perm), lane Width (factor f_w per

Exhibit 19-20), Grade % and HV % (combined heavy-vehicle/grade factor f_{HVg} , Eqs 19-9/10), Parking maneuvers/hr (Eq 19-11) and Bus stops/hr (Eq 19-12). Arrival Type (AT-1 worst ... AT-6 best, default AT-3 random/isolated, Exhibit 19-13) applies to the whole approach and drives the progression factor in uniform delay. Show Advanced exposes further options; + Add Lane Group adds rows. Lane configuration drives capacity $c = N \times s \times g/C$ (Eq 19-16) and permitted-LT capacity per Chapter 31 Section 6.

8.4. Advanced Analysis

Optional HCM saturation-flow adjustments for special conditions - leave disabled unless the condition applies: Ped/Bike Conflict Factors (f_{Lpb} , f_{Rpb}), Work Zone (f_{wz}), Downstream Blockage (f_{ms}) and Sustained Spillback (f_{sp}).

8.5. Pedestrian LOS

▼ Pedestrian LOS ⓘ

☒ Compute Pedestrian LOS

ⓘ Conflict vehicle volumes — Major Volume, RTOR Vol, and Permitted-LT Vol — auto-populate from peak-hour TMC data and Lane Configuration when left at 0. Enter a non-zero value to override (e.g., for sensitivity testing); the override is saved with the study and used by the engine. Each Run Analysis creates a new study snapshot — the previous study's values are preserved separately.

Northbound Crosswalk

Phase ⓘ Ph 1	Walk (s) ⓘ 7	Pedestrian Clearance (s) ⓘ 15	Lanes Crossed ⓘ 4
85th Speed (mph) ⓘ	Major Volume (veh/h) ⓘ	Crosswalk Length (ft) ⓘ	Crosswalk Width (ft) ⓘ

Figure 55. Per-crosswalk pedestrian inputs (Northbound crosswalk shown).

Check Compute Pedestrian LOS to score each crosswalk A–F per HCM Chapter 19 Section 5 (Eqs 19-55–19-60) - recommended for multimodal, school, downtown or transit-adjacent studies. Per crosswalk: serving Phase, Walk and Pedestrian Clearance times, Lanes Crossed, 85th-percentile Speed, Crosswalk Length and Width, and the Ped Head Signal / Rest in Walk flags. Conflict vehicle volumes (major volume, RTOR, permitted-LT) auto-populate from the peak-hour TMC data and lane configuration when left at 0 - enter values only to override; overrides are saved with the study. A Conflict Volumes & Corner / Crosswalk Geometry (Advanced) link exposes the full geometry.

8.6. Bicycle LOS

▼ Bicycle LOS ⓘ

☒ Compute Bicycle LOS

① Vehicle conflict volumes for the F_v score factor (HCM Eq 19-110: $v_{ik} + v_{ij} + v_{ji}$) are auto-populated from peak-hour TMC data and do not appear as input fields here. **Bicycle Volume** below auto-populates from the TMC *_bike columns at peak hour when left at 0; enter a non-zero value to override (saved with the study and used by the engine). Bike Volume drives bike capacity / delay (informational columns) but does NOT affect the LOS score.

Northbound

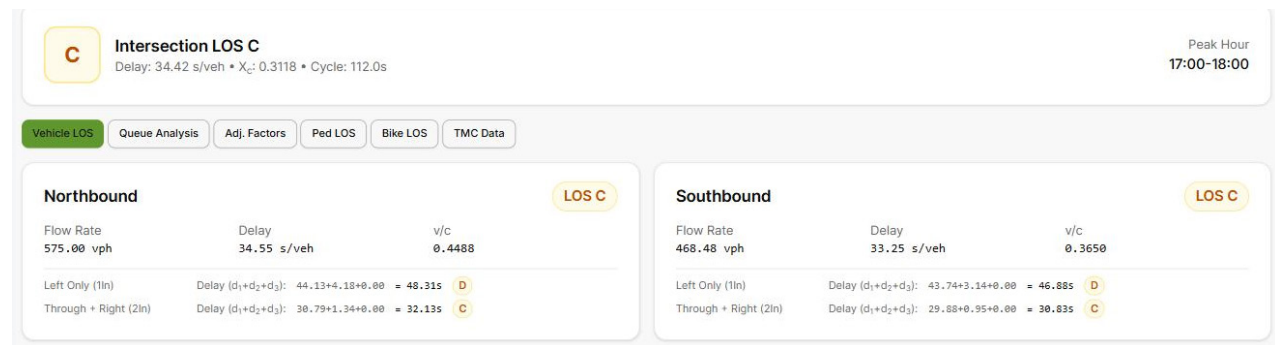
Phase Ph 1	Bicycle Volume (b/h) ⓘ 0	Cross Street Width (ft) 48	Outside Lane (ft) 12
Bike Lane (ft) 0	Shoulder (ft) 0	Parking Lane (ft) 0	Parking Occupancy % 0

☒ Has Curb

Figure 56. Per-approach bicycle inputs.

Check Compute Bicycle LOS to score each approach A–F per Eqs 19-106–19-110. Inputs per approach: Phase, Bicycle Volume (auto-populated from the count set's bike columns; informational for capacity/delay and not part of the LOS score), Cross Street Width, Outside Lane / Bike Lane / Shoulder / Parking Lane widths, Parking Occupancy % and Has Curb.

8.7. Results

Figure 57. Signalized results: LOS banner with delay, critical ratio and cycle; result tabs; per-approach cards with the $d_1+d_2+d_3$ delay build-up per lane group.

The banner reports intersection LOS, control delay, the critical intersection v/c ratio X_c and the cycle. Six tabs break the results down:

- **Vehicle LOS** - approach cards with flow, delay, v/c and per-lane-group delay components ($d + d + d = \text{total}$, with LOS chip).
- **Queue Analysis** - per movement: v/c, back of queue, 95th-percentile queue (veh) and queue storage ratio R_Q (Eqs 31-130–31-156).

- **Adj. Factors** - every saturation-flow factor per lane group (f_w , f_{HVg} , f_p , f_{bb} , f_a , f_{LU} , f_{LT} , f_{RT} , f_{wz} , f_{Lpb} , f_{Rpb} , f_{ms} , f_{sp} and the upstream filter I) - non-unity values are highlighted.
- **Ped LOS** - per crosswalk: effective walk, pedestrian delay, the F_w / F_v / F_s / F_{delay} factors, LOS score and corner/crosswalk circulation areas.
- **Bike LOS** - per approach: bike capacity, bike delay, F_w / F_v factors, LOS score and LOS.
- **TMC Data** - how the CSV counts became the flow rates used.

Vehicle LOS

Queue Analysis

Adj. Factors

Ped LOS

Bike LOS

TMC Data

Queue Analysis

Approach	Movement	Lanes	v/c Ratio	Back of Queue (veh)	95th Pctile Queue (veh)	Queue Storage Ratio (RQ)
Northbound	Left Only	1	0.360	2.7	5.4	0.000
	Through + Right	2	0.449	12.6	18.4	0.000
Southbound	Left Only	1	0.296	2.2	4.6	0.000

Figure 58. Queue Analysis tab.

Vehicle LOS

Queue Analysis

Adj. Factors

Ped LOS

Bike LOS

TMC Data

Pedestrian LOS

Crosswalk	Effective Walk (s)	Ped Delay (s/ped)	F _w Width ⓘ	F _v Volume ⓘ	F _s Speed ⓘ	F _{delay} Delay ⓘ	LOS Score ⓘ	Corner Area (ft²/ped)	Crosswalk Area (ft²/ped)	LOS
Northbound	11.00	45.54	1.3887	0.0000	0.0563	0.1531	2.198	999.00	999.00	B
Southbound	11.00	45.54	1.3887	0.0000	0.0563	0.1531	2.198	999.00	999.00	B
Eastbound	11.00	45.54	1.3887	0.0000	0.4095	0.1531	2.551	999.00	999.00	C

Figure 59. Pedestrian LOS tab.

8.8. Methodology notes

View Methodology documents the full computation: LOS thresholds (Exhibit 19-8; note $v/c > 1.0$ forces F), saturation flow (Eq 19-8), key equations (capacity Eq 19-16; uniform delay Eq 19-19 with progression factor from arrival type; incremental delay Eq 19-26 with $k = 0.50$ pretimed or Eqs 19-22–25 actuated; initial-queue delay Eqs 19-44–49), left-turn modes (Ch. 31 §6), the actuated phase-duration procedure (Ch. 31 §2, validated against HCM Exhibit 31-79 within $\pm 5\%$ per-phase and ± 1 s of the 101.8 s cycle), pedestrian and bicycle LOS, and queue analysis - plus explicit known limitations (for example, shared-lane permitted LT approximation, no Dallas phasing, Step P single coordinated pair).

Chapter 9. TWSC Analysis - Two-Way Stop LOS (HCM Ch. 20)

9.1. Overview and inputs

The TWSC module analyzes minor-street stop control with the HCM Chapter 20 gap-acceptance method: priority-ranked movements, conflicting flows, critical and follow-up headways, impedance, and movement capacity. Major-street through and right movements are free-flowing (Rank 1, zero control delay); LOS is reported for the stop-controlled movements and minor approaches only - per Exhibit 20-2 there is no intersection-level LOS, so the banner shows N/A by design.

The screenshot shows a web-based input form for the TWSC analysis. At the top, there are five input fields: 'PHF' with a value of 0.92, 'Heavy Vehicles (%)' with a value of 2, 'Grade (%)' with a value of 0, 'Legs' with a dropdown menu showing '4-Leg', and 'Major Street' with a dropdown menu showing 'N-S (NB/SB)'. To the right of these fields are two buttons: 'Import CSV' and 'Run Analysis'. Below the input fields are four expandable sections, each with a chevron icon and a link icon: 'Pedestrian Volumes — groups/hr (optional)', 'Geometry Configuration (optional)', 'Upstream Signal (optional)', and 'Pedestrian LOS Analysis (optional)'.

Figure 60. TWSC inputs and the optional sections for pedestrian volumes, geometry, upstream signal and pedestrian LOS.

- **PHF, Heavy Vehicles %** - as in the other modules (HV raises critical and follow-up headways per Eqs 20-16/20-17).
- **Grade (%)** - minor-approach grade; affects critical headway ($t_{c,G}$) for minor-street movements only.
- **Legs** - 4-leg or 3-leg (T); a T-intersection applies the 0.7 s reduction to the minor LT critical headway.
- **Pedestrian Volumes** - groups/hr (optional) - crosswalk pedestrian groups v13–v16 (HCM movement numbers). Leave 0 to use the TMC peak-hour counts; after a run the fields display the values used.

- **Geometry Configuration (optional)** - lane and median details beyond the defaults.
- **Upstream Signal (optional)** - when a signal lies within about 500 ft upstream, arrivals are platooned; Eqs 20-19/20/21 adjust capacity for the proportion of time blocked. Leave disabled for isolated locations.
- **Pedestrian LOS Analysis (optional)** - HCM Ch. 20 Section 5 perception-based pedestrian LOS for crossing the major street (Eqs 20-76–20-99); off by default and inert unless enabled.

9.2. Results

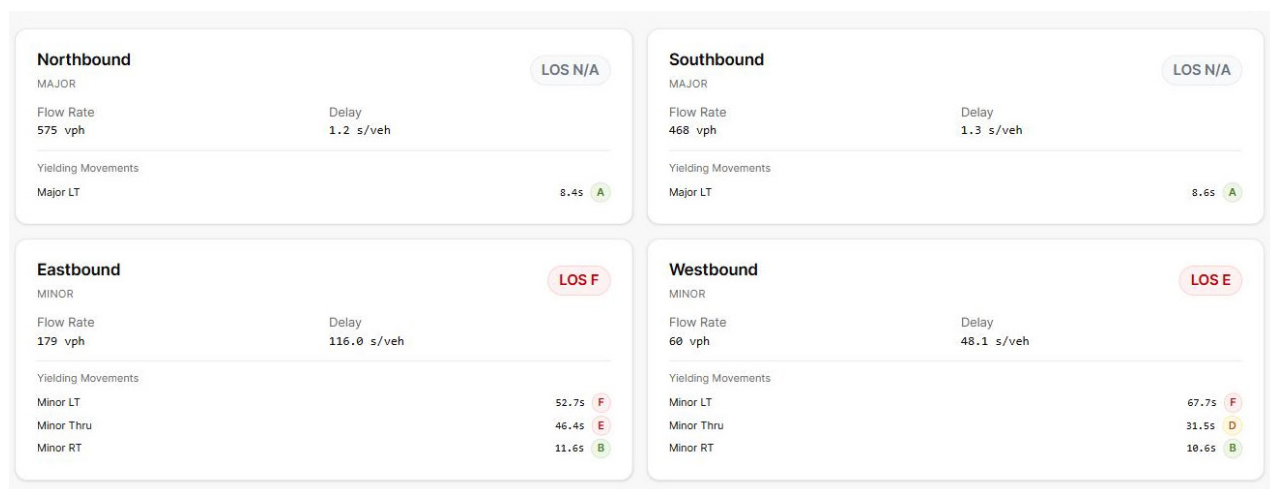


Figure 61. TWSC results: major approaches report negligible delay (LOS N/A at approach level for majors); minor approaches carry the LOS - here EB is LOS F with its yielding movements broken out.

The banner reports the average intersection delay for reference, the worst movement (for example “Minor LT (WB) - LOS F”) and the peak hour. Approach cards list each yielding movement with its delay and LOS. The Movement Details table gives rank, flow, conflicting flow, capacity, v/c, delay, Q95 and LOS per movement; values shown as “> 999” mean the movement has effectively zero capacity - demand exists but no acceptable gaps are available.

Chapter 10. Multimodal LOS Summary

10.1. The summary view

Multimodal LOS is a roll-up, not a calculation module: it assembles Auto, Pedestrian, Bicycle and Queue Storage performance for each intersection from the studies you have already run, following the HCM Chapter 16 multimodal evaluation framework. By default an intersection appears when its studies populate two or more of the four cards; toggle Include single-mode intersections to see the rest. The coverage mapping: Signalized → Auto, Pedestrian, Bicycle; TWSC → Auto, Pedestrian; AWSC and Roundabout → Auto; Queue Storage → Queue; Ped & Bike → Pedestrian, Bicycle.

Multimodal LOS Summary					
Auto, pedestrian, bicycle & queue storage performance summary across your projects (Intersections with multi-modal studies only)					
<i>Coverage rule</i> By default, an intersection appears here when its studies populate 2 or more of the four cards (Auto, Pedestrian, Bicycle, Queue) — the multi-modal coverage view. Use the toggle below to also include single-mode intersections (AWSC alone, Roundabout alone, Queue Storage alone, etc.). Mapping: Signalized → Auto, Pedestrian, Bicycle TWSC → Auto, Pedestrian (Section 5) AWSC → Auto only Roundabout → Auto only Queue Storage → Queue only Ped & Bike → Pedestrian, Bicycle (LTS & PHB) Why these products? HCM Ch.16 Section 2 defines the multimodal evaluation framework; this view implements Auto, Pedestrian, and Bicycle from that framework, plus Queue Storage (HCM Ch.31 Section 4) as a fourth card — operators find it useful at the same intersection scope. School Zone, Arterial, Signal Warrants, and Turn Lane are different analyses (zone scope, corridor scope, or design questions rather than LOS) — see the Methodology dialog for the full scope rationale.					
☐ Include single-mode intersections					
Project	Intersection	Streets	Source Studies	Modes Available	Latest Activity
User Guide Demo	Main St & 1st Ave	Main St & 1st Ave	AWSC Signalized TWSC	Auto Bike Ped	22/07/2026, 08:24
95th Street	95th and Santa Fe Trail Dr	VL11 & BD12	AWSC Ped & Bike Queue Roundabout Signalized TWSC	Auto Bike Ped Queue	20/07/2026, 06:57
Test	Intersection Test	1st Ave & 2nd Ave	Ped & Bike	Bike Ped	25/06/2026, 18:27

Figure 62. Multimodal LOS Summary: coverage rule, and one row per intersection with source studies, modes available and latest activity.

10.2. The details view

Click a row to open the Multimodal LOS Details. Every candidate source with usable results is stacked on each card in priority order (most authoritative on top - for Auto: Signalized → AWSC →

TWSC Roundabout; Pedestrian: Signalized TWSC; Bicycle: Signalized only), each row tagged with its source study and count set, with View study links. A TMC Data Entry selector can pin every card to a specific count set instead of “latest across all sets”. Approach Breakdown tables per auto source show approach LOS, delay and v/c together with the Ped and Bike LOS where the source provides them.

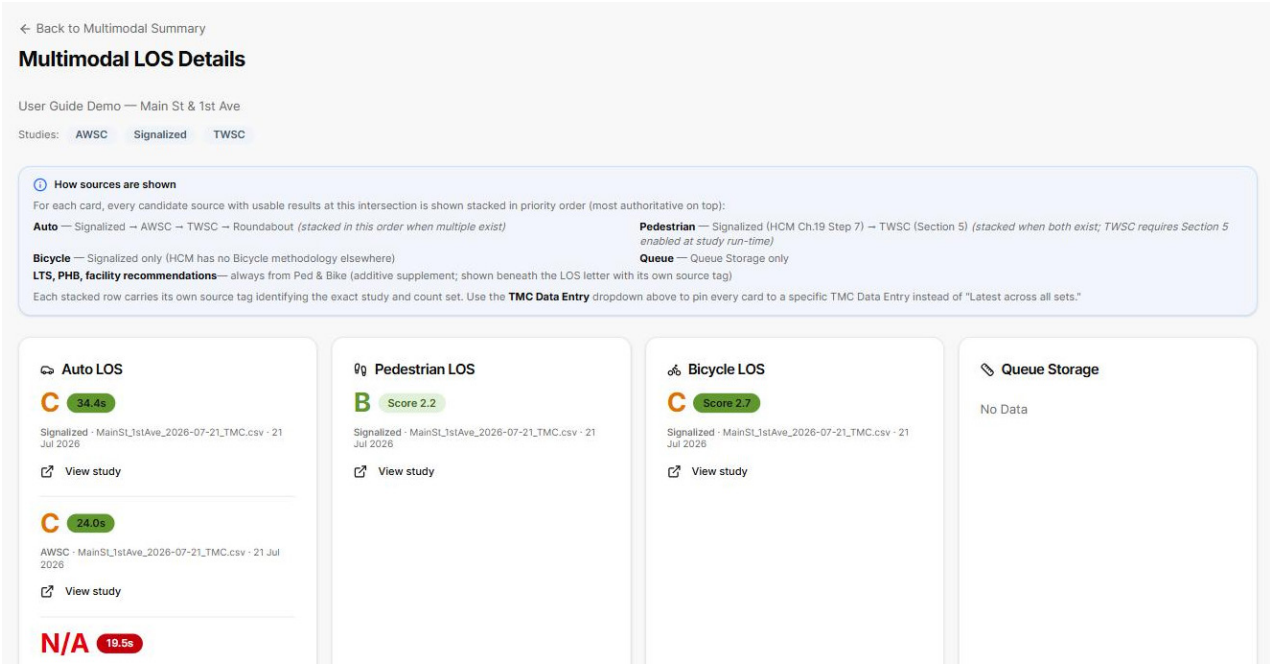


Figure 63. Multimodal LOS Details: the four cards with stacked, source-tagged results.

Approach Breakdown — Auto source: Signalized

Approach	Auto LOS	Auto Delay	v/c Ratio	Ped LOS	Bike LOS
NB	C	34.5s	0.45	B	C
SB	C	33.3s	0.36	B	C
EB	D	36.9s	0.28	C	B
WB	D	35.0s	0.09	C	B

Figure 64. Approach breakdown from the Signalized source, including Ped and Bike LOS columns.

We trust that the
information here is
helpful.

If you have any further
questions or require further
support, please don't
hesitate to reach out to us:



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