ITCTC
ITHACA-TOMPKINS COUNTY TRANSPORTATION COUNCIL

INVENTORY OF ALL ITCTC SOFTWARE: OVERVIEW, USE CASES, & POTENTIAL

This is a guide to all data and analysis software tools that the ITCTC uses on a day-to-day basis in order to fulfill its obligations as the MPO for Tompkins County, NY

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Data Viewers: Currently in Use

Replica

Overview	The Replica platform provides mobile location data and other sources to inform decisions about the built environment, urban planning, and transportation systems. It uses consumer, land use, and economic data to create human behavior and mobility models. Replica simplifies travel patterns, impact of infrastructure projects, and support data-driven planning for urban development, equity, and sustainable transportation.
Capabilities	• **Replica integrates de-identified mobile location data**, demographic, land-use, and economic activity data to show how people move and interact in a community. • **Supports Urban Planning & Policy:** Cities, metropolitan planning organizations, and developers use Replica's platform to create a common operating picture, quantify travel behavior, and plan for projects like electric vehicle charging stations and public transportation improvements. • **Enables Scenario Planning:** Allows users to simulate various scenarios, like custom road closures, to understand the impact on travel behavior and transportation network. • **Focuses on Data Privacy:** Replica prioritizes the privacy-preserving nature of its data by using de-identified mobile location data and other sources.
Datasets	**Modal Datasets:** 1. Primary Mode (Modal Breakdown) 2. Trip Purpose 3. Trip Starting Hour 4. Trip Duration (Minutes) Counties 5. Trip Distance (Miles) 7. Origin-Destination Pairs (Counties) 7. Vehicle Fuel Type 8. Transit Routes 9. Transit Stops 10. Residential VMT by (C) **Demographic Datasets:** 1. Household Income 2. Race & Ethnicity 3. Private Auto Availability 4. Age 5. Employment Status 6. Work From Home 7. Education 8. Tenure 9. Residence Building Type
Applications Available in Subscription	**Speeds Network Explorer:** Visualizes 85th percentile, 95th percentile, 50th percentile, average, and free-flow speeds along major roads. **AADT Network Explorer:** This explorer visualizes annual average daily traffic and hourly volumes along major roads across the country with totals for all vehicles **Foursquare ITP Transit Market Segmentation:** The Transit Market Segmentation Analysis Tool outlines origin-destination (OD) travel patterns and market opportunities for stakeholders. **Gate OD Analysis:** Conduct link-level OD analyses by making flow maps and matrices using defined origins and destinations. **Network VMT Calculator:** Measure & track network vehicle miles traveled (VMT) metrics **OD Flow Explorer:** Visualize bidirectional trip volume flows between geographies within study areas **Transit Equity and Demand Scores:** This score is a quantitative measure of predicted demand for transit services. It ranges from 0 to 100, with 100 being the highest demand.
Current Uses within the MPO	**Datasets Used in the Long-Range Transportation Plan** 1. Person Trips Per Day By Trip Purpose 2022 Table - LRTP Page 32 2. Person Trips Per Day By Trip Purpose 2022 Graph - LRTP Page 32 3. Person Trips Per Day By Mode of Transportation: 2019 and 2022 Estimates Table - LRTP Page 33 4. Trip Length By Trip Mode In Tompkins County NY 2023 - LRTP Page 34
Potential Use Cases	1. Evaluating transit demand to evaluate potential new TCAT Routes 2. Create daily traffic and hourly volume maps for the LRTP. 3. Create County level speed maps for major roadways for the LRTP 4. Evaluates areas in with pent-up demand for alternative forms of transportation.
Real World Use Case Studies outside of Tompkins County	1. Bus Network Redesign – NYSAMPO Oswego, NY Bus Network Redesign 2. Corridor Study and Transit Connectivity – Capital District Transportation Council mode-shift study in Town of Brunswick specific corridor 3. Speed Adherence Analysis – City of El Paso neighborhood roads/arterials speed limit adherence study 4. EV Action Plan – Washington State Transportation Electrification Strategy which uses Replica to predict EV trends and charging needs
Pros & Cons	**Pros** 1. Comprehensive and easy-to-access datasets that give useful overviews of the transportation landscape in Tompkins County. 2. Great source of information for the Long-Range Transportation Plan **Cons** 1. Gives a snapshot of transportation data for one day of the year, thereby limiting the scope of the datasets that we can use from Replica. 2. Uses mobile device data which is not as accurate as Census 3. Unable to conduct traffic flow analysis

CLEAR Crash Data Viewer

Overview

CLEAR is NYSDOT's safety management information system. It is used to query, visualize, and analyze crash data.

Capabilities

- System for accurately geocoding crash locations
- Batch Processing (nightly)
- Interactive (DMV)
- Management/Editing of crash data
- Management/Editing of the statewide intersection inventory
- Query, Visualization and Analysis of crash data
- Robust safety solution for implementing the six-step Highway Safety Manual (HSM) process
- Integration with NYSDMV Accident Information System (AIS)
- Integration with existing NYSDOT systems (e.g., OPPM)

Current Uses within the MPO

- The CLEAR Crash Data Viewer is used primarily as the MPO's source of crash data for ArcMap/ArcGIS Pro crash maps.
- The ITCTC also uses CLEAR to download crash data for specific neighborhoods, road corridors, intersections, etc. in response to crash data requests from the community and other local stakeholders. It can also provide basic aerial maps of the crash data inquiry area.

Datasets Used within the Long-Range Transportation Plan (LRTP)

1. Traffic Crashes in Tompkins County 2008-2023 – LRTP Page 42 &43
2. Crash Factors Ven Diagram – LRTP Page 43

Crash Data Query Parameters

Result Field Parameter Options

1. Crash Type	5. Road Surface Conditions	9. Number of Serious Injuries	13. Crash Date
2. Crash Severity	6. Weather Conditions	10. Number of vehicles	14. Case Year
3. Light Conditions	7. Number of Fatalities	11. Police Department	15. Police Report
4. Road Characteristics	8. Number of Injuries	12. Reporting Agency	16. Traffic Control

Currently Unused CLEAR Features

Dashboards:

- Each dashboard is fully interactive
- Often each component will dynamically update based on each other (e.g., zooming on map will update charts, or charts can be used as filtering mechanism)

Reports:

- A variety of tabular reports will be available for quick access
- When the Report Categories menu option is selected a list of categories is displayed
- To view the reports available within a category, click the name which will display a list of reports
- To view a report, click the name which will generate the report in a new browser tab

Pros & Cons

Pros

1. Excellent & comprehensive source of crash data.
2. Great for quickly meeting crash data request for specific streets, intersections, neighborhoods, local municipalities, etc.. It can produce basic maps alongside the data queries which are useful for providing context to the datasets.

Cons

1. The only con is that it is a very specialized tool, in that it is almost entirely focused on crash data. However, this is what we need it for, so it's not a big issue.

United States Census Bureau Data Viewer

Overview	Census Data Explorer application in the Census Bureau which allows for searching & downloading primarily American Community Survey (ACS) & Decennial Census (DC) data. It is an excellent source of modal makeup, demographic, & economic data for Tompkins County.
Capabilities	• Enables the download of Excel reports & CSV data for Travel to Work, Economic stat, & Demographic datasets
Datasets	Bicennial Census (every 10 years) and ACS Census Data (1-year and 5-year dataset options)
Applications Available in Subscription	1. Tables 2. Charts 3. Maps 4. Profiles 5. Pages
Current Uses within the MPO	**Datasets Used within the Long-Range Transportation Plan (LRTP)**
	6. Population Totals for Tompkins County & Villages tables (DC) – Pgs 28 & 29 7. Population Trends in Urban & Rural Areas Table (DC) – Page 29 8. Persons per Household in Tompkins County (ACS) – Page 30 9. Household Size in Tompkins County (ACS) – Page 30 10. Age of Population in Tompkins County (ACS & DC) – Page 30 11. Basic Economic Data graphics (ACS & DC) – Page 31 12. Tompkins County Regional Commuting Patterns Table – Page 35 13. Tompkins County Commuter Flow & Commutes by Mode within Tompkins County graphics (ACS) – Page 36
	14. Commutes by Mode to & from Tompkins County (ACS) Page 37 15. Means of Transportation to Work 2022 (ACS) – Page 39 16. Number of Vehicles per Household Tompkins County NY (ACS & DC) – Pg 40 17. Travel Time to Work Bar Graph (ACS & DC) – Page 41 18. Mean Travel Time to Work (ACS & DC) – Page 41 19. Household Income by Mode to Work – Tompkins County (ACS) – Page 44 20. Commute Mode within Tompkins County 2022 (ACS) – Page 44 21. Federal Aid Road System – Descriptive Statistics (DC) – Page 52 *The 2020 Functional Classification System is based on the 2020 Decennial Census
Potential Use Cases	*While the Census Data Explorer has many more downloadable datasets, the list above is comprehensive when addressing the current needs of the MPO. The Modal data is even more comprehensive when paired with Replica datasets. The two sources work well to enhance each other's accuracy and scope.
Pros & Cons	This data does not get updated as often as with other sources like Urban SDK

Mapping Software Tools
Software Tools: Currently in Use

Esri: ArcGIS Pro (In the process of switching over from ArcMaps)

Overview

ArcGIS Pro is a desktop geographic information system (GIS) application. It offers tools & capabilities that support urban planners. Users can maintain spatial data effectively; generate 2D, 3D, & 4D visualizations; & conduct advanced mapping analytics. The data sharing within the ArcGIS system fosters GIS solutions & insights

Capabilities

- **Exploration & Visualization:** Using 3D exploratory analysis, investigate your data by interactively creating graphics and editing analysis parameters. Interactive GIS tools help you to create analytical objects by clicking on the scene or using input source layers. Manipulate analysis parameters and receive real-time visual feedback.
- **Imagery & Remote Sensing:** ArcGIS Pro provides tools to visualize, manage, and analyze collections of imagery and raster data from drones, satellites, lidar, etc...
- **Data Management:** Desktop GIS software ensures data integrity with a complete toolset for storing, editing, and managing spatial data—including real-time data.
- **Customize & Create:** Reimagine ArcGIS Pro with add-ins and configurations developed with ArcGIS Pro SDK for .NET. Create, customize, & perfect the ideal ArcGIS Pro environment.
- **Cartography & Design:** Adds customized data to meet today's cartographic and design standards. Compiles data and brings projects into Adobe Illustrator. Symbology tools, performance rendering, and geospatial formats merges analysis and presentation.
- **Analytics & Data Science:** Uses scientific mapping analytical tools on 2D, 3D, & 4D geospatial data to identify patterns, make predictions, and answer questions.
- **Sharing Work:** Allows users to author & discover content and digital maps, including work within the organization or worldwide from the ArcGIS user community. Access cloud content like the World ArcGIS Living Atlas and share work throughout the ArcGIS platform
- **Launch New Capabilities:** Gives access to Voxel layers, a 3D volumetric layer to visually analyze and explore multidimensional data. Manage 3D and 4D parcel data, run analysis with Trace networks, Python Notebooks, Geodatabase replication workflows, etc. Add work from ArcGIS Pro to Adobe Illustrator to finalize project design.

Current Uses within the MPO

ArcGIS Maps in the Long-Range Transportation Plan

1. Census Block Population Density 2020 in Tompkins County (Page 27)
2. 2020 Tompkins County Highway Functional Classification System Maps (Page 53 & 54)
3. Structurally Deficient Bridges 2024 Maps (Page 56 & 57)
4. TCAT Bus Route System Ridership 2023 Maps (Pages 59 & 60)
5. Tompkins County Intermodal Facilities 2024 – (Page 65)
6. Bike Suitability Maps (Pages 68 & 69)
7. Tompkins County Sidewalk Inventory 2024 – (Page 71)
8. Multi-Use Trails Network in Tompkins County 2024 (Page 72)
9. Location of Parking Areas City of Ithaca 2024 – (Page 73)
10. Complete Streets Network May 2024 - (Page 74)
11. Unique Natural Areas Maps – (Pages 78 & 79)
12. Historic Bridges Maps – (Pages 80 & 81)
13. Priority Trails Maps – (Pages 108 & 109)

Other Use Cases

1. Traffic Crash Data & Map Requests: Zoom-in maps showcasing traffic crash locations & corresponding Excel data sheets
2. Traffic Volume Data & Map Requests: Zoom-in maps showcasing traffic count statistics & locations & corresponding Excel data sheets.

Potential Use Cases

***All of the current uses listed above are entirely based off ArcMaps, without factoring in the new capabilities available through ArcGIS Pro**

1. Nashville WeGo improved customer engagement and service by using GIS to create interactive online maps. This provided riders with detailed information & a better understanding of transit options.
2. St. Louis Metro transformed its bus-stop maintenance program with ArcGIS, improving data accuracy & asset management for operations and maintenance.
3. Central Florida Regional Transportation Authority (LYNX) uses GIS to analyze ridership patterns, helping to boost operational efficiency for 17 million annual passengers.
4. Long Beach Transit (LBT) uses ArcGIS Field Maps to manage and maintain its 250 buses and 1,000+ bus stops. A mobile-first approach allows crews to document the condition of bus stops and amenities in the field

Pros & Cons

Pros

1. ArcMaps was reliable but it had limits when it came to producing comprehensive and realistic maps in both 2D & 3D formats. ArcGIS Pro will enable better, more realistic 2D & 3D Maps
2. ArcMap allowed for users to work on one single map at a time, while ArcGIS Pro allows for multiple maps in one single project.

Cons

3. While ArcMap Pro will be a significant upgrade from ArcMaps, it will require more training for MPO staff, but it is similar so the transition shouldn't be difficult
4. ArcMap Pro is a significant upgrade, but it will not produce as realistic maps as CityEngine or ArcGIS Urban, but it can work together with these platforms.

5. *Overall, there are few downsides. It is very good at meeting the MPO's mapping needs.

Software Tools: Available through Esri, but not currently in use

	Esri: ArcGIS Urban	Esri: CityEngine
Background	These tools will be made available in October 2025 to the MPO as part of its Esri subscription at nominal extra cost. These two tools are highly synergistic; ArcGIS Urban allows planners to create comprehensive urban 2d or 3d maps & project outlines, and then those projects can be imported directly into CityEngine where they can be further flushed out in greater detail. They are designed to be supplementary to each other instead of separate. ArcGIS Urban and CityEngine work together to integrate comprehensive urban planning with detailed 3D design, enabling a bidirectional workflow where CityEngine's parametric modeling and generative capabilities enhance ArcGIS Urban's planning context, and Urban's spatial data and scenarios can be easily imported into CityEngine for detailed design and back again. You can import ArcGIS Urban projects into CityEngine to edit and refine designs, then publish these 3D models as scene layers back into the Urban plan for visualization and scenario comparison	
Overview	ArcGIS Urban is a web-based solution that applies GIS technology to urban planning to streamline plan creation, analyze the impact of plans, visualizes projects, and enables public engagement. ArcGIS Urban also helps to visualize city plans/projects in one place for stakeholder collaboration.	ArcGIS CityEngine is an Esri 3D city generator for creating and iterating on urban environments and scenarios using synthetic or real-world GIS data. CityEngine enables adjustments to the architectural style, or other features, of an urban environment to support efficient and streamlined workflows.
Capabilities	• **3D scenario modeling:** Designs a city or town's digital twin for a comprehensive understanding of the urban environment. Leverages this digital representation to enhance collaboration with stakeholders and the public to inform decision-making. • **Data-driven analysis:** Apply ready-to-use space uses, building types, and metrics and gain insights on the impacts of policy and development changes with urban visuals. • **Project e-submission:** Manage the urban development pipeline of a city's digital twin. • **Collaborative urban planning:** Communicates proposals and increases buy-in with easy-to-understand visuals and metrics. Reaches new audiences and boosts access to key demographics by using online feedback and discussions in the planning process. • **Extendable planning system:** ArcGIS Urban is the heart of your city planning system, integrating with complementary products through its API, enabling collaboration, data exchange, and immersive experiences for exploring and analyzing planning scenarios.	• **Accelerate urban planning workflows:** Creates and iterates on urban development projects using existing data, or design new cities from scratch. CityEngine consumes data for urban planning environments to create procedural models you can use to test your ideas and solve problems. • **Elevate architectural designs:** Creates realistic, place-based building models and iterates between different parameters by adjusting floor plans, size, architectural styles, and textures. Views structures in context to analyze factors such as zoning requirements, natural resource preservation, viewshed, and more. • **Create stunning, immersive experiences:** Leverages integrations with industry-leading game engines. Connects CityEngine to powerful animation tools to create realistic 3D scenes, stunning visual effects, and interactive experiences and simulations.
Current Uses within the MPO	*None at the moment. These platforms will be further explored when ArcGIS Urban becomes available through the MPO's Esri subscription later this year	
Potential Use Cases	1. The MPO can create 3D versions of its own 2D planning maps to improve its ability, and that of its partner agencies to enhance all project proposals, information maps, and datasets. 2. ArcGIS Urban can create an interactive online project portal so that both local stakeholders, partner design agencies, & the community can directly engage with the project online. This would go a long way towards improving the MPO's public engagement during ongoing projects, such as the Bike Suitability Map.	
Pros & Cons	**Pros** 1. These two tools are included with the MPO's ESRI subscription, no extra cost. 2. Enables the creation of 3D urban planning models/maps	**Cons** 1. As far as I can tell, both of these tools don't have transportation demand modeling like TransCAD, so they wouldn't be a replacement for it.