Task 2017-08 Appendix I
Complete Survey Results

Appendix I contains the complete responses to the informal survey conducted through the ITE All Member Forum.

Hennepin County, Minnesota

Ben Hao, PE, PTOE
Traffic Management Center, Transportation Department – Traffic Operations
Hennepin County Public Works

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  Hennepin County Traffic operations maintains a total of 460 traffic signals. A total of about 80 to 100 signals are retimed each year.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  1. Retime each signal and major corridor once at a minimum of every 5 years.
  2. Retime corridors with high crash rates and high volume or traffic pattern changes as needed
  3. Retime corridors with high signal timing requests

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  1. LOS at movement level for peak and off-peak periods
  2. Before and After Daily and Annual MOEs from Synchro Models: Delay, Stops, Fuel, Emissions at network level
  3. Before and After Travel Times by direction at corridor level measured by probe vehicles from the field for AM and PM peak periods.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  Not yet. We are currently working on implementing and assessing traffic responsive signal control strategy. The adaptive signal control (ASC) would be considered in the next phase. As to the MOEs for ASC evaluation, it is anticipated that the advanced traffic management system (ATMS) would be able to provide or generate system performance measures (SPM) to help evaluate adaptive signal control efficiency and benefits at corridor level. In addition to travel time collected in the field, the SPM provided by ATMS could be volume rate, occupancy and speed data collected by the field detectors and advanced MOEs derived by the ATMS, such as arrivals on green, throughput, volume to capacity ratio, coordination diagram, phase termination charts, split monitors and others.

Campbell, California

Matthew Jue, PE, PTOE, Traffic Engineer
City of Campbell

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  44 (soon to be 45). Retiming occurs if grant funding becomes available.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  Age of signal timing plans; whether traffic volumes or patterns on corridors have changed.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  Travel time runs are used for measuring before/after travel times and delay.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  We've been approached by two vendors of adaptive signal control. Since adaptive signal control would be new to us, we pay attention to word-of-mouth from other agencies or consultants. For example, one vendor in particular specifies the use of its own detection systems rather than the City's current detectors. We have candidate corridors that are 1) challenging corridors or 2) are simple enough that it wouldn't be a complete disaster if the adaptive system didn't work well.

Washington County, Oregon

Shaun Quayle, PE, Transportation Engineer
Washington County Department of Land Use & Transportation

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  We maintain approximately 300 signals. Last year we retimed approximately 50 signals.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  Measured or observed congestion, and citizen complaints drive our signal retiming efforts.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  Yes, we have 125 roadside Bluetooth readers plus signal controller logs that we use to evaluate the effectiveness of signal timing, plus we spend multiple days in the field gauging before and after performance and fine-tuning parameters, then monitor in an ongoing basis with Bluetooth reports and watching via PTZ CCTV cameras. Our primary metrics for effectiveness are corridor travel time, queuing/queue spillback, and cycle/split failures . . . we strive to reduce each.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  Yes, we have approximately 30 intersections running on the SCATS adaptive system, another 12 running on the InSync adaptive system and are currently considering adaptive on 27 additional intersections. Candidates for adaptive are often corridors at or over capacity, and experience unpredictable traffic volume changes. We measure the effectiveness on-street of an adaptive system equivalently to our time-of-day systems. We also judge the success of the adaptive system by its ease of maintenance and operations. Some systems are much easier to work with than others.

Clark County, Washington

Richard W. Gamble, PE, Intelligent Transportation Systems Manager
Clark County Public Works

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  We have about 100 signals and we don't have a schedule on when they get retimed. We have a project we're working on to address this issue.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  We do it based upon need or citizen complaint. Our signals operate quite dynamically though so they already have a lot of flexibility in their timing. We've added traffic responsive to the signals over the last couple of years.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  We will be doing a study next month to compare travel time with floating car vs. Bluetooth, vs INRIX. We hope to have some data on this by this summer. The goal of this is to try and develop some performance metrics to decide when a corridor should be retimed rather than putting corridors on a schedule. The hope is that the software algorithm or methodology we develop with this program will tell us when a corridor needs to be retimed. At this time, we are looking at several metrics and we don't know which one is going to be the preferred one.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  We are exploring adaptive signal control but have not implanted at this point. I believe we have a project this year or next that will deploy our first adaptive corridor.

Orange County, California

Ronald Keith, TSOS, Project Manager III
Orange County Transportation Authority

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  I am the Project Manager for the Regional Traffic Signal Synchronization Program for OCTA. It is called Project P. There are over 2000 intersections on this network. The 34 local agencies, the County of Orange, and Caltrans own and maintain these signals. The program is competitive between the agencies and the County. Caltrans is a participant but they cannot compete. Each year a call for projects is issued with a finite amount of funding to improve infrastructure and communications to the newest ATMS and ATC standards.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  The corridors are awarded points based on VMT, number of intersections, number of agencies participating, and if it is on the Master Plan of Arterial Highways (MPAH), the Signal Synchronization Network, and/or if it has been designated a Priority Corridor. All projects are interjurisdictional in nature. Each project lasts 3 years, 1 for the construction and implementation, followed by a 2-year Ongoing Maintenance and Monitoring period. The project's corridor is ineligible for funding or competition during this 3-year period. OCTA does about 7-12 corridors per year, some of which, by request, are administered by me, internal staff, and my team of on-call consultants. We probably retime about 500-700 intersections per year. Some corridors are on their 3rd iteration because of previous programs or Project P Priority. The Board of Directors assigned which corridors are Priority and they are usually Primary, Major, or Principal arterials on the MPAH.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  We measure the effectiveness by a layman based metric called the Corridor Synchronization Performance Index (CSPI). The CSPI is a scoring of between 30 and 108 based on average speed, number of stops per mile, and ratio of greens to red or if you make it through the intersection on a green or if you get stopped. Everyone can understand these 3 items. A score of 60 or below means you are in dire straits. Above 60, you might consider retiming or taking a close look at what is going on. Above 70 you are doing well. Above 80 and into the upper reaches, you are doing fantastic. The metrics are calculated by doing before and after floating car studies using Tru Traffic. The author of Tru Traffic, Greg Bullock, thought our CSPI was so great, that he wrote an add-on application to Tru Traffic that you can download and it will automatically give you the information.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  Very few of our agencies have explored Adaptive. None of them, to date, even use the Traffic Responsive features of their respective ATMS to turn on or off the plans from real time traffic data. Set it and leave it doesn't work for any system. I hope those that are planning Adaptive realize this and provide the resources for operating their systems as much as is possible; 24/7. Traffic is still happening at 6pm when you turn out the lights and go home.

Salt Lake City, Utah

Mark Taylor, PE, PTOE, Traffic Signal Operations Engineer
Utah DOT

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  We maintain 1220 traffic signals. My timing staff keeps track of the ones formally retimed, however, it varies each year based off of need and budget. Due to Utah's grid network, often changing the timing on one corridor will result in several other cross corridors needing to be retimed.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  Yes and No. No, we use a lot of engineering judgement in deciding if full retiming is necessary (new cycle length, splits, offsets), or if simply polishing up the existing plans is best. Yes, we use Automated Traffic Signal Performance Measures (ATSPMs http://udottraffic.utah.gov/atspm) extensively in helping us decide which areas may need to be retimed and if so, we use the real measured data from the ATSPMs to help us know what the timings should be (instead of collecting TMCs and going through the full modeling experience). For example, the traditional optimization process is to collect TMCs manually (by TOD), model for cycle length, splits, offsets, optimize the model, implement and fine-tune. Using ATSPMs, we will first Review ATSPMs in detail and conduct lots of field observations, Models are primarily used for just their time-space diagrams (not cycle length or split assessments). The ATSPMs are helpful with split allocation, progression quality, identifying overcapacity movements, vehicle counts for TOD schedule and progression balance. During implementation it is extremely helpful to be able to review operation of the new plans immediately or the next day.

  There are many other ways we use ATSPMs when optimizing a signal or corridor. The split monitor can tell you whether splits are allocated appropriately, negating the need for most TMCs. The Purdue Coordination Diagram can tell you how large your main street platoons are and if you have wasted time in the cycle, as well as how many vehicles arrive during the green phase. Approach volumes (collected automatically) can determine whether one-way or two-way progression is desired.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  On major retiming projects we will write a memo that we keep so that not only explain any improvements collected with ATSPMs (i.e. # of split failures before and after, platoon ratios, etc.), but help us understand some of the reasons why we timed certain corridors the way we did so to minimize "screw-driver drift" and make future retiming projects easier. We are also starting to use probe travel time data (HERE) and will start to evaluate in more detail travel time.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  Yes, we have three adaptive systems in use on some of our signals. Two are off the shelf systems and one was created in-house by my staff. I believe adaptive control has some

benefits in some areas but believe that TOD plans that are well maintained may outperform adaptive control in other areas. In other words, I'm not a believer in "adaptive control" everywhere. I think the decision to use "off the shelf adaptive" needs to be carefully reviewed using the systems engineering approach that also factors in the extremely high level of support maintenance that they require as well as the abundant maintenance costs. Just FYI, we spend much, much more time maintaining & babysitting our adaptive systems than we do our TOD systems.

Federal Way, Washington

Richard Perez, PE, City Traffic Engineer
City of Federal Way

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  We have 77 traffic signals and coordinate with state DOT on 3 more, and the County on 2 more. Only 6 City-owned signals will not have some type of interconnect by the end of the year. Since so many of them run as pretty much one system during the evening peak, we tend to marshal our resources every 3-5 years and retime everything at once.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  Other than system-wide efforts, just tweaks in response to requests.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  Currently we only are using travel time runs.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  Reviewing even one week of tube counts on many of our corridors amply shows that there is enough day-to-day variation to demonstrate that time-of-day plans (we run 4-10 plans a week per intersection) can't adequately address the variation, even without considering overflow effects from the freeway system. After 20 years of planting seeds, we are finally getting into Adaptive. Our first phase will cover over half of our signals and should be operating in late 2019 or early 2020. We expect to implement automated signal performance measures as part of the project.

Medford, Oregon

Karl MacNair, Transportation Manager
City of Medford

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  Approximately 120.

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  Nothing written. It's based on citizen input and local knowledge.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  We are currently only able to use travel time runs and traffic volumes, but would like to get SPM's in place in the long term.

- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  We have one adaptive corridor using InSync by Rhythm Engineering. We have seen a large increase in volume in the corridor without seeing an increase in congestion.

Toronto, Canada

Rajnath Bissessar, PE, Manager, ITS Operations
City of Toronto

- *How many signals does your agency maintain, and of those how many are retimed each year?*
  2,350 signals. We started a signal optimization program in 2012 and have retimed an average of 260 signals per year. More info on this program is on our website (https://www.toronto.ca/services-payments/streets-parking-transportation/traffic-management/traffic-signals-street-signs/signal-optimization-coordination-program/).

- *Does your agency have any sort of guidelines or rules used to prioritize intersections or corridors to be retimed? If so, what are those?*
  When undertaking the program, our focus was to concentrate on the major arterials. Since we had undertaken only a few comprehensive studies in the years prior to 2012, we choose the more heavily trafficked major arterials as our first priority. Even though we had originally planned to complete all the major arterials by 2016, we did not meet the target; we are hoping to compete the major arterials this year. We do not see much value in doing full blown coordination studies on the minor arterials and collectors – we are using basic time space diagrams to fill in the minor arterials and collectors. When we start the next round of coordination studies in 2019, we plan to concentrate on routes where there has been changes in traffic patterns or volumes. We will be using HERE data for that exercise since we have a three-year contract with HERE.

- *Does your agency measure the effectiveness of retiming operations? What metrics are preferred? What data sources (e.g., travel time runs, INRIX or other probe data) are used?*
  We report to the public on MOEs generated by Synchro software. We use a combination of floating car method (using GPS software), portable and fixed Bluetooth readers, and HERE data. The following MOEs are reported: vehicle delay (hr), stops (#), average speed (km/h), fuel consumed (L) and greenhouse gas emissions (kg). In addition, an overall benefit-cost analysis is developed for each individual corridor.

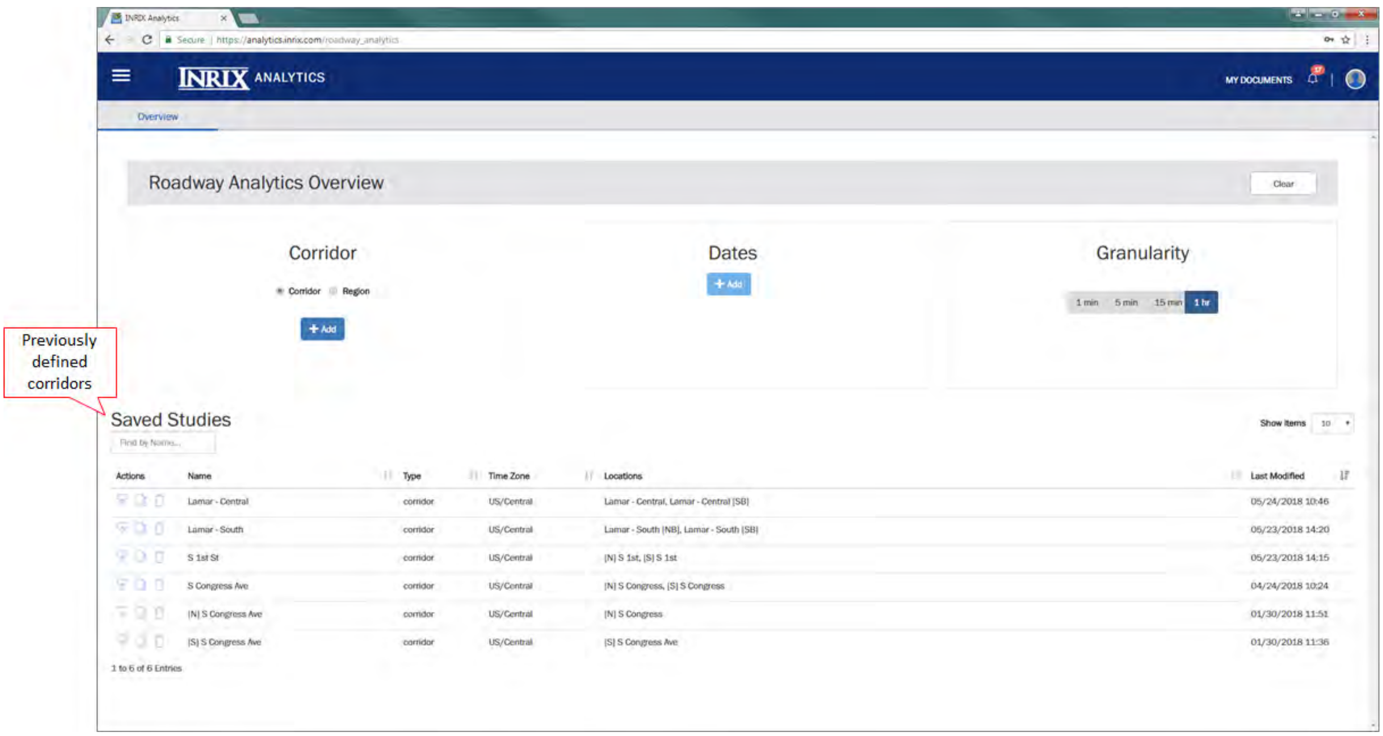
- *Has your agency used or explored the use of Adaptive Signal Control? If so, how do you evaluate candidate corridors, and measure the effectiveness?*
  We installed a SCOOT system about 20 years. We currently have about 300 signals on SCOOT. The routes chosen for SCOOT were generally parallel to major expressways – to accommodate the overflow of traffic during planned maintenance shutdowns or during incidents. We had SCOOT in the downtown core, but most of these signals have been converted to the conventional traffic system (TransSuite TCS) – there was not much benefit in having SCOOT in the downtown because of the need to keep cycle lengths low due to pedestrian wait time issues – hence, there was no room to optimize splits. We are piloting two "new" adaptive technologies this year - InSync and SCATS – 10 signals each. These two routes are currently on the TranSuite TCS and were optimized within the past three years. The TransSuite optimized timings will be used as the baseline. The main MOE that will be used is travel time on the main street (derived from floating car and HERE probe data), side street delay and pedestrian delay.

Task 2017-08 Appendix II
Data Acquisition How-to

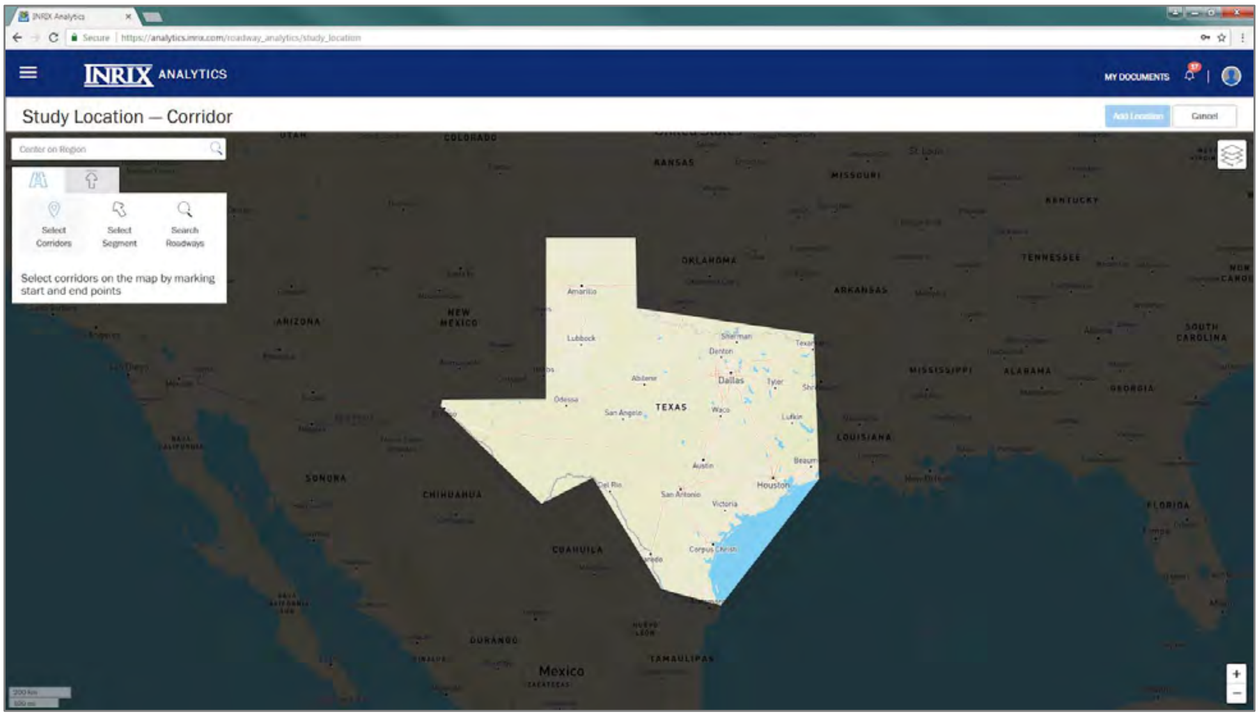
Defining Corridors

The City of Austin corridor definitions can be found at http://transportation.austintexas.io/signal-timing/. Only about one-third of all CoA corridors are retimed each year so, in order to view all corridors switch between the fiscal year tabs at the top. Selecting one signal on the maps will highlight all of the signals in that corridor. Some corridors include signals that are on adjacent roadways. For the purpose of this analysis, each corridor should be understood as the principle collection of signals in the grouping which are along the same roadway. In most cases, the adjacent signals can be disregarded for now.

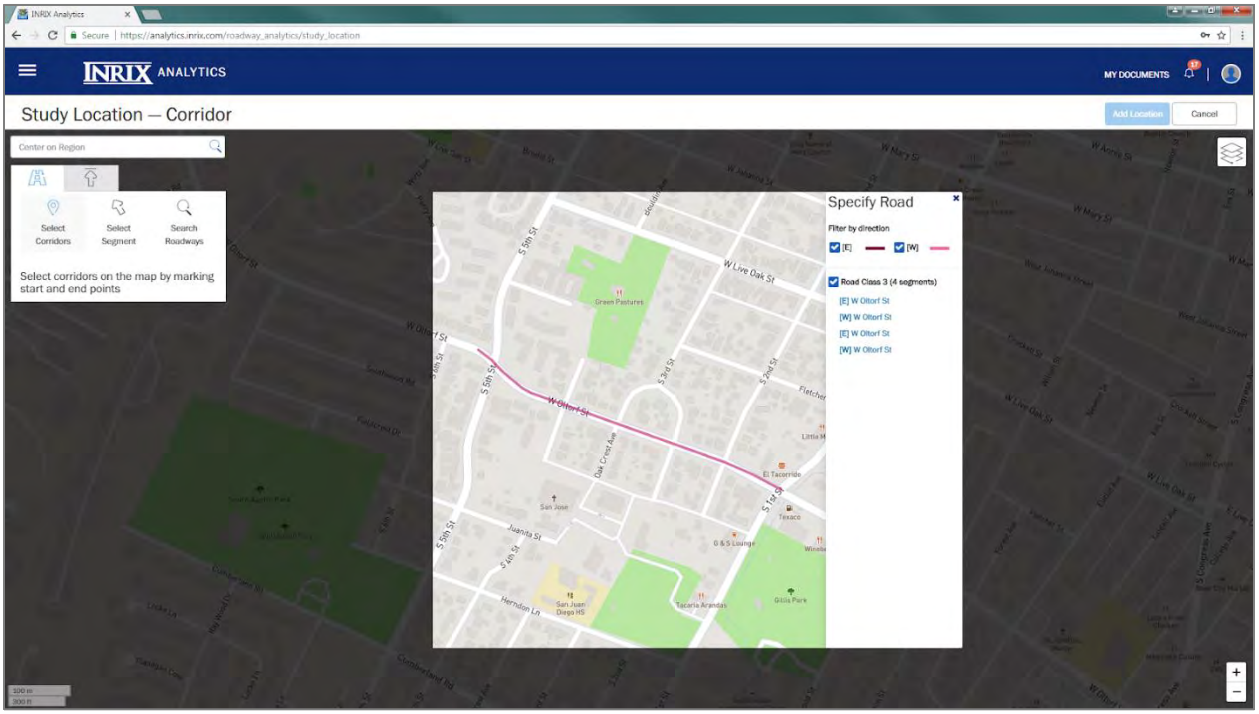
Navigate to INRIX analytics homepage (https://analytics.inrix.com/roadway_analytics) and log in.



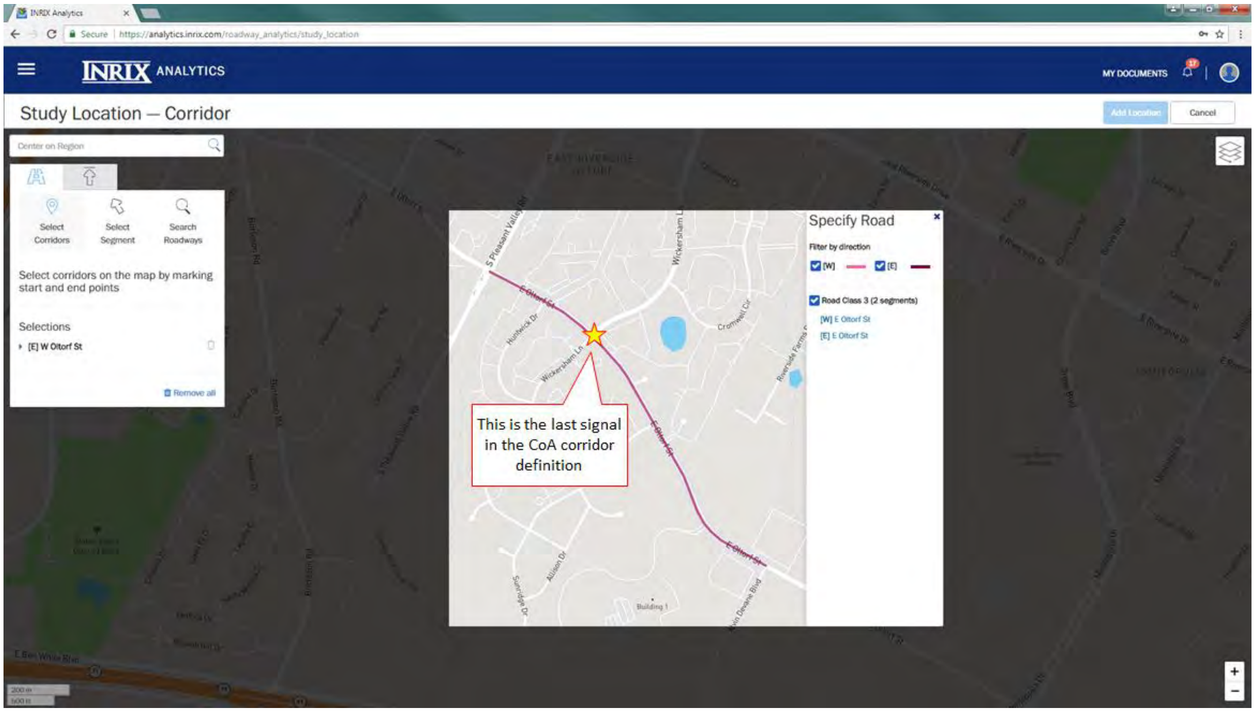
Add a corridor:



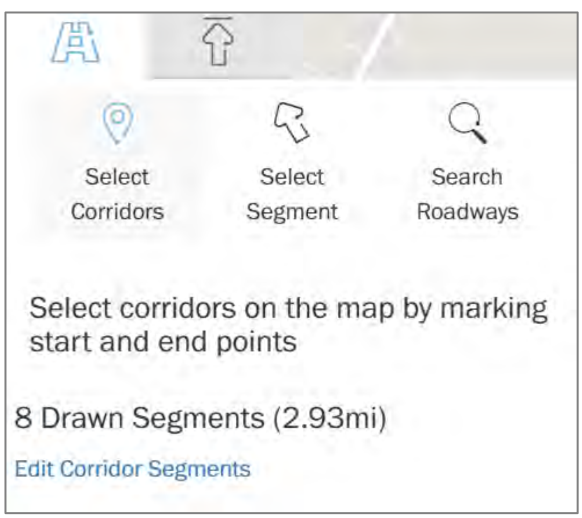
Zoom in on Austin and find the starting point of the corridor. This example will use the Oltorf corridor, which covers Oltorf Road from South 5th Street on the west to Wickersham Lane on the east. Begin by selecting the eastbound direction of travel, starting at South 5th Street. Click near the intersection of South 5th and Oltorf, which will bring up the following window:



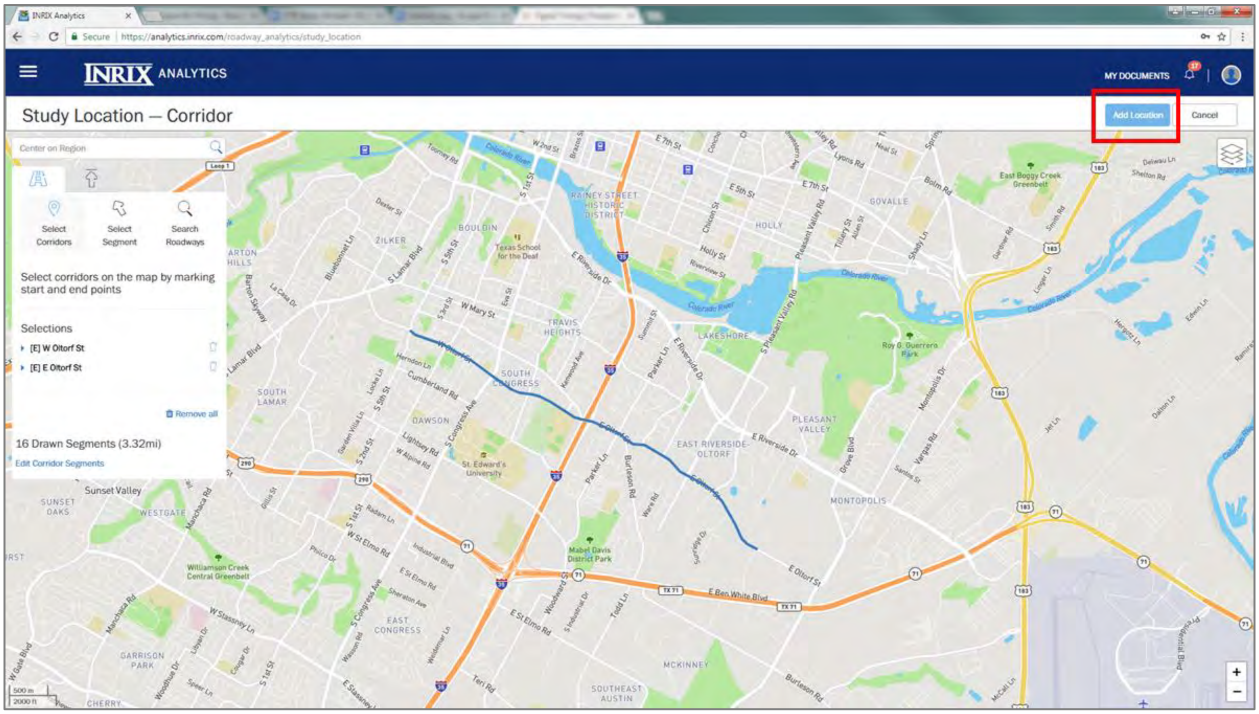
Under "Specify Road," select the correct starting segment for the desired direction. In this case, click on "[E] W Oltorf St." Then, go to the other end of the corridor and select the correct ending segment in a similar manner. In this case, the INRIX segments do not match up perfectly with the City of Austin corridor definitions, so select the segment that goes a little bit past the last intersection in the CoA corridor definition (Wickersham Lane). Make sure to select the eastbound option. Note that INRIX fills in the intermediate segments.

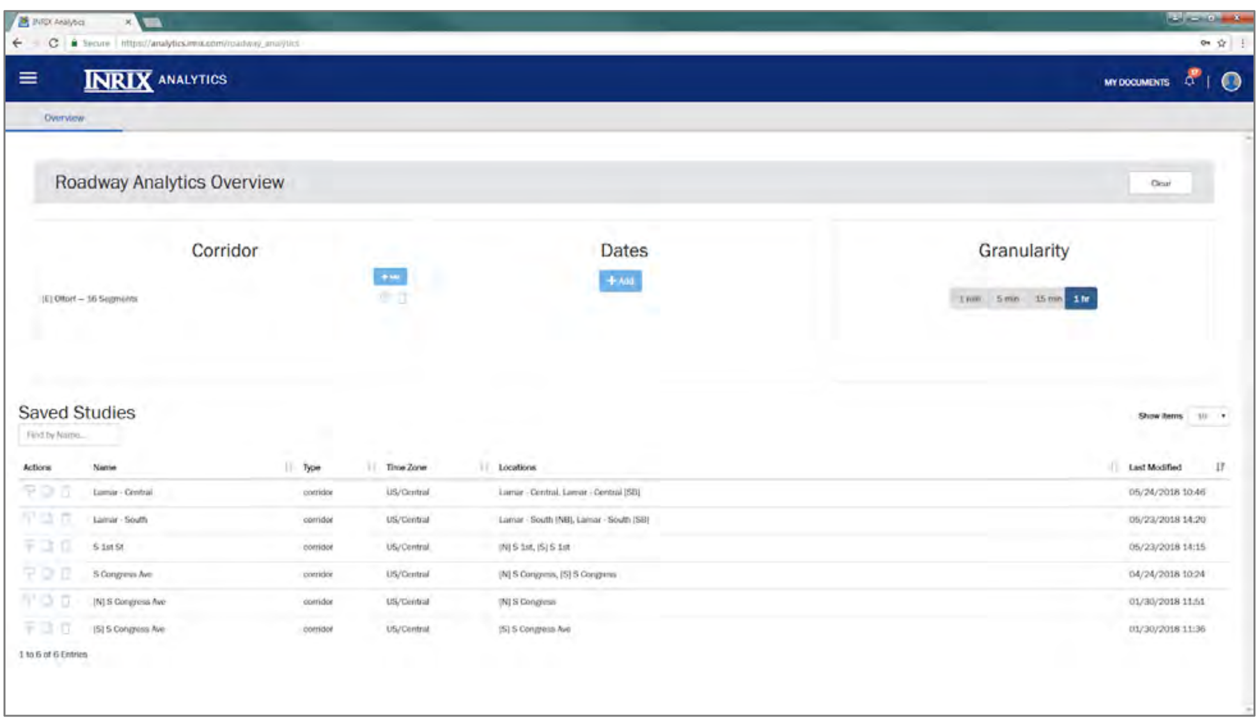


Depending on the corridor in question, there are some bugs in the INRIX interface that affect the selection of roadway segments to form a corridor. Some can be selected without any problems, while others are very difficult. For instance, sometimes if the northbound direction segments are selected for the start and end segments, INRIX will fill the intermediate segments in as southbound. For this reason it is very important to ensure that the segments INRIX selects for are the ones expected. To check, click “Edit Corridor Segments” (shown below) to see a list of the individual segments selected. Pay special attention to the “direction” column.



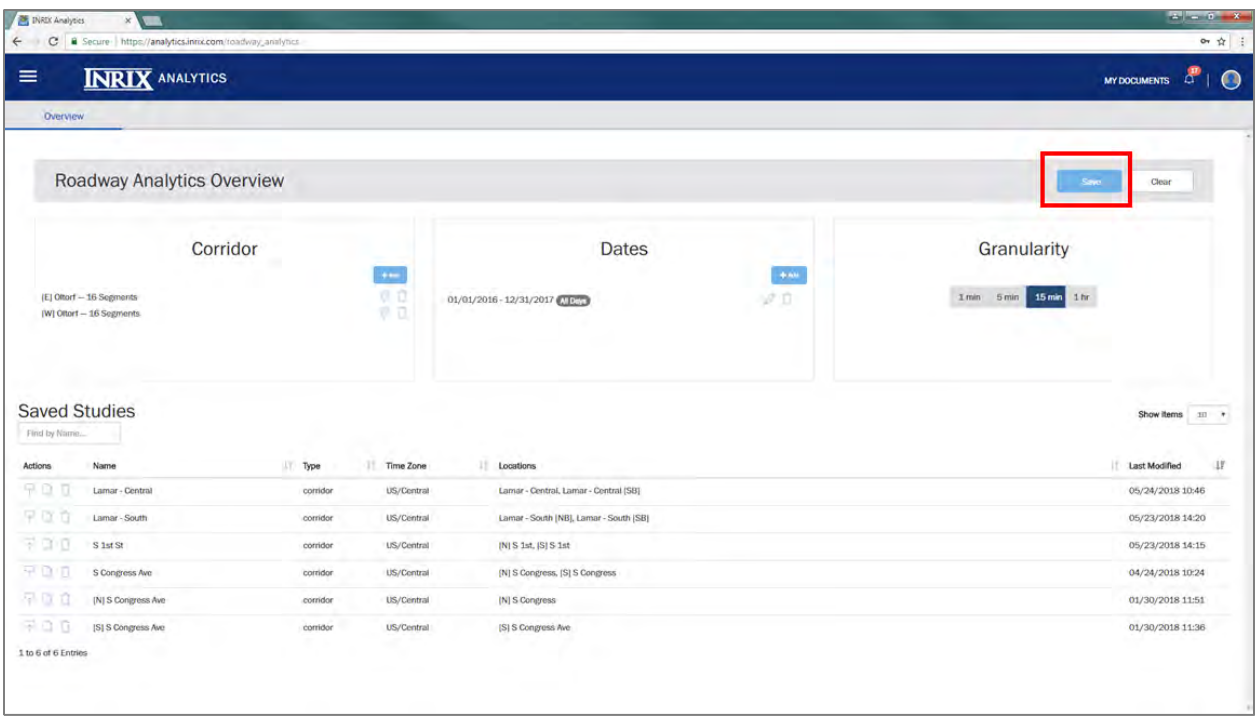
Once the corridor is selected correctly, click on "Add Location" in the upper right corner and name the location "[E] Oltorf." Now the eastbound portion of the corridor (a total of 16 segments) is saved.





Click “+ Add” under Corridor and repeat the process to add the westbound direction. Now the full corridor has been created. Select the desired date range (in this case, 01/01/2016 through 12/31/2017 for two full years of data) and 15-minute granularity.

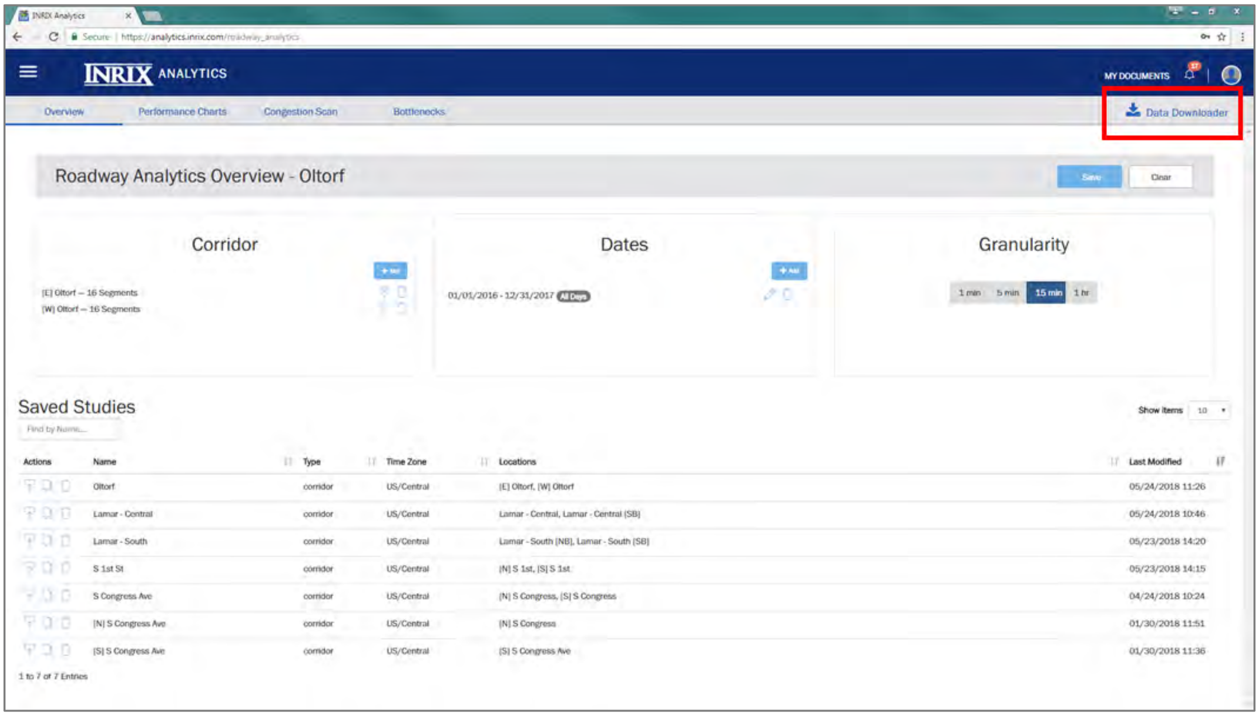
Now click “Save” in the upper right corner and name the study “Oltorf.” Make sure that the study is named to match the CoA name for the corridor.



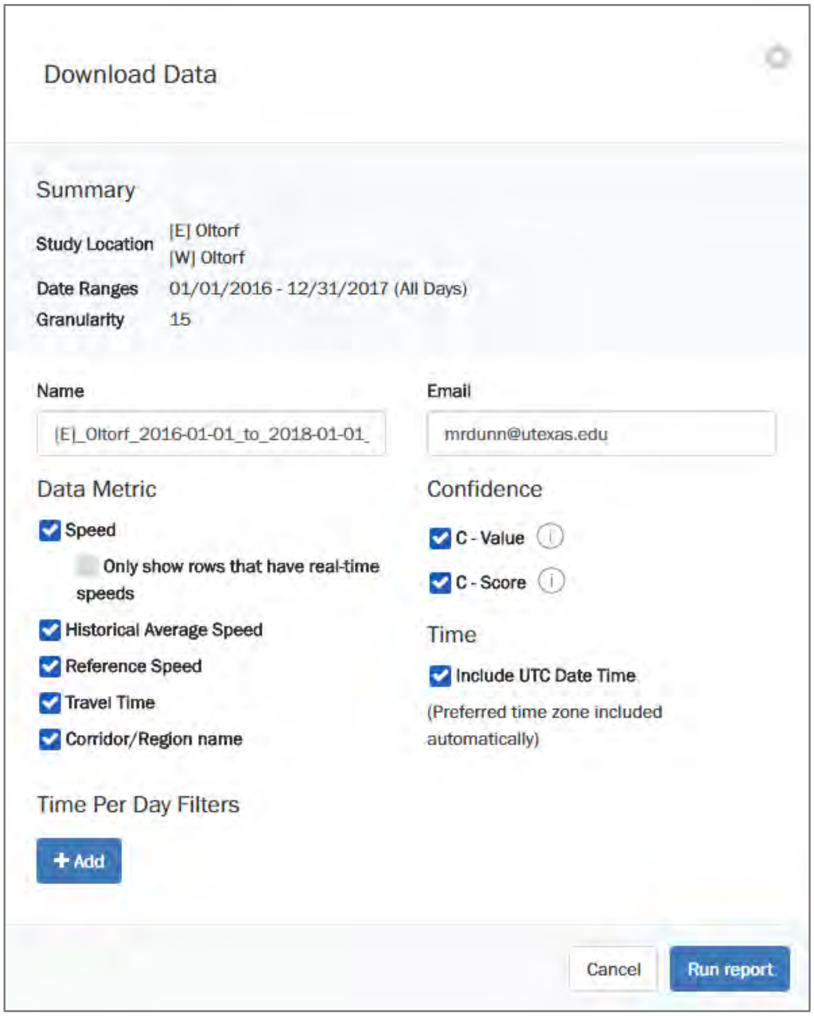
Note that now, the “Oltorf” study can be pulled up from the list of saved studies at the bottom of the home page.

Using the Data Downloader

Click on “Data Downloader.”



It is not necessary to change any of the data download settings. Click “Run Report.”



The data may take a couple of minutes to download. When it has downloaded (status reads “completed” or “queuedcompleted”), you can click the download symbol under the “Actions” heading. Note that some of the larger corridors must be downloaded in multiple zip files. If this is the case, a dark gray arrow will be present to the left of the download name. Click this arrow, which expands the individual files, and click the blue download symbol next to each file.

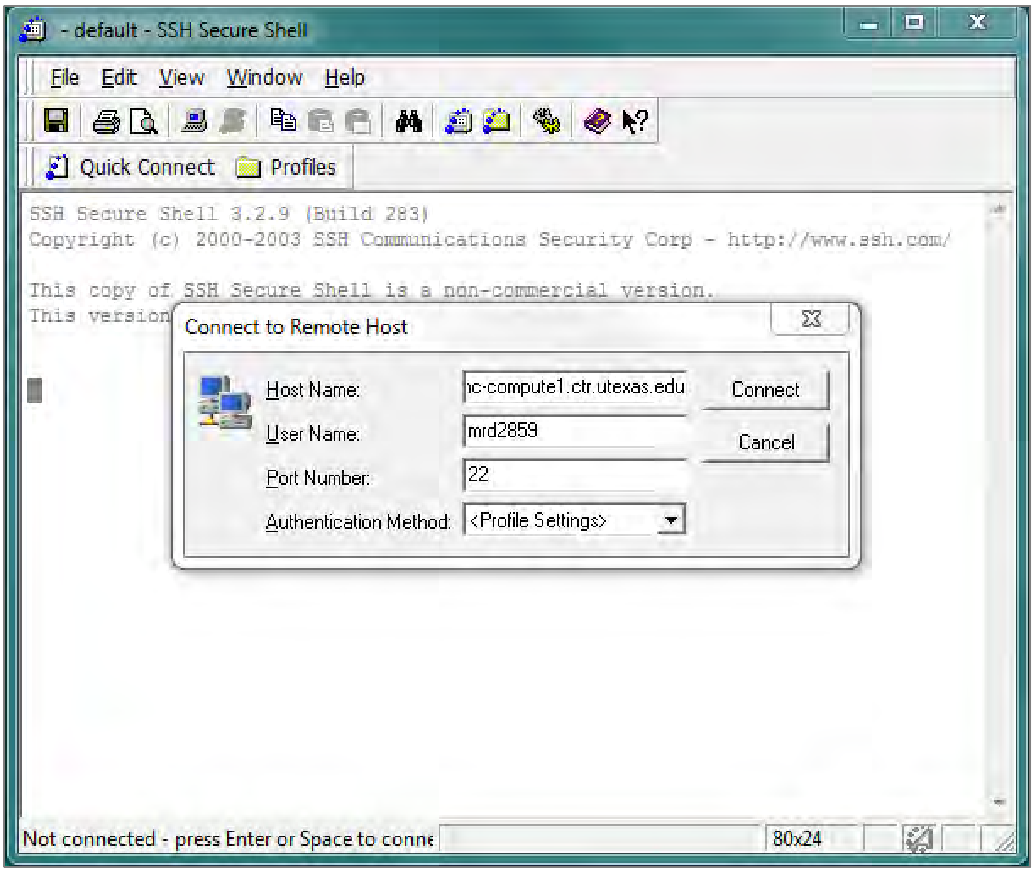
Once the file(s) are downloaded and unzipped, note that the folder contains two .csv data files. One, the “data” file, contains the individual speed records for every segment on the corridor during the study period. The other, the “metadata” file, is much smaller and contains information describing each segment. These two files are related using the unique segment ID for each segment.

Save the data in the project folder. Name the folder according to the CoA corridor definition name and add that name to the individual files. Note that if the corridor requires multiple downloads, the metadata file will be included with each download but only needs to be saved once. **Note that the file naming convention has**

changed since these examples were made. Finally, an alteration needs to be made to the metadata file. Open it and add two new columns at the end called “CoA Corridor” and “CoA Direction.” Fill “CoA Corridor” with the CoA corridor name (as seen on the CoA website with the corridor definitions). Fill “CoA Direction” with a consistent direction indicator for the whole corridor. In other words, make sure the whole corridor is either E/W or N/S in this column, as the segments can sometimes be mixed in INRIX. Also, while the metadata file is open, check to make sure that it looks correct and free from errors (correct number of segments, road names, etc.). Save the .csv and close it.

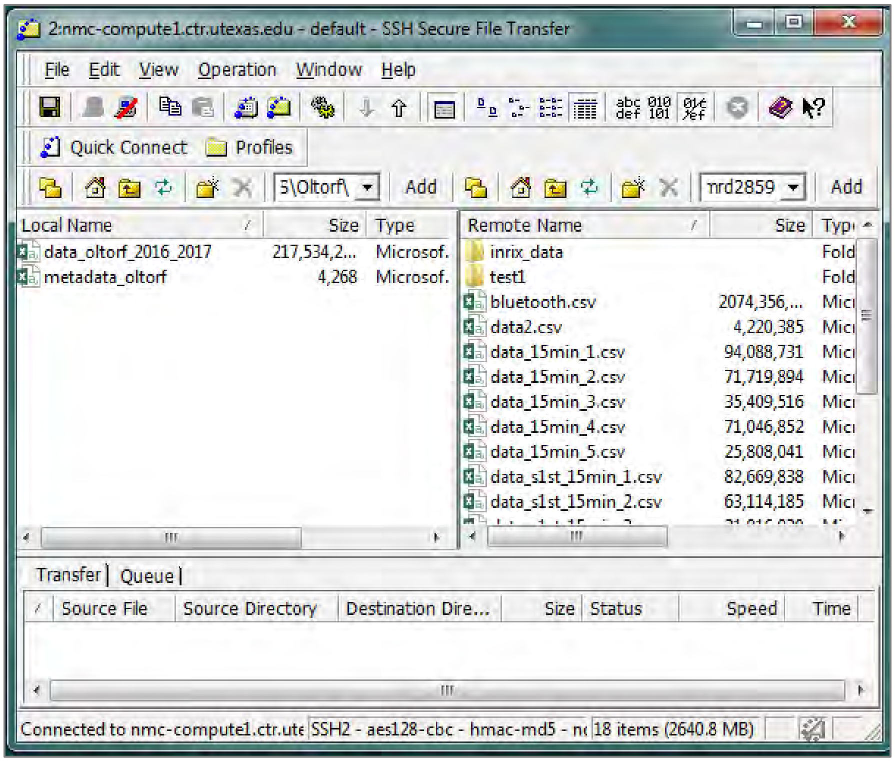
Ingesting Data into Postgres Database

Open a Secure Shell Client (SSH) session and log in to the host nmc-compute1.ctr.utexas.edu using your UT EID and password.



Open Postgres and navigate to the database using the following command: psql -U vista -d retiming

Open a new file transfer window (shortcut button or Window > New File Transfer). In the left side of the window, navigate to the location where the data was saved earlier.



Right click on each file and select “Upload.” Once the data has uploaded, ingest each file into the correct table in the database. Use the following commands:

\copy inrix_15min from data_oltorf_2016_2017.csv delimiter ',' csv header

\copy inrix_segments from metadata_oltorf.csv delimiter ',' csv header

Ingesting the speed data will take a minute or two. The metadata should be fast. Once the data has been ingested, it is ready to be analyzed and explored using SQL queries in Postgres.

Task 2017-08 Appendix III

Full Corridor Ranking

The following table is the full version of Table 2, including the ranking and calculated ranking metrics for all seventy-nine corridors examined in this study.

		Percent of Corridor Experiencing Speed Decrease			Percent of corridor Experiencing Speed Decrease > 3 mph			Maximum Speed Decrease				
Rank	Corridor	AM	Midday	PM	AM	Midday	PM	AM	Midday	PM	Total Length (mi)	Number of Signals
1	US 290 - East	95.93	85.36	96.85	21.30	22.48	25.62	-28.38	-27.31	-28.25	5.30	19
2	US 183 - Central	86.29	100.00	86.14	48.51	48.51	30.02	-19.61	-16.75	-5.17	2.79	10
3	US 183 - South	48.37	65.58	65.08	47.65	35.90	48.68	-11.35	-10.52	-11.23	3.08	15
4	51st	70.75	69.59	94.57	24.87	24.87	24.87	-3.82	-3.78	-5.79	3.26	12
5	Airport	63.07	74.65	80.88	14.66	16.87	21.64	-3.82	-5.59	-7.30	6.41	27
6	MLK - East	60.12	85.10	89.35	19.54	18.03	13.38	-3.55	-7.59	-6.04	5.42	15
7	Lamar - North	75.65	100.00	86.24	7.93	7.93	7.93	-3.69	-3.69	-5.45	5.88	15
8	Enfield	56.49	76.61	100.00	8.28	8.53	21.47	-3.21	-6.02	-4.09	1.30	9
9	Ben White - East	91.28	52.06	52.72	37.55	0.19	28.08	-5.43	-3.17	-9.35	3.61	14
10	Manor	79.88	57.12	67.69	3.55	3.55	3.55	-4.96	-6.03	-6.47	3.83	15
10	Pleasant Valley	80.22	80.22	99.05	0.00	1.67	42.95	-2.16	-3.33	-8.38	2.93	11
12	IH 35 SRVC RDS	46.65	33.61	67.96	16.66	13.12	55.77	-6.09	-5.23	-6.40	2.27	16
12	Southwest Parkway	46.57	48.05	71.24	21.57	9.33	21.57	-5.99	-3.34	-6.96	5.16	18
14	Parmer - West	44.31	52.13	74.05	11.13	5.26	14.86	-10.02	-4.44	-8.85	13.99	29
15	Loop 360 - North	26.26	54.34	49.05	3.60	19.46	31.89	-8.31	-8.12	-13.48	8.17	14
16	Brodie	100.00	78.71	70.96	0.17	0.00	8.28	-4.09	-2.65	-4.37	6.55	19
17	Slaughter	49.52	38.84	67.71	17.30	16.34	20.29	-5.20	-3.50	-5.37	9.75	31
18	7th - East	66.31	57.41	89.97	0.96	0.96	20.79	-3.28	-3.38	-3.90	2.38	12
19	Riverside	63.00	67.76	83.07	0.77	0.00	13.76	-3.35	-2.91	-5.37	3.79	24
20	Braker	59.18	89.63	63.70	0.36	2.25	0.00	-4.03	-7.14	-2.48	5.56	19
21	Lamar - Central	90.14	62.31	63.44	0.00	10.88	0.95	-2.51	-5.19	-3.35	3.78	15
22	Cameron - South	61.16	46.32	59.75	6.67	5.84	0.00	-3.98	-4.57	-2.72	2.10	14
23	Koenig/Northland	56.16	37.11	51.77	2.20	1.65	4.41	-5.67	-5.97	-4.30	3.66	21
23	Steck	99.13	99.13	100.00	0.00	0.00	0.00	-2.82	-1.50	-2.12	1.46	6
25	West Gate	47.77	47.77	47.60	47.60	47.60	0.00	-6.34	-3.72	-1.67	2.10	6
26	Barton Springs	66.09	10.87	6.67	1.40	5.87	5.87	-6.49	-5.04	-6.89	1.75	9
27	Oltorf	66.86	70.39	57.75	0.00	3.37	0.00	-2.75	-3.09	-2.87	3.32	14
27	US 183 - North	37.46	59.72	42.78	1.24	25.90	1.12	-3.16	-5.11	-4.79	2.15	15
29	Cameron - North	43.32	100.00	85.07	0.00	0.00	0.00	-2.28	-2.99	-2.76	3.24	11
30	Manchaca	55.68	30.95	75.19	14.33	0.00	0.81	-5.24	-1.72	-3.33	6.90	15
31	24th	100.00	100.00	100.00	0.00	0.00	0.00	-1.56	-0.96	-1.53	0.66	6

		Percent of Corridor Experiencing Speed Decrease			Percent of corridor Experiencing Speed Decrease > 3 mph			Maximum Speed Decrease				
Rank	**Corridor**	**AM**	**Midday**	**PM**	**AM**	**Midday**	**PM**	**AM**	**Midday**	**PM**	**Total Length (mi)**	**Number of Signals**
32	Wells Branch	51.30	47.80	68.56	0.00	0.00	17.58	-2.62	-1.79	-4.67	4.43	13
33	Loop 360 - South	48.04	19.88	19.88	34.84	19.88	0.00	-5.60	-4.46	-2.77	2.14	9
34	St Johns	39.84	32.21	97.87	0.00	1.29	1.29	-2.85	-3.47	-3.65	1.79	8
35	12th - East	100.00	90.53	96.35	0.00	0.00	0.00	-1.76	-1.11	-0.67	1.02	7
36	RM 620	20.06	6.54	41.15	4.69	2.48	1.97	-4.83	-6.43	-6.11	6.41	23
37	Far West	100.00	100.00	100.00	0.00	0.00	0.00	-0.82	-0.10	-0.58	1.12	5
38	William Cannon	59.77	49.42	56.32	0.10	0.00	0.00	-4.26	-1.88	-2.15	10.08	30
39	Guadalupe - North	42.28	72.51	62.76	4.25	0.00	0.00	-3.42	-1.37	-2.23	2.84	17
40	45th	81.76	43.46	56.58	0.00	0.00	0.00	-2.21	-2.00	-2.74	2.73	11
41	South 1st - South	99.80	64.43	56.42	0.00	0.00	0.00	-2.46	-2.00	-1.09	4.21	8
42	RM 2222 - East	20.75	20.75	100.00	0.00	0.00	20.75	-1.58	-1.67	-7.96	1.57	3
43	Dean Keeton	100.00	30.05	100.00	0.00	0.00	0.00	-0.63	-1.57	-1.83	0.92	10
44	38th	38.04	40.91	68.19	0.00	0.00	0.00	-2.93	-2.47	-2.42	2.17	12
44	MLK - West	70.22	42.91	55.37	0.00	0.00	0.00	-2.84	-1.96	-2.07	1.00	12
46	Anderson Mill	29.03	40.91	59.41	0.34	0.00	0.00	-3.89	-2.00	-2.71	3.13	10
47	McNeil/Spicewood Spgs	23.94	35.16	40.95	0.00	0.59	12.11	-2.20	-3.60	-4.88	4.74	19
48	Rundberg	96.40	72.64	56.50	0.00	0.00	0.00	-1.00	-1.30	-1.48	2.14	14
49	Congress - South	13.45	27.06	52.66	0.00	10.88	10.88	-1.32	-4.61	-3.77	6.76	24
50	Burleson	37.91	29.43	26.83	9.49	0.00	0.00	-3.37	-2.10	-2.93	4.83	11
51	South 1st - North	13.38	22.89	54.22	13.38	0.00	0.00	-3.31	-2.96	-2.58	3.03	14
52	12th - West	100.00	61.13	38.80	0.00	0.00	0.00	-2.04	-0.84	-1.38	0.52	7
53	Montopolis	21.54	57.19	60.78	0.00	0.00	0.00	-1.90	-1.94	-1.84	2.55	9
54	Exposition	0.00	27.89	100.00	0.00	0.00	23.90	0.17	-0.96	-3.86	2.09	12
55	US 290 - West	44.66	30.44	46.27	0.00	0.00	8.87	-1.70	-1.54	-3.75	1.98	9
55	Woodward	29.84	29.84	100.00	0.00	0.00	0.00	-1.14	-1.45	-2.08	0.70	9
57	8th	69.22	69.70	47.55	0.00	0.00	0.00	-1.39	-0.67	-1.48	0.71	10
58	Stassney - West	28.50	55.04	83.62	0.00	0.00	0.00	-1.33	-1.19	-1.62	2.93	8
59	Lamar - South	39.77	36.12	45.27	0.00	0.00	0.00	-1.06	-2.95	-2.91	5.12	26
60	San Jacinto	72.22	41.98	56.20	0.00	0.00	0.00	-1.76	-1.16	-0.60	0.48	8
61	RM 2222 - Central	54.01	6.23	6.23	0.00	0.00	2.76	-2.11	-2.44	-3.11	2.81	7
62	Anderson	48.21	16.71	55.31	1.24	0.00	0.00	-3.42	-1.40	-1.26	2.14	10
63	6th	56.88	33.71	49.10	0.00	0.00	0.00	-1.10	-1.42	-2.22	2.07	20
63	RM 2222 - West	2.64	2.63	100.00	0.00	0.00	0.00	-0.35	-2.10	-2.41	1.48	4
65	11th	57.34	47.78	29.12	0.00	0.00	0.00	-1.89	-1.83	-0.89	0.70	10
66	Ben White - West	17.69	56.83	45.71	0.00	0.00	0.00	-2.20	-2.06	-0.63	1.72	8
66	Trinity	66.77	49.99	49.99	0.00	0.00	0.00	-0.47	-0.54	-0.97	0.41	6
68	Congress - North	21.07	6.97	57.87	6.97	0.00	0.00	-3.20	-0.29	-1.86	0.97	20

		Percent of Corridor Experiencing Speed Decrease			Percent of corridor Experiencing Speed Decrease > 3 mph			Maximum Speed Decrease				
Rank	Corridor	AM	Midday	PM	AM	Midday	PM	AM	Midday	PM	Total Length (mi)	Number of Signals
69	Metric	30.13	13.21	30.13	0.00	0.00	0.00	-2.29	-1.51	-2.69	4.96	14
70	Stassney - East	46.09	46.09	46.09	0.00	0.00	0.00	-0.42	-1.05	-1.59	2.18	7
71	7th - West	27.87	42.86	58.81	0.00	0.00	0.00	-0.91	-0.31	-1.48	0.71	12
72	Cesar Chavez - E	44.48	28.73	43.09	0.00	0.00	0.00	-1.21	-0.45	-1.97	2.06	7
73	5th	0.00	40.85	41.19	0.00	0.00	0.00	0.02	-1.32	-2.61	1.78	18
74	Great Hills	24.30	24.30	24.30	0.00	0.00	0.00	-0.37	-2.07	-1.46	1.50	6
75	Lavaca	14.95	6.78	63.51	0.00	0.00	0.00	-0.16	-0.08	-1.69	0.98	13
76	Guadalupe - South	45.79	35.30	8.69	0.00	0.00	0.00	-0.56	-0.83	-0.51	0.76	12
77	Jollyville	22.35	0.00	22.35	0.00	0.00	0.00	-0.47	0.00	-1.69	2.60	5
78	Escarpment	0.00	0.00	0.00	0.00	0.00	0.00	1.37	0.78	0.43	4.19	7
79	Lakeline	0.00	0.00	0.00	0.00	0.00	0.00	2.59	4.31	1.95	1.28	6