



**SHRP2 C03: Interactions between Transportation
Capacity, Economic Systems, and Land Use**

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Phase II, Task 15

**Transportation Project Impact
Case Studies (TPICS):
Instructions for Use**

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PREFACE

P1. Project Products and Reports

This document is one of a series of technical products from SHRP2 Project C03, *Interactions between Transportation Capacity, Economic Systems, and Land Use*.

TPICS Web Tool. One of the products is a web-based database tool that contains 100 case studies of the economic and development impacts of highway projects, along with analysis tools for screening, viewing and analyzing them. That web site can be accessed in two ways.

- Via the SHRP2-sponsored web site: *Transportation for Communities - Advancing Projects through Partnerships (TCAPP)*, which can be found at www.transportationforcommunities.com (click on the TPICS link at the bottom of the page)
- or directly from the project web site: *Transportation Project Impact Case Studies*, which can be found at: www.tpics.us

Technical Documents. The project also produced a series of technical reports, which can all be viewed and downloaded from the internet. They can also be accessed from the TPICS web page by selecting the tab on top labeled “More Info.” These reports include:

Case Study Analysis

- TPICS Web Tool: User Guide (Instructions for Use)
- Description and Interpretation of Case Studies: Handbook for Practitioners
- Case Study Design and Development
- Case Study Dataset Documentation

Research Methods and Findings

- Economic Impact Data Analysis Findings
- Economic Impact Performance Metrics
- Working Paper: Stakeholder Needs, Limitations of Available Tools and Future Research

P2. Acknowledgements

Contract. This project was conducted under a contract from the National Academy of Sciences and Engineering, through the Strategic Highway Research Program II (Capacity Program, Project C03), to Economic Development Research Group, Inc.

Supervision. The project was undertaken with oversight from staff of the Strategic Highway Research Program, with direction from Stephen Andrie and David Plazak. The project benefitted from review provided by Oversight Panel of the SHRP2 Capacity Program.

Contractors. The case studies and technical reviews were conducted by a team comprised of Economic Development Research Group and subcontractors: Cambridge Systematics, Wilbur Smith Associates, Texas Transportation Institute and Susan Moses & Associates.

The TPICS (Transportation Project Impact Case Studies) data base and web tool were designed and developed by Economic Development Research Group, and implemented by ICF Consulting.

1

INTRODUCTION

1.1 Project Background and Overview

The Strategic Highway Research Program II (SHRP2), Capacity Project C03 was entitled: *Interactions between Transportation Capacity, Economic Systems, and Land Use*. This project produced a series of reports on methods, models and case studies that examined the economic and development impacts of highway capacity investments projects. This report is one volume in that series.

Project Objective. The intent of this project and its research products and web tool is to further public and transportation agency understanding of the range of economic impacts that occur from various types of highway projects. This information can aid both technical research and public discussion of the topic. It can also help define the broad range of impacts and factors affecting them, to assist transportation agencies in their planning processes. And it can help refine public debate about highway projects by establishing boundaries of the likely positive and negative impacts that typically occur from such projects.

The products of this study were designed to help the collaborative decision-making process for transportation planning, by providing a background context on the range of observed results from past highway projects. Such information can potentially be of substantial use in early stages of the planning process, in which alternative project concepts are being suggested and screened.

Of course, one cannot assume that every proposed project will have the same results as the average observed from past projects of a similar type that were previously implemented elsewhere. That is precisely why local data is collected and models are applied developed in later stages of the planning process, to identify expected changes in local traffic characteristics and subsequent economic development. Thus, this project should be viewed as a complement and not a replacement for local-specific transportation and economic impact analysis that may be necessary in later phases of the planning process.

Case Study Database. The most notable accomplishment of this project was the development of 100 case studies of highway projects, which (a) compared pre-project and post-project changes in economic and land development conditions, (b) contrasted them with corresponding conditions for a base of comparison, and (c) included both quantitative impact measures and qualitative assessments based on local interviews.

This collection of case studies, completed in 2010, was compiled with the goal of including all known pre-post highway impact studies in the US, plus available

English language studies from Canada and abroad. Members of the project team then conducted additional quantitative and qualitative data collection and analysis to bring all of the cases up to a similar standard of comparability. (For further information on the case study development process, readers are referred to report entitled *Case Study Design and Development*, which can be accessed as described in the Preface.)

TPICS Web Tool. The case studies were put into a web-based viewing and analysis system called “TPICS” – “Transportation Project Impact Case Studies.” This system includes: (a) a *search function* that allows for user-defined screening and selection of relevant cases, (b) a *case study viewer* that provides user access to impact measures, discussion text, maps and related documents, and (c) an *impact estimation calculator* that shows the average and expected range of impact associated with any user-defined project profile. (For further information on this system, readers are referred to a separate document, *TPICS Web Tool User Guide*, which can be accessed as described in the Preface.)

The TPICS system was designed to assist transportation agencies in project planning and evaluation, by providing agency staff and interested stakeholders with a means for establishing the range of job, income and development impacts typically associated with various types of transportation projects in different settings.

1.2 Objective of the TPICS Web Tool

The Transportation Project Impact Case Study (TPICS) web tool was designed for the user to do the following:

- Review, select, and analyze case studies based on criteria selection
- Understand the relationship between project characteristics and economic impacts
- Compare and evaluate projects by specified criteria
- Develop a range of anticipated impacts for your customized project

The tool’s user interface is structured around two different approaches to analyzing projects, which are outlined on the next page:

- **Case Search** – which accesses the database of case studies of highway projects, allowing the user to:
 - 1) Filter the cases they want to see based on many factors (type, region, cost, etc).
 - 2) Select cases to view separately or compare based on the user’s criteria.
 - 3) View pre and post conditions, project area settings, project characteristics, intermodal volume (if applicable) and economic impacts for each case.
 - 4) Read a short narrative on the case that provides background on how the project came to be built, its influence on the local area, and other non-transportation factors that enhanced or mitigated the economic impacts of the project.
 - 5) View a google map image of where the project is located.

- **My Project Tools** – which provides an estimate of economic impacts for a hypothetical project based on:
 - 1) The type, length, and setting of the project chosen by the user.
 - 2) The magnitude of AADT (Average Annual Daily Traffic), miles, and project cost—which are all estimated based on the type, length, and setting but can be changed by the user.
 - 3) The extent to which there is supporting business climate, infrastructure, and land-use policies to encourage economic development.

The rest of this document is an instruction manual that explains the logic of the TPICS web tool and how the system should be used. A separate document, entitled *Handbook for Practitioners*, provides further guidance on the interpretation of TPICS results.

2

INSTRUCTIONS FOR USING THE TPICS ON-LINE DATABASE AND PROJECT TOOL

2.1 Home Page

The menu bar on the top features four buttons shaded in gray. 1) Home; 2) Case Search; 3) my Project Tools; and 4) About T-PICS which are illustrated in Figure 1.

- “Case Search” should be selected if the user wants to see case studies of actual projects.
- “My Project Tools” should be selected if the user wants to estimate the economic impacts of one hypothetical project.

First, we will walk through the **Case Search** option where the user selects a series of project characteristics to meet their criteria and based on the defined parameters, TPICS then provides a list of project cases that meet the selected criteria.

The Case Search box in the lower left hand corner of the screen or the tab at the top of the screen can be selected to go to the Case Search page.

First, the user should go to the TPICS web site – either by typing the TPICS URL directly into the browser (<http://stage.shrp.icfi.com/t-pics/>), or by accessing TPICS through the Related Research section of the TCAPPS web site (<http://www.transportationforcommunities.com/>). Figure 1 shows the view of the TPICS homepage.



Figure 1: TPICS Homepage

2.2 Case Search Page

Basic Criteria

Selecting **Case Search** brings you directly to the “**Basic Criteria**” tab, which provides six different categories to define the type of case study projects that will be selected. Underneath the first three criteria types are links that allow the user to “**Select All**” or “**De-Select All**” category types within the criteria (Figure 2). The user can use any categories that they want as the default settings include all 60 cases. In this manner, toggling with each category will only make the number of cases decrease.

Project Type: This category provides the descriptions of all the case study project types which include: Bypass, Bridges, Limited Access Road, Access Road (Highway), Beltway, Bundled, Interchange, Connector, Widening, Intermodal Passenger, and Intermodal Freight.

Region: There are six geographic regions where the case studies were located which are based on BEA (Bureau of Economic Analysis) defined regions.

Motivation: This category describes nine different reasons the project was built which are based on access, market expansion, development, congestion mitigation, and tourism. A project can have multiple motivations.

Urban/Class level: Defines if a project is located in Metropolitan (Metro), Rural, or

Mixed (both) environment. This is based on US Census classifications by county.

Economic distress: Here the user can choose to select or not select case studies where the local/regional unemployment levels are higher than the national average (“distressed”) or lower (“non-distressed”).

Keywords: TPICS provides users with a search option for keywords in the narrative portion of the case study. Each Case Study includes a narrative report that provides an in-depth description and economic analysis of the project.

Once the Base Criteria have been selected, the number of potential matches is listed in the upper right hand of the screen.

Click on the “**View Results**” button on the left side of the screen to see the cases that fit the criteria or proceed to “**Other Criteria**” to further filter out the cases based on project cost, AADT, and other factors as shown in Figure 2.

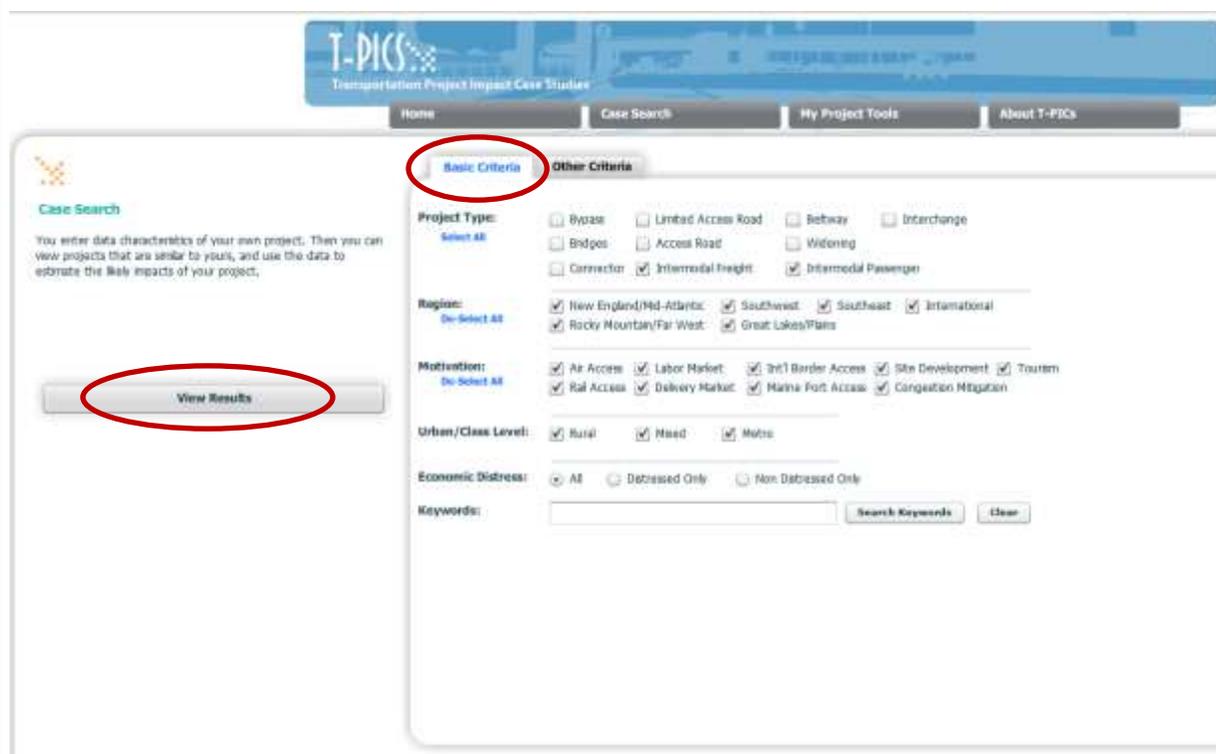


Figure 2: Case Search – Basic Criteria

Other Criteria

“**Other Criteria**” provides list of additional project selection criteria from a range of values based on the case studies. To select the value for each category, click on the triangle “slider” icons to define the range of desired values. You will notice that the Potential Matches in the top right corner will change as you move the sliders.

Project Cost: Measured in 2008 dollars ranges from \$0 to greater than \$1B

Market Size: Describes (in thousands) the size of the population within 40 minutes of the study area which ranges from 0 to 4 million.

AADT: the Average Annual Daily Traffic (in thousands) counts for the project which ranges from 0 to 500,000.

Population Density: Defines the population per square mile which ranges from 0 to 16,200.

Airport Travel time: Describes (in miles) the distance required to travel to the nearest commercial airport which ranges from 0 to 150 miles.

Topography: Measures the type of terrain within the Case Study which ranges from 1-Flat to 21- Mountainous.

Length: Describes the distance (in miles) of the project which ranges from 0 to 325 miles

Population, Employment, and Income Growth: Describes the respective percentage growth for these three categories from 2001 to 2006.

The “**Reset Sliders**” button at the bottom allows the user to reset all of the selected values. A check box option to the right also provides the option to “**Include cases with missing data.**”

Click on the “**View Results**” button on the left side of the screen to see the results as shown in **Figure 3**.

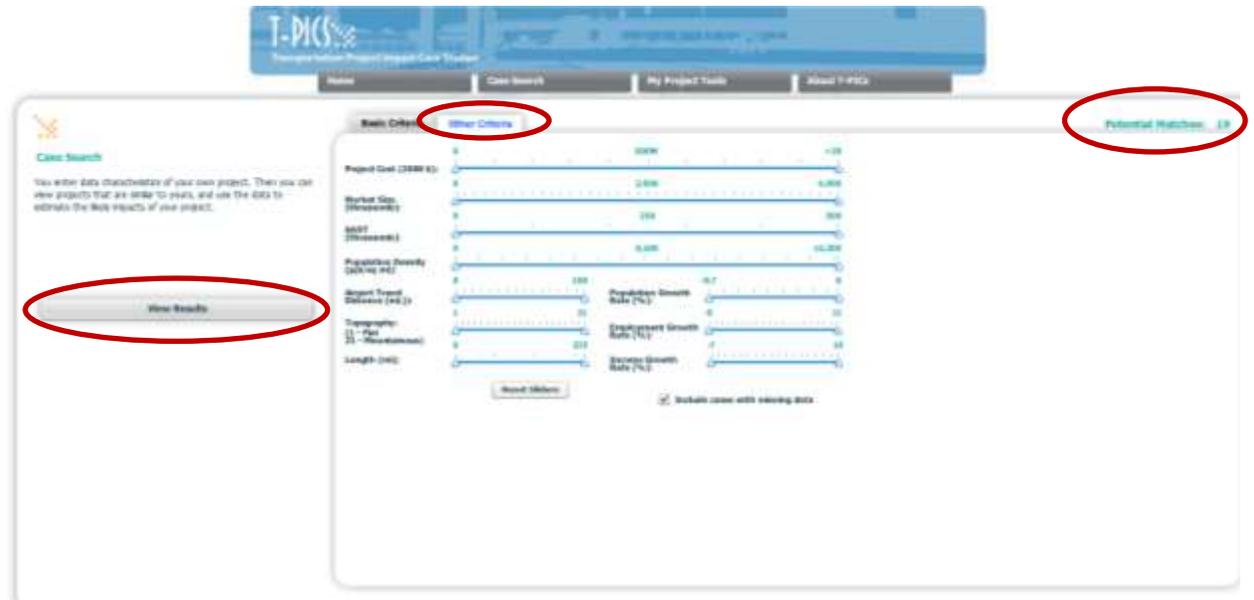


Figure 3: Case Search – Other Criteria

Case Search Results

After the “**View Results**” tab is selected, all of the Case Studies that include the selected criteria are displayed below and as illustrated in Figure 4. In the upper box is a list of all user defined search parameters that are included in the Case Study results. The table below shows the case study results, the number of case matches are shown in the upper left corner.

On this page, there are several options to analyze the cases:

1. **Sorting by Case Study category description** – TPICS allows users to sort each case by clicking on the gray category description headers. Cases can be sorted by title, project description, project type, state, BEA region (modified), project cost, and date of completion.
2. **Compare Cases** – In order to compare cases, select the boxes under the “**Compare**” header and then select the “**Compare Projects**” button on the lower far right of the screen.
3. **View Case** – To view a specific individual case, select the **linked name of the case under the “Title”** column in the lower left hand of the screen.

Other options include at this screen include:

- **Download search results** – This feature allows the user to capture the criteria that was selected for the search results.

- **Print Search Results** – This option prints out the search parameters listed in the upper box as well as the Case Study descriptive information defined by the labels shaded in gray.
- **Change Search Parameters** – If changes to the search criteria are required, clicking on the link in the upper right hand corner returns the user back to the Basic Criteria page.

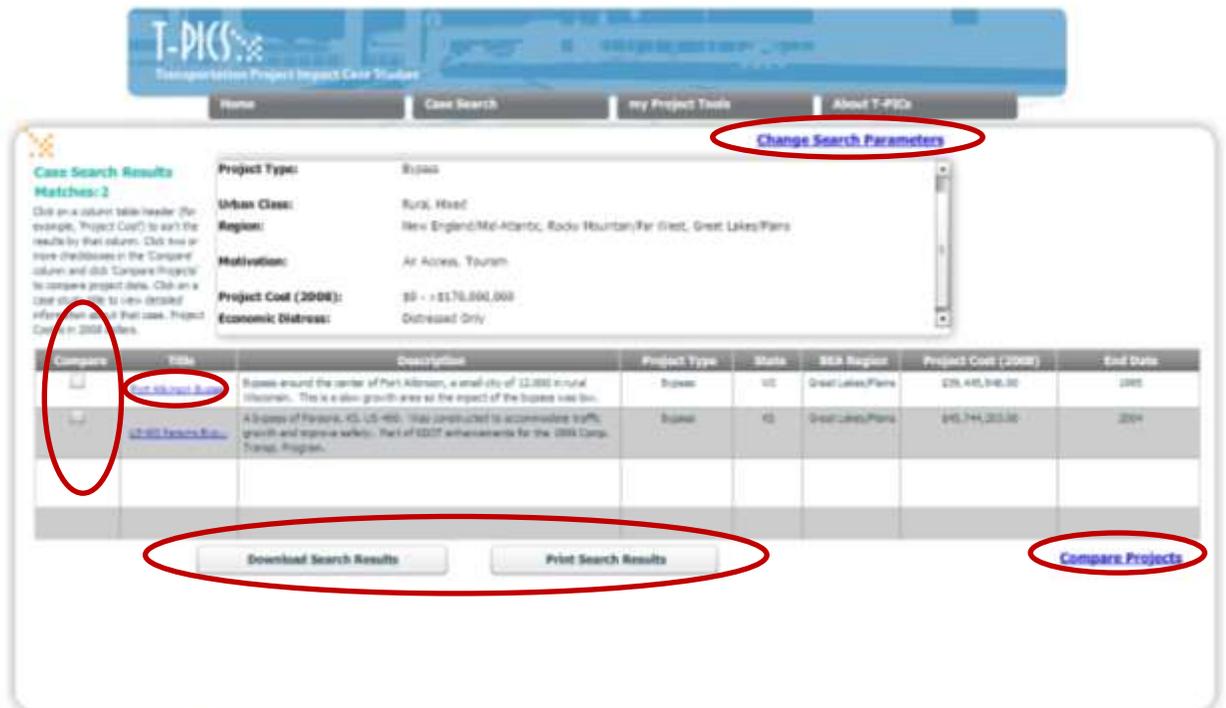


Figure 4: Case Search results

Comparing Case Results

After selecting the two or more projects under the “**Compare**” column and selecting the “**Compare Projects**” button, the screen shown in Figure 5 will appear. This view provides an example of the economic impact categories, and provides a high-level comparison between the selected projects. This summary gives the user a better idea of which cases they could examine in more depth.



Figure 5: Case Search results – Case comparison

Viewing a Case

To view a specific case, return to the Case Search Results page (click on the **“Back to results”** button at the top right corner of the Case Search Results: Case Comparison page.) Simply click on the Case Study name under the “Title” column, and the screen below in Figure 6 will appear. This screen provides individual tabs describing the different categories of information available. If at any point you want to return to the results page select the **“Back to results”** button in the top right corner of the screen.

The first tabbed table that appears is labeled **“Characteristics”**. It provides a summary of the original user defined search parameters with a few additional points of data about the project (coordinates, construction dates, city, impact area—based on counties for US cases).

Instructions for Using the TPICS On-line Database and Project Tool



Figure 6: Case Search results - Characteristics

The second tab of the Project Case is “**Intermodal.**” This section provides planned cost, actual cost, Freight volume, and Passenger volume for intermodal projects as seen in . This section is blank for non-intermodal projects.



Figure 7: Case Search results - Intermodal

The third tab of the Project Case is “**Setting.**” This section provides the details of the

“Other Criteria” parameters that are specific to this case Figure 8.



Figure 8: Case Search results - Setting

The fourth tab labeled “**Pre/Post Conditions**” lists a variety of economic measurements at a local (city or municipality), county (or multiple counties), or state level (Figure 9). The measurements include Personal Income, Total number of Jobs, Population, Property Value, Business Sales, Tax Revenue, and Density. These measurements are only economic indicators at the scale of measurement selected (e.g., local, county or state), and should not be viewed as “economic impacts”. These effects are shown on another tab. The dollar values are comparable since they have been adjusted to post year equivalent dollars (i.e., pre year dollars were adjusted using the appropriate CPI to rescale the values).

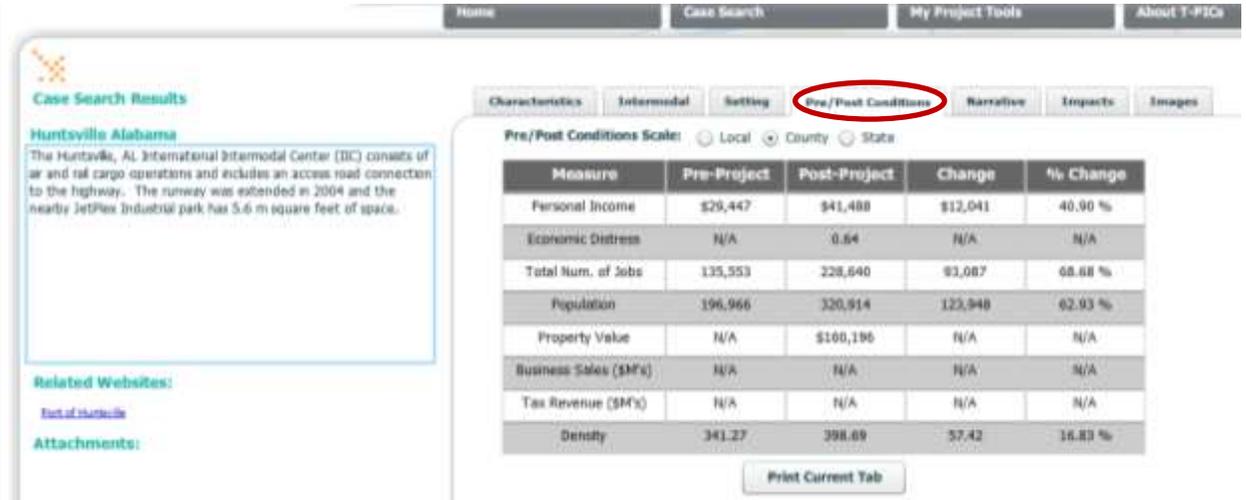


Figure 9: Case Search results – Pre/Post Conditions

The fifth tab is the “**Narrative**” section of the case (Figure 10). For each Project Case, several interviews were conducted with Municipal Planning Organizations, Economic Development Corporations, Departments of Transportation, Chambers of Commerce, Planning Departments, and local businesses. The narrative provides background information on the project and context for viewing the economic impacts. Each narrative is divided into six sections:

- 1) Synopsis - an overview of the project and economic impacts.
- 2) Background - a review of the events leading up to project construction.
- 3) Project Description and Motives – an in-depth description of the needs the project was meant to address and the logistics of construction.
- 4) Project Impact – an analysis of the estimated economic impacts due to the project.
- 5) Non-transportation factors – describes other non-transportation related influences that affected economic development in the area.
- 6) Resources – a list of citations for information gathered and organizations interviewed.

On the bottom left hand corner there are links to **Related Websites** where additional information regarding the case can be found and **Attachments** for additional information in documents, reports, and other analysis regarding the project case.

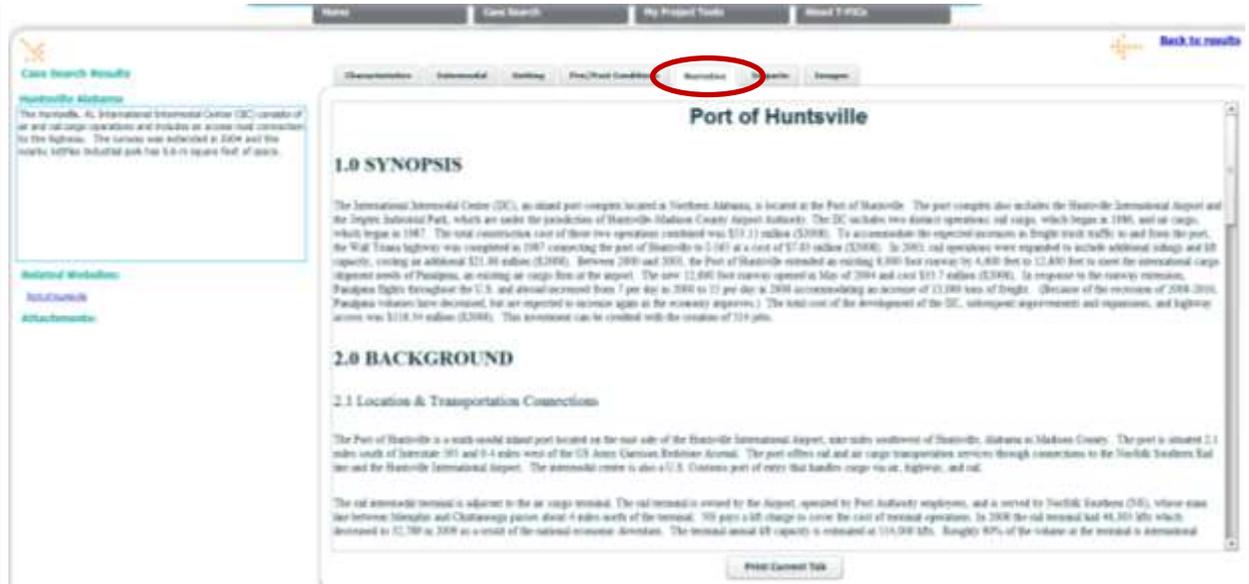


Figure 10: Case Search results - Narrative

The fifth tab is the “**Impacts**” tab (Figure 11) and lists the economic impacts that were estimated for the selected case. These are meant to capture the net economic impacts (i.e. only those impacts that can be attributed to the project). These impacts include (where available): **Number of Jobs, Income/Wages, Output, Investment (in square feet), New Construction, Property Value, Local Taxes, and State Taxes.** They are broken down in terms of:

- **Direct Impacts** – which are those directly attributed to the project
- **Indirect Impacts** – which capture the multiplier effects (from suppliers and worker re-spending of wages) in the local economy generated by the direct impacts.
- **Total Impacts** – which are the sum of direct and indirect impacts. Thus, they are a measure of the “economic footprint” of the project.



Figure 11: Case Search results - Impacts

The sixth and final tab on the Case Search Results is the “**Images**” tab (Figure 12) that connects the user to an interactive Google Maps link that highlights the area where the project was developed. It provides a visual assistance to understand the relationship between the project, other transportation linkages and the surrounding development. Many of the Google links to case images can be viewed at the street level – providing the user with a flexible and informative view of current on-the-ground conditions for each case.



Figure 12: Case Search results - Images

2.3 My Project Tools Page

If the user wishes to estimate a range of potential economic impacts for a planned project, they should proceed to **My Project Tools** by either clicking the tab at the top of the screen or selecting the button of the same name on the Home page.

Project Parameters

The **My Project Tools** page (Figure 13) differs from the **Case Search** page in that instead of defining project criteria to match a case, the user selects parameters for a “hypothetical case”. These parameters are used to estimate the likely ranges of economic impacts based on project cost, traffic volumes and other parameters. The initial parameters to be defined are: **1) Project Type, 2) Region, 3) Urban/Class Level, 4) Economic Distress, and 5) Length of Project**. Once these initial categories have been selected, click on the “**View Results**” button on the lower left hand corner of the screen. (NOTE: For Interchanges, just leave the “**Length of Project**” window blank.)

The screenshot shows the TPICS (Transportation Project Impact Case Studies) interface. At the top, there is a navigation bar with four tabs: 'Home', 'Case Search', 'My Project Tools' (highlighted with a red circle), and 'About TPICS'. Below the navigation bar, the 'My Project Tools' section is visible. On the left side of this section, there is a 'View Results' button, also highlighted with a red circle. The main area of the page contains a form for selecting project parameters. The form is organized into several sections:

- Project Type:** Radio buttons for Express, Limited Access Road, Safety, Interchange, and Widening. Below these are radio buttons for Tollway, Access Road, and Connector.
- Region:** Radio buttons for New England/Mid-Atlantic, Southwest, Southeast, and International. Below these are radio buttons for Rocky Mountain/Pix West and Great Lakes/Plains.
- Urban/Class Level:** Radio buttons for Rural, Mixed, and Metro.
- Economic Distress:** Radio buttons for Distressed Only and Non Distressed Only.
- Length of your Project:** A text input field with the value '10' and a 'Miles' label.

Figure 13: my Project Tools

Results Page and Sensitivity Analysis

With the initial criteria defined, the results page (Figure 14) estimates the ranges of economic impacts including Jobs, Wages, and Output. These three categories of impacts are divided into Direct, Supplier and Wage Impacts (i.e. Indirect), and Total Impacts (as defined in the “**Impacts**” tab for “**Case Search**”).

Above the ranges of economic impacts are listed a variety of additional project parameters that can be adjusted with a specific range. EDR Group analyzed the relationships between project characteristics and the resulting economic impacts and calculated the sensitivity of how changes in these variables would ultimately affect the economic impact outcomes. The option to adjust these parameters allows the user to adjust costs, traffic estimates, and other economic development factors to properly reflect the project’s local environment. In turn, these adjustments will drive changes in expected economic impacts of the project. They are comprised of the following:

- 1) **Project Cost** – the cost of construction in \$2008, default setting is the median based on the project parameters. The project cost determines the maximum economic impacts so, if this has been reached, toggling with other parameters will not allow the impacts to increase.
- 2) **Average Annual Daily Travel (AADT)** – current AADT, along with mileage is a main driver of economic impacts, default setting is median based on project parameters
- 3) **Land Use Policies** – a measure of how restrictive or supportive the local area is to build on (e.g. tax breaks or financing). The default setting is “Average” but moving to either side will increase or decrease economic impacts by the percentages shown.
- 4) **Business Climate** - a measure of how supportive the local area is in allowing development. The default setting is “Average” but moving to either side will increase or decrease economic impacts by the percentages shown.
- 5) **Infrastructure** – a measure of supporting infrastructure to serve development associated with the project (e.g. water/sewer). The default setting is “Average” but moving to either side will increase or decrease economic impacts by the percentages shown.

These impacts should not be viewed as final since they are a “best guess” given the information available from the case study database and the professional judgment of EDR Group. However, they should be viewed as capturing the appropriate magnitude of impacts given the project specifications. The shifts in impacts should also accurately capture the relationship between economic impacts and the effects of project parameters and local conditions.

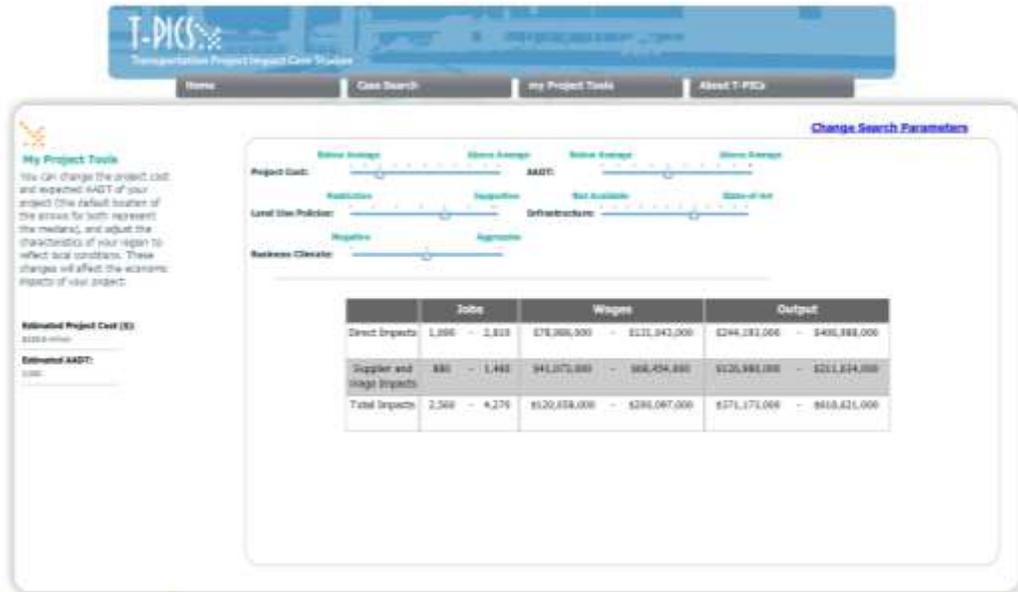


Figure 14: my Project Tools – Impact results

By clicking the “**Change Search Parameters**” link and returning to the first screen (see Figure 13), the user can redefine the proposed project and assess how changes in the characteristics of the project may produce different ranges of economic impacts. The combination of location, project type and characteristics, and supportive initiatives in land use policies, non-transportation infrastructure investment and business climate and conditions can be explored to see how these decisions interact to produce economic impacts associated with each proposed project.

The final tab on the TPICS site is labeled “About TPICS” (see Table 15) and is linked to an external web page that contains additional information. This webpage contains documents such as the Practitioners Guide, Case Study and Meta-analysis design, Assessment of Economic Impact Tools, and also contains power point slide presentations.

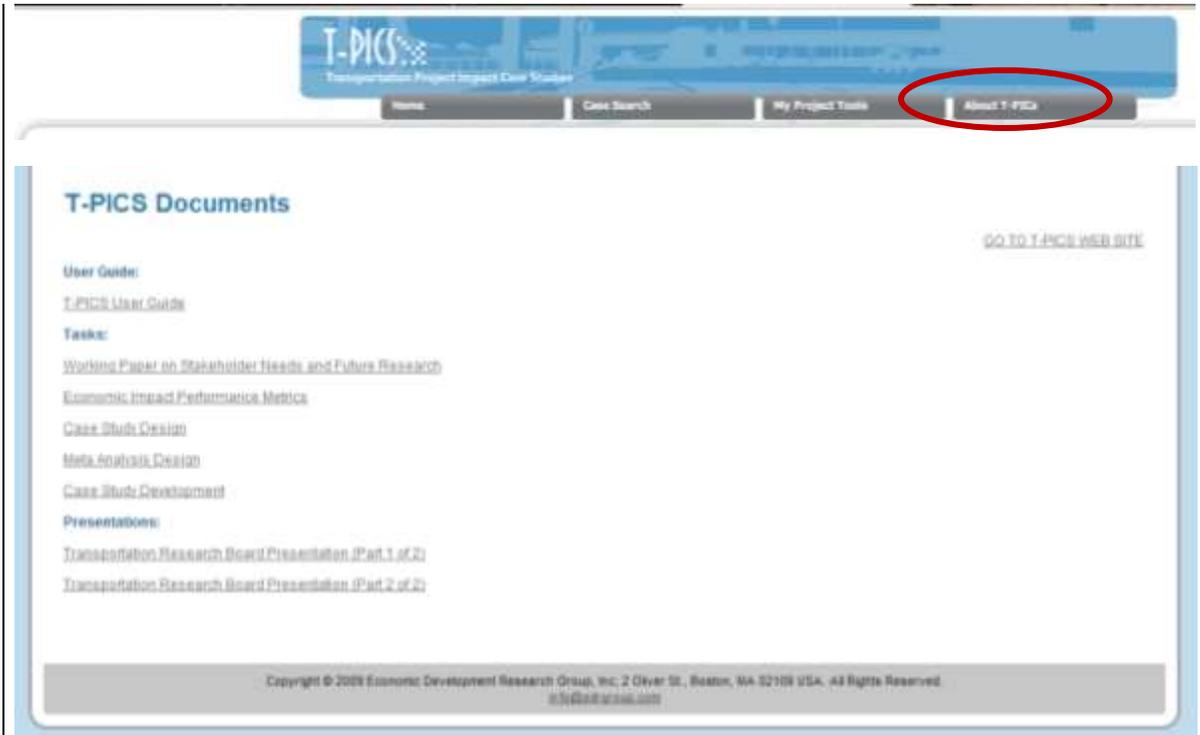


Figure 15: TPICS page – More Information