March 22, 2019

**Memorandum #2019-47**

**TO: Regional Connectors Study (RCS) Working Group**

**BY: Camelia Ravanbakht, RCS Project Coordinator**

**RE: Regional Connectors Study Working Group Meeting – March 28, 2019**

Attached is the agenda for the **Regional Connectors Study Working Group Meeting** scheduled for **Thursday, March 28, 2019 at 10:00 a.m.** in the Regional Building, Conference Room D/E, located at 723 Woodlake Drive, Chesapeake, Virginia 23320.

MK/kg

**Voting Members:**
Earl Sorey (CH)
Angela Rico (HA)
Bryan Stilley (NN)
Brian Fowler (NO)
James Wright (PO)
Jason Souders (SU)
Phil Pullen (VB)

**Nonvoting Members:**
Jason Flowers (Army Corps)
George Janek (Army Corps)
Robert Pruhs (Army Corps)
Ivan Rucker (FHWA)
Kevin Page (HRTAC)
Tim Dolan (US Coast Guard)
Gene Leonard (US Coast Guard)
Michael King (US Navy)
Tony Gibson (VDOT)
Jennifer Salyers (VDOT)
Kit Chope (VPA)
Barbara Nelson (VPA)

**Staff:**
Bob Crum (HRTPO)
Mike Kimbrel (HRTPO)
Rob Case (HRTPO)
Keith Nichols (HRTPO)
Dale Stith (HRTPO)

**Project Coordinator:**
Camelia Ravanbakht

# Agenda

# Regional Connectors Study

# Working Group Meeting

# March 28, 2019

# 10:00 AM

The Regional Building, Conference Room D/E, 723 Woodlake Drive, Chesapeake, Virginia

1. Call to Order
2. Welcome and Introductions
3. Public Comment Period (Limit 3 minutes per individual)
4. Minutes

   Summary Minutes from March 14, 2019 Working Group Meeting – Attachment 4

   - Recommended Action: For Approval

5. Craney Island Site Visit Update – Camelia Ravanbakht, RCS Project Coordinator

   - Recommended Action: For Information

6. Phase 2 Scope of Work Supplement – Craig Eddy, MBI

   During the March 14, 2019 Working Group Meeting, the Consultant Team were requested to prepare new language for Tasks 4.5 through 4.7 (less any reference to candidate projects), plus rewording of the portions of 4.3a and 4.3b – Attachment 6

   - Recommended Action: For Discussion and Approval

7. Regional Connectors Study: Review and Discuss Vision, Goals, and Objectives

   Original Draft Phase 2 Scope of Work Document with Comments (shown in Track Changes) - Attachment 7

   - Recommended Action: For Discussion

**8.** Schedule and Next Meetings:

- **Working Group - TBD**
- **Steering (Policy) Committee - TBD**
- **Scenario Planning Webinar #4 - April 11, 2019**
- **HRTPO Board Meeting – April 18, 2019**
- **HRTPO Board Meeting - May 16, 2019**
- **Craney Island Site Visit – May 2019 – (Doodle Poll in Progress)**

**9.** Adjournment

# Regional Connectors Study
# Working Group
# Minutes of March 14, 2019

The meeting of the Regional Connectors Study (RCS) Working Group was called to order at 10:00 a.m. by Bob Crum (HRTPO) in the Regional Board Room, 723 Woodlake Drive, Chesapeake, Virginia, with the following in attendance (alphabetically by last name):

Keith Cannady (HRPDC)
Rob Case (HRTPO)
Bob Crum (HRTPO)
Beth Drylie (Michael Baker Intl.)
Rick Dwyer (HRMFFA)
Craig Eddy (Michael Baker Intl.)
Jason Flowers (USACE)
Brian Fowler (NO)
Carl Jackson (PO)
George Janek (USACE)
Mike Kimbrel (HRTPO)
Michael King (Navy)
Kendall Miller (HRTPO/HRPDC)
Keith Nichols (HRTPO)
Kevin Page (HRTAC)
Bridjette Parker (NN)
Lorna Parkins (M Baker)
Camelia Ravanbakht (RCS Project Coordinator, by phone)
Tara Reel (VB)
Dustin Reinhart (Port of Va.)
Angela Rico (HA)
Earl Sorey (CH)
Bryan Stilley (NN)
Dale Stith (HRTPO)
Eric Stringfield (VDOT)
James Wright (PO)

**Welcome and Introductions**

Mr. Robert Crum, HRTPO Executive Director, welcomed the group and initiated the introduction of persons attending.

**Public Comment Period**

There were no public comments.

**Organizational Structure**

The group elected Brian Stilley (Newport News) as chair, and Earl Sorey (Chesapeake) as vice-chair.

**Minutes**

The minutes of the Feb. 13, 2019 joint meeting (Steering/Policy Committee and Working Group) were approved.

**Craney Island Tour**

Bob Crum introduced the idea of the group touring Craney Island. Brian Fowler (Norfolk) suggested that discussion of the tour be postponed until later in the meeting. Jason Flowers (USACE) said that it is vital to get "boots on the ground" to see the USACE, Navy, and Coast Guard facilities in the Craney Island area. Michael King (Navy) committed to coordinating with Camelia Ravanbakht (RCS Project Coordinator) and Jason Flowers (USACE) on tour details (including candidate dates) for the tour.

**Next Phase- Name and Scope**

Mr. Crum reviewed the history of the RCS, including the approval of the Phase 2 (scaled down) scope by the HRTPO Board Feb. 21, 2019. Mr. Stilley led a discussion of the name and scope of the phase that will follow the approved Phase 2. Brian Fowler (Norfolk) suggested that the development of the scope for the next phase be postponed until after completion of Phase 2. Mr. Stilley stated a distaste for an open-ended process, and a desire instead for a blueprint for the total process. Ms. Lorna Parkins (Michael Baker Intl.) reviewed the tasks of Phase 2. Mike Kimbrel (HRTPO) stated a need for completion through Task 4.7 ("Evaluating the Scenarios", proposed in, but deleted from the Phase 2 scope prior to Feb. 21, 2019 approval) by Jan. 2020 so that the scenario planning tools may be used in the development of the HRTPO's 2045 Long-Range Plan (LRTP). Carl Jackson (Portsmouth) stated a desire that the RCS not be rushed to meet the LRTP schedule. Tara Reel (Va. Beach) concurred. Craig Eddy (Michael Baker Intl.) stated that keeping Phase 2 on-schedule is subject to the delayed receipt of the regional model from VDOT. Bob Crum suggested calling Phase 1 "Data Collection" and Phase 2 "Building the Scenario Planning and Traffic Model Tools". Mr. Eddy said the next phase must include Tasks 4.5 thru 4.7 (in order to meet LRTP needs). Brian Fowler made a motion to request the consultant to create new language for Tasks 4.5 thru 4.7, less any reference to candidate projects, plus rewording of the portions of 4.3a and 4.3b which were deleted. The motion passed.

**Schedule and Next Meetings**

The next working group webinar is scheduled for March 15, 2019. Additional webinars will follow approximately every other week.

The working group will meet March 28, 2019.

**Adjournment**

The meeting was adjourned approximately at noon.

# ATTACHMENT 6

REGIONAL CONNECTORS STUDY

## PHASE 2 – TECHNICAL ANALYSIS

## SCOPE OF WORK - SUPPLEMENT



Introduction

Phase 2 of the study will entail the technical analysis required to identify, assess, and prioritize potential transportation improvements to enhance connectivity between the Peninsula and the Southside of Hampton Roads. Phase 2 tasks are described in the following paragraphs.

### TASK 1 – Execute Engagement Plan

This task outlines the process for the implementation of a Public Engagement Plan developed in Phase 1 of the Hampton Roads Regional Connectors Study (RCS). The subtasks associated with implementation of the Public Engagement Plan seek to inform, educate and engage stakeholders, residents, businesses, and travelers in the Hampton Roads Region. Phase 2 covers the period from January 2019 through January 2020, a 13-month period. As such, the Public Engagement Plan will be reviewed on a quarterly basis to ensure alignment with the goals and objectives of the study and to address any additional information obtained through the engagement process. The Consultant Team will adhere to all applicable policies and procedures as directed by HRTPO and applicable federal guidelines covering MPOs and recipients of federal funds for planning purposes.

**Task 1.1: Task Management**

The engagement task lead will provide a task-based progress report, participate in monthly team meetings and bi-weekly calls as appropriate with HRTPO staff and the project management team. Progress reports will summarize and report the percentage complete of each task and provide the basis for the monthly invoice. Progress reports will be provided to the project management team in acceptable format. The engagement task leader will attend Consultant Team meetings as needed, including but not limited to bi-weekly engagement team meetings, internal team meetings, and

meetings with HRPTO staff as required. The engagement task leader will provide schedule updates to inform the master project schedule.

**Task 1.2: Engagement Plan Review**

The study engagement team will perform a quarterly review of the RCS Engagement Plan. This review will include evaluation of the demographic profile, tools and tactics, metrics, stakeholder groups and key messages. Any revisions will be provided to HRTPO staff in track changes for review and acceptance. An electronic copy of each plan revision will be submitted.

**Task 1.3 Implementation of Engagement Program**

The study engagement team will conduct stakeholder outreach tasks to engage regional stakeholders as directed and approved by HRTPO and the Working Group. This will consist of outreach to the targeted stakeholders representing or living in the jurisdictions covered by HRTPO agreements. Activities to be implemented by the engagement team include:

Task 1.3a Study Mailing list and Comment Database

The study engagement team will create, organize, and maintain a project database and mailing list to house contact details for agency representatives, elected officials, civic groups, businesses, and other important stakeholders. The engagement team will work closely with HRTPO to develop the agency and locality mailing list. The list will be used to disseminate project status information such as a study brochure and to notify people of upcoming in-person and online engagement opportunities.

Throughout the course of the study, the engagement team will expand and update the list by encouraging interested parties to refer others to the list or through mailing list signups via the study website. The engagement team will utilize database software such as MailChimp to maintain the database.

This database can also be used to house public meeting comments for extraction and future response development. The engagement team will accept all public comments submitted during public outreach efforts and at public meetings. This effort will include: developing a public comment section of the database; collecting and cataloging all correspondence sent to the study team; categorizing all comments for inclusion in comment analysis or reports and creating the public outreach comment table summary for inclusion in the Engagement Summary Report.

**Task 1.4 Website Upgrades and Maintenance**

The study engagement team will develop content for use and subsequent uploading to the study website by the study team. This effort includes initial content development to be reviewed and approved by the Working Group and HRPTO along with the development of content updates by the study team at project milestones and other pertinent events.

Task 1.4 Prepare Website Content

The study team will develop a creative brief for Phase 2 to orient readers to the Regional Connectors Study and its phases.

As a part of Phase 2, the study website will be populated with fresh information as it becomes available, including analysis results, meeting dates, reports, and meeting/briefing dates. Updates and reporting documents such as one-pagers will be shared as they become available. Templates for these updates will be designed and developed as a part of this task. New content, including microsimulation of alternatives' traffic operating conditions, will be integrated into the site, and new components will be added to the site as needed to accommodate this content. Original copywriting will be delivered as a part of these updates, and publication will be managed by the study team. Regular hosting and maintenance of the study website will also be covered under this scope.

A key feature of Phase 2 will be the development of an Interactive Map, which will require coordination to establish visual goals, data sources, and other content needs. Once designed, this map will be integrated into the existing study website.

Phase 2 will also feature a new Scenario Planning Page Template which will appear at the top-level navigation on the site. New copy will be developed, and technical analysis elements performed by team members will be uploaded. This page will be designed to feature animations and other graphical elements.

As the Study gathers momentum, a plan will be created to report events on a regular schedule, and a post template for these events posts will be created.

Finally, survey results will be shared in the form of a final report. Survey-generated publications will be added, and categories for these publication types will be created and added to the website backend.

*Task 1 Timing:*

- 13 months

*Task 1 Meetings:*

- Meetings with HRTPO staff: 1
- Working Group Meetings: 0
- Steering Committee Meetings: 0

*Task 1 Deliverables:*

- Study mailing list (electronic format)
- Comment database (electronic format)
- Public Engagement Summary Website deliverables

## TASK 4 – Conduct Scenario Planning

The Regional Connectors Study (RCS) Regional Scenario Planning process will provide insight to decisionmakers regarding the need for and the benefits of alternative transportation investments considering potential alternative future trends. The Scenario Planning process will consider a baseline 2045 scenario and three alternative 2045 scenarios that present plausible futures with respect to economic, demographic and technology drivers. The scenarios will be developed in Phase 2, but not analyzed until Phase 3.

Throughout the RCS Regional Scenario Planning process, the RCS Working Group will work closely with HRTPO staff and the Consultant team to provide guidance, affirm scenarios, select drivers and performance measures, and evaluate interim and final results. The RCS Steering Committee that is overseeing the overall RCS process will also be updated on the progress on the Regional Scenario Planning effort.

The economic modeling tasks require model access and data license charges that are detailed in Appendix A.

### Task 4.1: Building the Base Data, Models, and Scenarios

**Overview**

The purpose of this task is to build a series of datasets and maps that will be used as the basis for the Scenario Planning effort. It will require close coordination with technical staff from the HRTPO and effective communication with the Working Group to ensure that each step is documented and vetted, particularly because the data gathered in this task will be the foundation for all the scenario and modeling work in the following months. The Consultant team will obtain all readily available data that localities have provided to HRPDC and will also coordinate any additional land use data collection efforts with local government planning and economic development staff.

The conversion of substantial amounts of data into useful information is a significant challenge that requires clear and concise data analysis and synthesis. The Consultant Team's planning process will be built upon developing an accurate, living library through assembling the compiled data into an organized structure and accessible formats, and by analyzing the data in a coordinated, comprehensive manner. The data collected and used in this study will be updated to provide regional leaders and analysts with accurate information from which to make strong, technically-supported decisions.

**Task 4.1a. Kick Off and Data Collection**

The focus of this task will be to review and analyze available data (much of it collected in Phase 1), with the goal of establishing a unified dataset for analysis of future scenarios, as well as to enable a foundational "benchmarking" of the core indicators of success in the Region. In addition, in this task we will hold a kick off meeting with the Working Group to guide the start of the technical and analytic process.

**Task 4.1b: Build GIS Base for Scenario Planning**

In this task, the Consultant Team will build a layered base, using GIS data, of the entire region to be used as the platform for spatial allocations in the Scenario Planning model. The initial data we anticipate

assembling (some of which has been collected in Phase 1) includes information on demographics, housing, transportation, environment, infrastructure, governance, employment, education, finance and a host of other measures. In addition, we will organize this data in spatial terms, as layers on the regional GIS base map for future analysis.

A key step in building this base will be the determination of the scale of the "grid" to be used as the surface for the analysis of the region. There are several options for this grid, based on how the region is broken down into modules for different analytic purposes. These include:

- The TAZs used in the Regional Model
- Census Block Groups
- Existing parcel data
- An overlay grid of equal squares sometimes used for analysis purposes – usually ranging from 30x30 meter squares to 40-acre squares.

The type of grid used for the land use allocations will be determined once all the data is assembled to see which scale of grid is most conducive to data collection and analysis. In all cases, however, regardless of the primary grid chosen for analysis purposes, all data will of necessity be translated to the TAZ geography ultimately for use in the Travel Demand Model.

**Task 4.1c: Build Place Types**

The land use allocation aspect of the Scenario Planning process will be conducted through a "Place type" approach. This involves converting the existing and future land use data categories in the region into a series of typical community or "place" types, with names such as residential suburban community, agricultural community or high-density mixed-use community with a commercial or residential focus. These Place types will be used both to profile the existing land use pattern in the region and to construct each of the future land use scenarios.

The process of building a set of Place types will involve several steps, including:

- Profiling existing and future land use types in the region to develop a unified set of Place types that describe regional development patterns
- Developing quantitative summaries of each Place type that summarize land uses, developed areas, and environmental data for each
- Developing summary 3-D visualizations of each Place type, to clearly explain them to stakeholders and the public

Available HRTPO datasets of existing and future land uses will be used as the basis for the Place types, and they will be checked against air photos and parcel data from sample locations in the Region to calibrate the Place types to existing conditions.

**Task 4.1d: Build "Virtual Present" Map of the Region**

The Virtual Present map is a picture of where development is <u>currently</u> located in the Region. Building the Virtual Present involves allocating the Place types onto the GIS base map of the region to match the existing pattern of development and land uses on the ground today. The existing parcel-based land use

data from HRTPO will be used for this, but where there are any potential gaps in the parcel dataset, we can use National Land Cover data to fill in the missing areas. The output will be a GIS map of the Region that converts the existing land uses to Place types, with resulting data derived from the Place types about land use, environmental features, accessibility and transportation characteristics.

As part of this task, the Consultant team will provide the land use and place type data to be used in the model to each jurisdiction to confirm land use data input/assumptions. To avoid delaying the schedule, the distribution of the data will be accompanied by a single webinar to explain the data origins and anticipated use.

**Task 4.1e: Land Suitability Analysis**

The Land Suitability Analysis is a necessary step to build future scenarios and land use allocations. To be able to allocate new development based on growth scenarios, it is necessary to understand which lands are suitable for development from a regulatory, environmental and existing conditions standpoint. In this task, a series of new data layers will be added to the Regional GIS base that describe the suitability of the land for development or redevelopment based on:

- Federal, state or local government-owned lands
- Environmental constraints
- Utilities, infrastructure and easements
- Zoning and other regulatory constraints
- Flood and inundation zones
- Value of land and improvements (if parcel level data is available in GIS)
- Other constraints or factors influencing development potential

Together, the Virtual Present map and the Land Suitability Analysis overlays will define where new growth is both feasible and (to some extent) likely to occur. This information will form the basis for allocating future growth for the land use portion of the scenario development process.

**Task 4.1f: Calibrate "Virtual Present" to TAZ control totals**

An important aspect of this process will be to calibrate the allocations of land use to the control totals for socioeconomic data in the Travel Demand Model for each TAZ. This task will involve modifying the Place type allocation in the Virtual Present so that the population and industry employment totals match the controls in each TAZ according to the Travel Demand Model. This will ensure that the Virtual Present map exactly matches the spatial distribution of population and employment data that is used in the Travel Demand Model so that the Scenario Planning model and the Travel Demand Model are in synch. This will also highlight any significant differences between the 2015 land use data and the socioeconomic data in the Travel Demand Model.

**Task 4.1g: Review Data on Economic Conditions and Trends**

To support later development of economic "drivers" for use in scenario planning, the Consultant Team must first develop a baseline understanding of current economic conditions as well as key trends and drivers of future economic conditions. To this end, the Consultant Team will review HRTPO's 2015

profile of socioeconomic data and its 2045 regional socioeconomic forecasts, developed with the use of the Regional Economic Models Inc. (REMI). HRTPO will provide the Consultant Team with methodological documentation.

The Consultant Team will review and document trends and forecasts of several critical socio-economic and demographic variables, including employment by sector, population, population by age, households, household size, labor force participation, and migration by county. The Consultant Team will discuss the forecast process and results with the Chief Economist of HRPDC, as needed. To support interpretation of these forecasts, they will be benchmarked against other sources of information, such as Federal and State data, as well as proprietary sources such as Moody's Economy.com. The Consultant Team will further outline and discuss the transportation implications of the socio-economic and demographic changes identified, as well as the key underlying assumptions within the REMI model or other parts of the forecasting process that drive outcomes. The Consultant Team will review embedded assumptions related to the types of economic drivers that will subsequently define alternative scenarios, to ensure divergent futures can be correctly "pivoted" from the baseline forecast, and to identify any key sources of uncertainty.

In addition to the broad regional review, the Consultant Team will conduct a specific review of expected trends at Port of Virginia facilities. This will include a review of port demand forecasts contained in the travel model and documented in PoV's 2065 master plan and a meeting with PoV staff. This review will ensure alignment between the travel model and the port's expectation and will support the option for integrating shifts in port activity (including mode shifts) as potential scenario drivers later in the process.

**Task 4.1h: Identification of Economic Opportunities**

In this task, the Consultant Team will review available information on identified economic development opportunities within the region that may affect spatial and industry patterns of long-term regional growth. This is expected to include a review of information collected by HRTPO regarding potential large parcel economic development sites, as well as discussions with staff concerning the way in which these sites are treated in the TPO's future forecasting process. In addition, the Consultant Team will review the Hampton Roads Economic Development Alliance report that identified competitive industries that could drive additional regional growth including advanced manufacturing & logistics, shared services (e.g. ADP), and IT. The Consultant Team will also review HRPDC's most recent Regional Economic Development Strategy (REDS) and Regional Benchmarking Study and will hold 1-2 stakeholder meetings with regional economic development experts. This information will provide a basis for defining potential scenario economic drivers that are specific to the Hampton Roads Region, with attention given to different potential economic diversification futures.

**Task 4.1i: Economic and Financial Implications of Alternative Development/Industry Mix**

The Consultant Team will conduct an initial review of data and tools available to connect alternative development (by Place type or industry) and transportation scenarios to likely economic and financial outcomes. This preliminary research will help parameterize the range of economic performance measure options available, to be further refined in Task 3. At a minimum, this will involve coordinating with TPO staff regarding options to use the TREDIS economic modeling system with or without REMI. TREDIS's modular framework enables economic impact evaluation either with the built-in Regional Dynamics economic model, or through integration with REMI. As part of this TREDIS review, the

Consultant Team will coordinate with TPO staff regarding freight data options that enable the connection of commodity movements to economic activity and impacts. The vFreight county-to-county trade flow database will be the default option. However, should the TPO have access to new Transearch data via VDOT, this option can be considered as well.

The Consultant Team will also review data on average square feet per employee and development value per square foot by different development types. This can support definition of scenarios in both development and employment terms.

**Task 4.1j: Review Data Describing Regional Travel Behavior**

The Consultant Team will assess the data underlying the updated (2015/2045) HRTPO travel model for its adequacy in sustaining the performance of the model and for use in developing the identified potential model enhancements and extensions. The Consultant Team's data assessment will [a] identify shortcomings, if any, of existing data, [b] prioritize needed data collection, and [c] describe alternative data collection methods for cost-efficiently updating the underlying model data. The Consultant Team will prepare a preliminary cost estimate and schedule for acquiring any needed data. The assessment will include a review of any available information including previous studies, surveys, and reports characterizing personal and commercial travel behavior in the region.

This review will include any data collection and analysis documented because of the ongoing HRTPO model modifications by VDOT to not duplicate efforts.

**Task 4.1k: Evaluate Updated Regional Travel Demand Model**

HRTPO model modifications are currently underway by VDOT and its consultants, including a base year update to Year 2015 - accommodating HRTPO's long range planning process. The Consultant Team is actively coordinating with VDOT and their consultants to incorporate recommendations deemed critical to this study for this model update. Once the model update is complete, the Consultant Team will conduct an evaluation of the updated model targeted to the application of the model for use in the RCS.

The Consultant Team will review available documentation describing the updated HRTPO model and associated performance. The review will include an examination of currently available base and future year model sets reflecting the updates, and the Consultant Team will execute the model set(s), mechanically verifying results and the implementation of updates as described in the documentation, as well as model performance, as needed to conduct a study-focused validation to ensure the model well represents the travel markets that use the Harbor crossings.

The Consultant Team will review and summarize the current model structure, modeling procedures, software, hardware, run scripts, and data flows. The Consultant Team will also review various model parameters, including vehicle and truck trip generation rates. Based on its review, the Consultant Team will describe the types of analysis that the model process is currently capable of supporting. If necessary, in concert with feedback from HRTPO staff, the Consultant Team will identify potential enhancements and extensions to the modeling process that will broaden and/or integrate the model's analysis capabilities to address study needs. The list of potential model enhancements will be prioritized by the Consultant Team. The Consultant Team will outline the steps and actions needed to implement each enhancement.

This review may recommend further modification and testing of the model sets and will produce a list of recommended enhancements for implementation. The Consultant Team will summarize review findings and recommendations in a technical memorandum. After allowing HRTPO sufficient time to review the draft recommendations, two Consultant Team members will meet with HRTPO staff at the HRTPO office to discuss and finalize any necessary model modifications.

*Task 4.1 Timing:*

- 3+ months (note that the 2045 regional travel demand model will need to be available for some parts of Task 4.1)

*Task 4.1 Meetings:*

- Meetings with HRTPO staff: 3
- Working Group Meetings: 3
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 3-4
- Land Use/Place Type webinar: 1

*Task 4.1 Deliverables:*

- Scenario Planning Methodology White Paper
- Memo Summarizing Economic Trends and Opportunities
- Memo Summarizing Travel Behavior Data Review
- Memo Summarizing Travel Demand Model Evaluation
- GIS Base for Scenario Planning Model
- Place type Dataset
- 3-D Visualizations of Place types
- Virtual Present GIS Mapping
- Land Suitability GIS Mapping
- TAZ Calibration of Place types
- Presentation materials, posters and slide decks of Deliverables for public outreach process

## Task 4.2. Defining Alternative Future Scenarios

**Overview**

This task is a crucial one in the overall process as it defines the set of alternative future scenarios that will be the basis for all the subsequent analysis and modeling in the project. There are two broad aspects to defining alternative scenarios. One is the engagement aspect and the other is the technical aspect. Each one is outlined below separately but, these two aspects will need to work together, with each major technical milestone having full input and vetting from the HRTPO staff, the Working Group and the Steering Committee.

It is assumed that there will be up to three Alternative Future Scenarios, in addition to the 2045 Baseline Scenario described in Task 5 below. As discussed in Phase 1 of this project, the 2045 Baseline Scenario is assumed to be HRTPO's 2045 forecast that is being finalized for the Travel Demand Model. The Alternative Future Scenarios will assume a level of growth that is in addition to the 2045 baseline growth in the model.

**Task 4.2a: Identify Framework Scenarios**

In this task, the Consultant Team will collaborate with the Working Group to define and affirm up to three draft "framework" scenarios. The Framework Scenarios will be simplified narrative descriptions of each scenario in plain language that describe the storyline for each alternative future. Through a series of work sessions with the Working Group and HRTPO staff, a set of draft frameworks will be developed, each of which profiles a different economic and growth future for the region. Some work has been done on this already in the region and the Consultant Team will be mindful not to reinvent the wheel but start with whatever has already been vetted with stakeholders to date.

**Task 4.2b: Affirm Framework Scenarios**

In this task, the Consultant Team will involve the Working Group and Steering Committee in a process of vetting and affirming the Framework Scenarios. Various techniques may be used to build consensus and affirmation in this task, including:

- Website questionnaires and interactive surveys (if broader exposure/input is desired)
- Focus group sessions with stakeholder groups
- Work sessions with the Working Group and Steering Committee

The result will be consensus on the part of the Working Group and Steering Committee on the three Alternative Future Scenarios that will go forward in this project, described in basic framework terms, without any quantitative analysis at this stage in the process.

**Task 4.2c: Define Draft Drivers**

Once the Framework Scenarios have been defined and vetted, the Consultant Team will use its research and technical expertise to propose a set of draft Drivers that will be used to develop the future scenarios. These drivers will be major change parameters in basic categories such as:

1. Demographics and location choice
2. Economy
3. Technology

Each category will have a set of quantitative drivers associated with it that will be used to construct the alternative future scenarios. Examples of the quantitative aspects of the drivers include things like:

- Population change by age cohort
- Place type location preference by age cohort
- Employment change by industry
- Adoption rate of transportation technology by Place type and/or age cohort

Given the importance of resiliency (sea level rise/storm surge/recurrent flooding) to the Hampton Roads region, the study team will incorporate assumptions regarding resiliency in the scenarios, the specifics of which will be determined through stakeholder engagement.

Note, the scope and budget does not currently include any environmental drivers in the alternative scenarios beyond the incorporation of one sea level rise assumption consistent with HRPDC policy, to be

applied across all scenarios. If the engagement process leads to the incorporation of additional variables and data in the model set, the cost of those additions will need to be added.

Drivers can sometimes be paired or interrelated to identify a potential outcome of interest. As an example, an increase in the number of workers with a college degree could be a driver of growth in knowledge-intensive industry sectors. Similarly, trends towards e-commerce can yield changes in the composition of truck trips and mileage on the transportation system.

The result of this task will be a set of Draft Drivers that can each be quantified and serve as model inputs for constructing the quantitative aspect of each of the future scenarios.

**Task 4.2d: Define Scenario Socioeconomic Control Totals and Aggregate Spatial Assumptions**

The Consultant Team will use the Drivers and the Framework Scenarios to create a set of socioeconomic control totals and aggregate spatial assumptions for each future scenario. The control totals will set the future levels of population and employment by industry for each scenario. Aggregate spatial assumptions will describe the decision-rules for spatial allocation of employment and population and will be developed by relating economic drivers to some combination of (a) Place types, (b) Specific major development sites, and (c) Existing clustering dynamics of industries within the region.

Once we identify drivers for each scenario, we will scan the academic literature and regional information collected in Task 1 to understand how each is related to changes in employment, population, and the spatial distribution of activity. This means that if the selected driver is, for example, level of educational attainment, we will use existing research to estimate the expected increase in regional employment associated with a certain change in the number of workers with a college degree. Similarly, a driver of reduced military spending would result in targeted decreases in the defense sector at military sites in the region. A successful diversification scenario might then also add employment to identified competitive industries, with spatial assumptions derived from the literature or based on existing clustering dynamics. Adjustments like these are what will differentiate the baseline scenario from a set of alternative scenarios.

This task will involve close coordination with technical staff to ensure that each scenario's control totals are realistic, plausible and fit within the storyline of each Framework Scenario defined in task 2a above. We will also fine-tune the scenario drivers if we find that the anticipated effects of different drivers within the same scenario may have opposite effects, thereby diluting the overall impact of the scenario.

For the purpose of having apples-to-apples comparisons among scenarios, our starting assumption is that all three Alternative Future Scenarios will have the same overall regional control total for population and employment, although the spatial distribution and type of employment will vary for each scenario. However, this will need to be affirmed with staff and we are flexible if the staff's desire is to use different control totals for the scenarios, as long as the implications of this for the scenario analysis are clear for all.

**Task 4.2e: Define Scenario Changes in Travel Behavior/System Performance**

Changes in travel behavior are dictated by the nature and spatial allocation of activity, changes in perceived and actual costs of travel, availability of personal transportation modes, freight modal preferences associated with industry mix, and the efficiency of the transportation infrastructure in

accommodating demand. Once we identify drivers for each scenario, we will scan the academic literature and regional information collected in Task 1 to understand how each is related to changes in all independent variables affecting travel behavior. The Regional Travel Demand Model, in conjunction with appropriate input data and parameter adjustments, will account for these behavior changes. With respect to drivers such as demographics and the economy, socio-economic data inputs to the travel model will reflect changes to travel behavior. Advances in technology such as ITS and connected/autonomous vehicles (C-AVs) will also impact the spatial allocation of land use. Technology will induce travel behavior changes that will depend on scenario assumptions regarding:

- market penetration of these technologies
- level of auto ownership (affects number of privately owned vs. shared C-AVs, zero occupant vehicle (ZOV) trips and other factors/behaviors related to mode share)
- parking location
- traveler values-of-time (and their effect on average trip lengths)
- trip rates (reflecting induced demand and mobility by seniors, children, and disabled)
- effective capacity of roadway infrastructure (due to platooning, higher density traffic flows)

Some of these variables will vary by Place type or other driver such as age cohort, facilitating assessment of the relationships between land use allocation and transportation performance. This task will involve close coordination with technical staff to ensure that each scenario's assumptions are realistic, plausible and fit within the storyline of each Framework Scenario defined in Task 2a. above.

**Task 4.2f: Affirm Drivers and Scenario Parameters**

In this task, the Consultant Team will use a similar process as in Task 4.2b, above, to reconnect with the advisory groups to affirm each Scenario again in a quantified format with control totals, aggregate spatial assumptions, and changes in travel behavior for each. The result will be a consensus on the total amount and types of growth that each scenario will analyze in the subsequent tasks, as well as high-level parameters governing spatial distribution across the region and changes in travel behavior that will subsequently be reflected in the travel model.

*Task 4.2 Timing:*

- 2-3 months

*Task 4.2 Meetings:*

- Meetings with HRTPO staff: 2
- Working Group Meetings: 2
- Steering Committee Meetings: 1-2
- Other/Stakeholder Meetings: 2

*Task 4.2 Deliverables:*

- Tech Memo on Framework Scenarios
- Infographics and Visualizations of Framework Scenarios
- Tech Memo on Drivers
- Tech Memo on Control Totals, Aggregate Spatial Assumptions, and Travel Parameters

## Task 4.3: Defining Measures of Success

**Overview**

This task will establish a series of economic, land use and transportation factors that will be used to measure how each scenario contributes to a successful future for the Hampton Roads region. The factors will serve as the measures of effectiveness against which to test the overall regional impact of each scenario. It is anticipated that there will be numerous measures, but they will be grouped according to broad goals and objectives derived from the LRTP and RCS planning processes. Alignment with the HRTPO Project Prioritization Tool measures is also a priority.

A matrix will be developed that aligns each metric according to an established objective for the region. The example below is purely for illustration and the objectives and metrics will be developed in coordination with staff and Working Group and relate to the overall vision for the region:

| OBJECTIVE | MEASURE | METRIC | DATA SOURCE |
|---|---|---|---|
| **Improve Regional Accessibility** | Labor market access | Population within a 40-minute travel time of employment centers | Travel demand model (population and travel time skims) |
| | Job accessibility of low-income residents | Jobs accessible within a 40-minute travel time | Travel demand model (population and travel time skims) and/or network-based accessibility measure |
| **Preserve the environment and enhance resiliency** | Resilient development patterns | Square feet of development in non-flood-prone areas | Land use allocation model and GIS data on flood-resilient areas |
| | Impact on unprotected natural areas or green infrastructure | Location of sensitive but unprotected natural areas; developed, or development near (1/4 mile). | A composite of natural features, development footprints |
| **Enhance economic vitality** | Cost of congestion | Monetized reliability costs borne by travelers | TREDIS and travel demand model to analyze VMT/ VHT subject to congestion |
| | Economic impacts of congestion | Forfeited jobs, wages, income, or GRP | TREDIS and travel demand model |
| | Good jobs | Average wages per worker | REMI and Adjusted Scenario Industry Composition |

### Task 4.3a: Establish Goals and Objectives for the RCS Evaluations

In this task, the Consultant Team will coordinate with the Working Group to establish goals and objectives for the RCS evaluations, upon which the performance measures will be based. The goals and objectives will be derived from the study Vision statement and input from stakeholders and the public in Phase I. The Consultant Team will ensure that the objectives are measurable and will provide a basis for meaningful performance measures. The goals and objectives will be reviewed and refined with the Working Group and presented for approval to the Steering Committee.

### Task 4.3b: Develop Draft Scenario Performance Measures

In this task, a set of scenario performance measures will be developed in four categories – land use, environmental, transportation, and economic. They will each relate to the specific modeling

methodology used – the land use model and related GIS data, the Travel Demand Model, and the economic models (including TREDIS, REMI, and spreadsheet "models"). Many of these measures will be of aggregate regional performance. However, the Consultant Team also expects some subset of targeted measures related to cross-harbor connections, in support of understanding the need for improved regional connectors. The Consultant Team will take great care to consider new data sources and the available modeling tools to derive insightful and credible performance measures.

**Task 4.3c: Alignment with HRTPO Project Prioritization Methodology**

A key aspect of the performance measures that will be explored in this task will be alignment with HRTPO's Project Prioritization Tool. Coordination between the Scenario Planning process and the HRTPO's project prioritization process will be a priority, and the Consultant Team will work with the staff to ensure compatibility between measures that are used in this project with measures used by the HRTPO in their transportation planning and programming efforts. The Project Prioritization Tool will not, however, limit the scenario performance measures.

**Task 4.3d: Affirm Final Performance Measures and Develop Performance Dashboard**

The final performance measures will be vetted with the Working Group and HRTPO staff and, as needed, will be reviewed with the Steering Committee. The result will be a consensus on the methods and metrics that will be used to gauge success in the evaluation of each of the scenarios in subsequent tasks.

Once the final performance measures have been affirmed, the Consultant Team will develop a user-friendly interface to display the performance measures in a graphic dashboard format for use in public presentations and on the project website. The performance dashboard will allow a consistent way of comparing the scenarios and will show quantitatively how well each scenario helps the Region achieve its overall vision and goals for the future. It will be delivered in a format that allows HRTPO staff to use and update it later.

**Task 4.3e: Conduct Scenario Planning Webinars**

As part of this task, the Consultant Team will conduct 7 Scenario Planning webinars to assist with the conveyance of information and the engagement of stakeholders in the scenario planning process. The meetings will be held over a 4-month period and be integrated with other Task 4 activities, so the overall task can be completed efficiently.

*Task 4.3 Timing:*

- 3 months (measures and data collection)
- 1 month (dashboard)

*Task 4.3 Meetings:*

- Meetings with HRTPO staff: 3
- Working Group Meetings: 3
- Scenario Planning Webinars: 7
- Steering Committee Meetings: 2
- Other/Stakeholder Meetings: 0

*Task 4.3 Deliverables:*

- Tech Memo on Performance Measures
- Performance Dashboard
- Infographics for Performance Measures

## Task 4.4: Evaluate 2015 Regional Conditions

**Overview**

At this point in the process, all the elements will have been assembled to allow the scenario modeling process to begin. The first step in this process is to model and evaluate current (2015) conditions as a benchmark for future comparisons. The purpose of this initial model run is threefold:

1. To verify the modeling approach and outputs of the three modeling efforts – land use, economic and travel demand models – and make sure they are working in concert
2. To establish a picture of the region today using the approved Performance Measures to profile current conditions in the region for comparison against future scenarios
3. To calibrate the scenario model inputs and perform a "reality check" so that the model outputs plausibly profile current conditions from the standpoint of stakeholders

**Task 4.4a: Evaluate 2015 land use, economics and travel conditions**

Under this task, the Consultant Team will evaluate current regional conditions using information from the land use, economic and travel demand models and organize the outputs based on the approved performance measures and the Performance Dashboard as described above. In the case of the land use model, this involves calibrating and running the model to reproduce current conditions. The Travel Demand Model will be calibrated in Task 4.1k. above, so this task will just organize the outputs into the Performance Dashboard. Economic evaluation/modeling will involve a hybrid approach of spreadsheet-based evaluations and TREDIS-based modeling of the economic implications of avoidable transportation costs experienced by transportation system users and non-users because of system performance. The latter analysis will be supported by standard transportation data available from the regional travel demand model (e.g. network skims, O-D matrices, and V/C ratios).

While the exact nature of this analysis will be determined collaboratively within Task 4.3, this analysis can potentially quantify the forfeiture of travel time and operating costs driven by congestion, lack of reliability, and other network constraints, as well as additional societal costs associated with degradation of environmental or safety conditions. It may also visualize and quantify forfeited labor and freight markets, as well as identify which facilities within the regional network contribute the most to the loss of regional accessibility and associated business productivity.

**Task 4.4b: Validate Model Outputs and Data for 2015 Performance**

Once an initial set of 2015 performance outputs have been generated from the models, this task will involve a validation of the data to ensure that it is a plausible portrayal of conditions in the Region for 2015. The Consultant Team will compare the 2015 land use model outputs against available data on

regional economic and demographic conditions as well as other documented areas of performance to ensure that they generally match. This task may involve some adjustment of the model inputs and additional model runs to ensure that the 2015 model accurately outputs known measurable conditions in the Region.

*Task 4.4 Timing:*

- 5 weeks

*Task 4.4 Meetings:*

- Meetings with HRTPO staff: 2
- Working Group Meetings: 1
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 0

*Task 4.4 Deliverables:*

- Land Use, Economic and Travel Demand model runs/evaluations for 2015 Current Conditions
- Dashboard Outputs for Model Runs
- 2015 Land Use Allocation and Transportation Model sets for HRTPO use

## Task 4.5: Modeling the 2045 Baseline Scenario

**Overview**

At this point in the process, based on work from the previous tasks, we will have a working set of models that portray an accurate picture of conditions in the Hampton Roads region for 2015. The next series of tasks will create the "baseline" scenario for 2045 that matches HRTPO's Travel Demand Model assumptions and outputs. This first scenario will be called the 2045 Baseline Scenario because it will be the standard of comparison for all the other future scenarios. It establishes a baseline pattern and level of growth in the Region that has already been vetted with the Region's public and stakeholders through the HRTPO's transportation planning process. All the other future scenarios will use this Baseline as a starting point in adding further growth based on enhanced future conditions in the "storyline" of each scenario. To correlate to HRTPO's long range transportation planning process, we will ensure the following assumptions for the 2045 Baseline Scenario:

- Use the 2045 future socioeconomic forecasts by TAZ from the Travel Demand Model
- Use the 2045 Existing + Committed network from the Travel Demand Model

**Task 4.5a: Developing the 2045 "Virtual Future" map of the Region**

In the same process as creating the Virtual Present, above, this task will assign the Place types according to future land use data obtained from localities and the 2045 TAZ from the Travel Demand Model. We will use the 2045 control totals from the Travel Demand Model to ensure correlation of the socioeconomic data with the Travel Demand Model. This task will involve iterations and cross checking so that the Place types assigned within each of the Region's 1,500 TAZs each contains the same total population and employment numbers as the Travel Demand Model.

**Task 4.5b: Conduct 2045 Baseline model runs for land use, economics and travel demand models**

Under this task, the Consultant Team will conduct model runs of the land use, economic and travel demand models for the 2045 Baseline scenario and organize the outputs based on the approved performance measures outputted into the Performance Dashboard as described above.

Once the model outputs have been organized into the Performance Dashboard, a clear picture of the 2045 state of the Region based on current trends and policies should emerge.

In addition, this task will involve running the outputs from the Travel Demand Model through the TREDIS model (as in all subsequent scenario tests from this point on). This task will also involve affirming the assumptions and outputs to-date with the Working Group as an important check in before proceeding to the next steps of testing alternative future scenarios. Note that the performance output of this model run, should it take place before similar model runs for the overall RCS study, will provide useful information regarding future deficiencies.

*Task 4.5 Timing:*

- 6 weeks

*Task 4.5 Meetings:*

- Meetings with HRTPO staff: 1
- Working Group Meetings: 1
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 0

*Task 4.5 Deliverables:*

- Land Use Allocation for 2045 Baseline Conditions
- Land Use, Economic and Travel Demand model runs/evaluations for 2045 Baseline Conditions
- Dashboard Outputs for Model Runs
- Presentation materials, posters and slide decks of Deliverables for public outreach process
- 2045 Land Use Allocation and Transportation Model sets for HRTPO use
- Economic Model sets for HRTPO use

## Task 4.6: Building the Alternative Scenarios

**Overview**

Up to this point, the workflow has concentrated on developing quantifiable models and profiles of conditions in the Region for 2015 and for the adopted 2045 vision from the Travel Demand Model. The next series of tasks will focus on developing and testing alternative future Scenarios for the year 2045 based on the scenario "storylines" developed in earlier tasks of this process. These next tasks will involve operationalizing the Scenarios with the assumptions (i.e., future economic and land use forecasts, future land use allocation for each scenario, technology assumptions in the Travel Demand Model, etc.) that have been developed to define each Scenario.

It is important to note that each of the alternative Future Scenarios will allocate growth that is in addition to the growth inherent in the 2045 Baseline model from the Travel Demand Model. This means that each Scenario is dealing with an additional increment of growth above and beyond the assumed growth for 2045 in the Travel Demand Model. In addition, it is important to note that each Scenario will use the same Existing + Committed transportation network as in the 2045 Baseline Scenario. These two

considerations should help in maintaining consistency and provide an 'apples-to-apples' comparison among scenarios.

**Task 4.6a: Develop Land Use Allocations for 3 Alternative Future Scenarios**

The first step in building each of the alternative future Scenarios from a land use standpoint is to "paint" the appropriate scenario-based pattern of land uses (using Place types) onto the regional Base Map. This pattern will be based on the future assumptions about land uses and growth, including demographic drivers, described in each Scenario. Each Scenario will have assumptions about how and where future growth will happen in relation to the economic future that each Scenario envisions. These assumptions are likely to incorporate both specific assumptions about growth opportunities derived from identification of industry clusters or large development sites, as well associations between economic growth patterns and Place types. Based on that economic future, we will allocate to Place types by TAZ to match the overall control totals under each Scenario.

The product of this task will be a series of land use allocations, one for each future Scenario, that are derived from the growth and economic profiles of each Scenario. These land use allocations will then be used as the basis for the model runs in Task 7 to determine the impacts of each scenario.

**Task 4.6b: Convert Land Use Allocations to TAZ Spatial Datasets for 3 Scenarios**

Once the land use allocations for each Scenario have been completed, it will be necessary to translate them to the socioeconomic data required by the Travel Demand Model. For each Scenario, this involves converting the grid-based Place type map into the TAZ map with associated socioeconomic data used for the Travel Demand Model. The population and employment data built into each Place type will be converted to a TAZ geography for the Travel Demand Model.

This is an important step as it will allow both the Travel Demand Model and the TREDIS economic model to use the same assumptions for growth and land use for each Scenario.

*Task 4.6 Timing:*

- 2-3 months

*Task 4.6 Meetings:*

- Meetings with HRTPO staff: 2
- Working Group Meetings: 1
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 0

*Task 4.6 Deliverables:*

- Land Use Allocations for 3 Future Scenarios
- TAZ Calibration for 3 Future Scenarios

## Task 4.7: Evaluating the Scenarios

**Overview**

The next step in the scenario modeling process is to run the various models for each Scenario and evaluate the results. The goal of this task is to assemble and evaluate the performance measures for each Scenario based on economic, transportation and land use/environmental metrics. As noted above, each Scenario will use the same transportation network (Existing + Committed) but will have different growth assumptions, land use patterns, and transportation behavior or technology assumptions. The Consultant Team will compare the scenario results to the 2045 Baseline to infer differences in performance attributed to the scenario drivers. This is a key step in understanding the potential range of future outcomes without regard to transportation investment choices. The analysis of performance from transportation investments will be conducted in Task 8.

**Task 4.7a. Travel Demand Modeling of 3 Scenarios**

In this task the Travel Demand Model will be run for all 3 Alternative Scenarios. Socio-economic datasets developed in Task4.6b and parameters associated with the technological assumptions for the scenarios vetted in Task 4.2e will serve as inputs to the TDM, distinguishing each scenario. The outputs from each model run will be summarized on the Performance Dashboard and will be used for the economic modeling.

**Task 4.7b. Economic Modeling of 3 Alternative Scenarios**

In this task, each of the Travel Demand Model outputs for the 3 Alternative Scenarios will be run through TREDIS modeling and potentially other spreadsheet economic models to analyze the potential economic benefits and impacts to the Region for each Scenario. The outputs from each model run will be summarized on the Performance Dashboard and will be used for the overall evaluation of Scenarios.

**Task 4.7c. Land Use modeling of 3 Alternative Scenarios**

In this task, each of the land use allocations for the 3 Alternative Scenarios will be analyzed through land use modeling in the same way as for the 2015 Current Year and the 2045 Baseline Scenarios. The outputs will allow comparisons of indicators such as land use efficiency, accessibility to destinations, environmental impacts, etc. The outputs from each model run will be summarized on the Performance Dashboard and will be used for the overall evaluation of Scenarios.

*Task 4.7 Timing:*

- 3 months

*Task 4.7 Meetings:*

- Meetings with HRTPO staff: 1
- Working Group Meetings: 1
- Steering Committee Meetings: 1
- Other/Stakeholder Meetings: 0

*Task 4.7 Deliverables:*

- Land Use, Economic and Travel Demand model runs for 3 Future Scenarios

- Dashboard Outputs for Model Runs
- Tech Memo on Scenario Evaluation

## TASK 5– Prepare for and Attend Meetings (Working Group and Steering Committee)

### Task 5.1: Working Group Meetings

The Consultant team will be represented by the Project Manager at all meetings (barring unforeseen conflicts) and supplemental team members depending upon the type of expertise being presented/discussed at each meeting. Discipline experts have estimated the number of Working Group meetings they will attend in each of the task/subtask summaries in this scope of services.

### Task 5.2 Steering Committee Meetings

The Consultant team will be represented by the Project Manager at all meetings (barring unforeseen conflicts) and supplemental team members depending upon the type of expertise being presented/discussed at each meeting. Discipline experts have estimated the number of Working Group meetings they will attend in each of the task/subtask summaries in this scope of services.

*Task 5 Timing:*

- 13 months

*Task 5 Meetings:*

- Meetings with HRTPO staff: 0
- Working Group Meetings: 10
- Steering Committee Meetings: 5
- Other/Stakeholder Meetings: 0

*Task 5 Deliverables:*

- Power Point slides and meeting handouts

## TASK 6 – Manage the Project

### Task 6.1: Weekly Coordination Conference Calls

Consultant Project Manager will participate in weekly coordination calls with RCS Project Coordinator, other interested parties, and HRTPO staff (assume 56 conference calls).

### Task 6.2: Schedule and Budget Oversight

Consultant Project Manager will monitor schedule and budget on monthly basis and make changes to schedule, as needed. Budget monitoring will occur monthly during preparation of monthly progress

reports so that any budget issues can be included in those reports. A Critical Path Method (CPM) schedule will be developed and maintained throughout Phase 2.

Task 6.3: Quality Assurance of Deliverables

Consultant PM will review all documentation and deliverables before they are forwarded to the RCS Project Coordinator for distribution to the Working Group and HRTPO staff.

**Task 6.4 – Craney Island Site Visit**

**A maximum of three (3) Consultant Team members will accompany Working Group members on a guided tour of Craney Island. The purpose of the field visit is to gain a better appreciation of the surrounding operations and constraints to potential transportation alternatives.**

*Task 6 Timing:*

- 13 months

*Task 6 Meetings:*

- Meetings with HRTPO staff: 1
- Working Group Meetings: 1
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 0

*Task 6 Deliverables:*

- Coordination meeting minutes

# APPENDIX A: ECONOMIC MODELS & DATA

## Cost Assumptions

12-month TREDIS subscription for HRTPO region (13-counties)

= $19,800 for 12-months up to 8 counties + $500 x 5 additional counties = $22,300

Either vFreight add-on OR Transearch connection (if Transearch data available through VDOT)

= $10,000

Task 1i includes a decision point to select among these:

As part of this TREDIS review, the Consultant Team will coordinate with TPO staff regarding freight data options that enable the connection of commodity movements to economic activity and impacts. The vFreight county-to-county trade flow database will be the default option. However, should the TPO have access to new Transearch data via VDOT, this option can be considered as well.

Given duration of project effort, assume 2-year subscriptions:

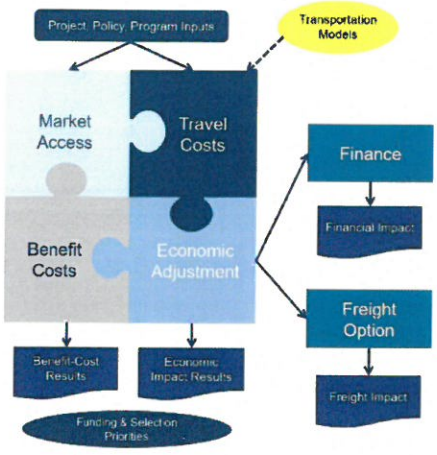
= 2 x ($22,300 + $10,000) = $64,600

Note: If HRTPO would prefer, the subscription can be billed in 1-year increments. These costs are currently included in Task 4.1.

| TREDIS PACKAGE | Term | Study Areas | Users | Training & Support | Subscription Cost $US |
|---|---|---|---|---|---|
| US Regional MPO Subscription | 12 months | Up to 8 counties | Up to 3 | 10 hours | $19,800 |
| **Optional Add-ons** | | | | | |
| vFreight county level freight data | 12 months | 1 state | -- | -- | $10,000 |
| Transearch connection | 12 months | 1 state | -- | -- | $10,000 |
| Additional county | 12 months | 1 county | -- | -- | $500 |

**HRTPO Independent Use:** Note that the TREDIS subscription comes with 3 independent log-ins. HRTPO could independently use TREDIS as well as take advantage of the designated training and project/program support via phone, email, and web meeting. All subscriptions include unlimited technical support.

## Model Background




**TREDIS Model:**

TREDIS® is the ***transportation economics suite*** – a unique decision support system for transportation planners that spans economic impact analysis, benefit-cost analysis, and financial analysis, as well as freight and trade impact analysis. It is the only system applicable for all modes – covering passenger and freight transport via aviation, marine and rail modes, as well as truck, car, bus, bicycle, and pedestrian travel. It is widely recognized for its high level of documentation, which is backed by published research, and its transparency, allowing users to trace the calculation of results. TREDIS is the most widely used system for economic impact analysis of transportation projects in the US and Canada.

Fact sheet on using TREDIS for economic impact analysis: http://tredis.com/images/pdf-docs/datasheets/TREDIS-Economic%20Impact%20Analysis%202014.pdf

**TREDIS Freight:**

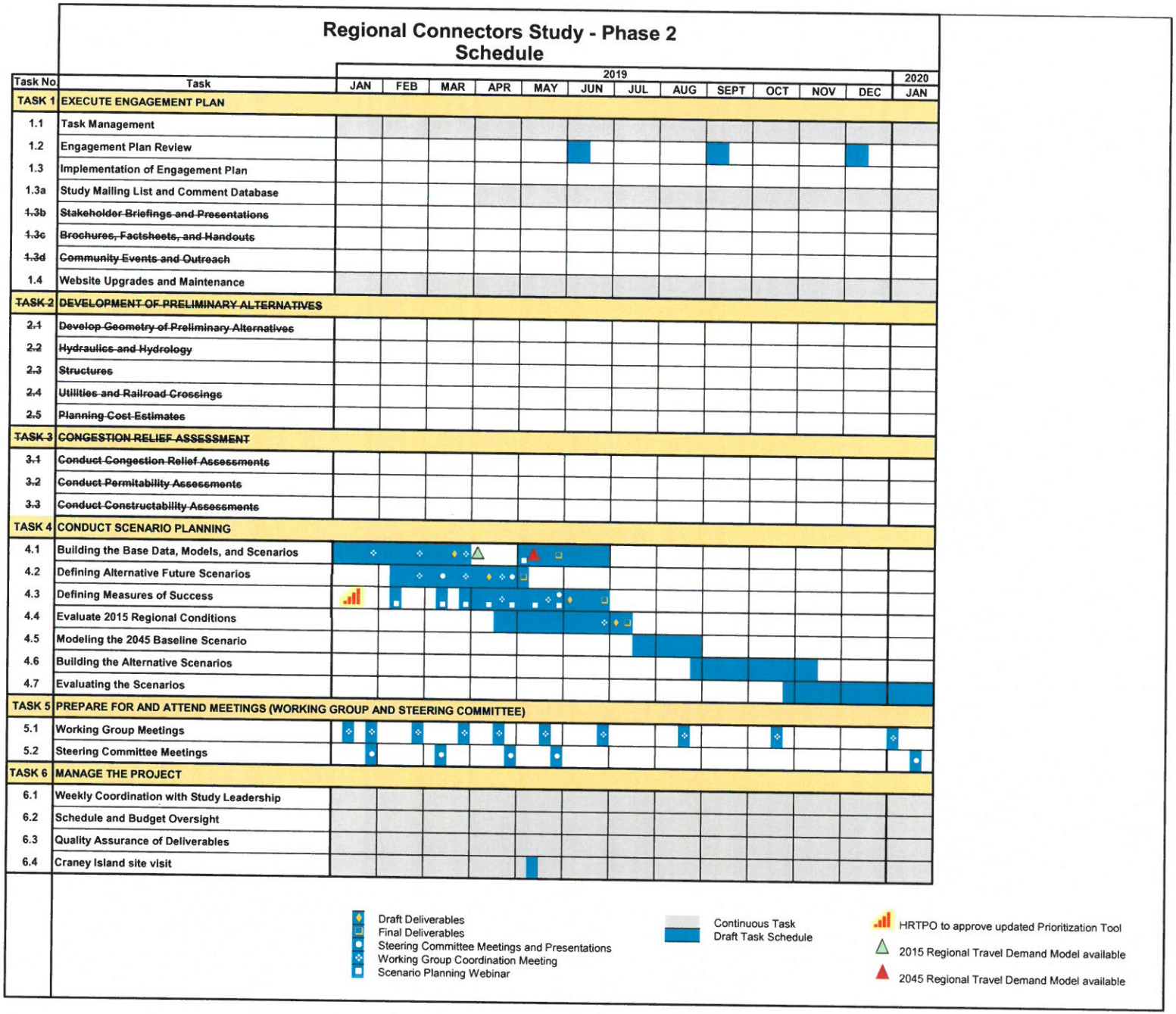
The TREDIS FREIGHT module provides State DOTs, MPOs and transportation organizations with unsurpassed analysis capabilities that support freight planning, strategy development, project prioritization, economic impact assessment, and benefit-cost evaluation as well as meeting several other Federal requirements. These capabilities are enabled by a clearly laid-out framework that (a) brings together available transportation, economic and trade data, and (b) integrates industry, commodity and modal perspectives.

TREDIS Freight can be set up with one of two data options:

**TREDIS vFreight** provides data on county-to-county freight flows by 2 or 3-digit SCTG commodity level and both domestic and international mode. This data is integrated within the TREDIS economic impact module to enable more accurate and detailed industry impact evaluations based on the specific composition of commodity flows at the county level. It can also be used to identify existing freight dependence within a region.

**TREDIS Fueled by Transearch®** integrates IHS Global Insight Transearch data (purchased separately) into the TREDIS model. This enables corridor-level analysis of freight flows and economic reliance on/impacts of freight.

# DRAFT - Phase 2 Supplement Schedule




Attachment 6

# Attachment 7

REGIONAL CONNECTORS STUDY

PHASE 2 – TECHNICAL ANALYSIS

SCOPE OF WORK

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Commented [EC1]: Norfolk Comment – Workflow in terms of logical sequencing and relationship between TASK sections is difficult to ascertain. Our interpretation of the sequence of events based on the provided scope and schedule is that there are significant pitfalls. Also, there seems to be some lack of congruence between Tasks 2, 3, and 4 on the issue of alternatives evaluation processes, a crucial aspect of the study.



Introduction

Phase 2 of the study will entail the technical analysis required to identify, assess, and prioritize potential transportation improvements to enhance connectivity between the Peninsula and the Southside of Hampton Roads. Phase 2 tasks are described in the following paragraphs.

## TASK 1 – Execute Engagement Plan

This task outlines the process for the implementation of a Public Engagement Plan developed in Phase 1 of the Hampton Roads Regional Connectors Study (RCS). The subtasks associated with implementation of the Public Engagement Plan seek to inform, educate and engage stakeholders, residents, businesses, and travelers in the Hampton Roads Region. Phase 2 covers the period from January 2019 through January 2020, a 13-month period. As such, the Public Engagement Plan will be reviewed on a quarterly basis to ensure alignment with the goals and objectives of the study and to address any additional information obtained through the engagement process. The Consultant Team will adhere to all applicable policies and procedures as directed by HRTPO and applicable federal guidelines covering MPOs and recipients of federal funds for planning purposes.

### Task 1.1: Task Management

The engagement task lead will provide a task-based progress report, participate in monthly team meetings and bi-weekly calls as appropriate with HRTPO staff and the project management team. Progress reports will summarize and report the percentage complete of each task and provide the basis for the monthly invoice. Progress reports will be provided to the project management team in acceptable format. The engagement task leader will attend Consultant Team meetings as needed, including but not limited to bi-weekly engagement team meetings, internal team meetings, and meetings with HRPTO staff as required. The engagement task leader will provide schedule updates to inform the master project schedule.

### Task 1.2: Engagement Plan Review

The study engagement team will perform a quarterly review of the RCS Engagement Plan. This review will include evaluation of the demographic profile, tools and tactics, metrics, stakeholder groups and key messages. Any revisions will be provided to HRTPO staff in track changes for review and acceptance. An electronic copy of each plan revision will be submitted.

**Task 1.3 Implementation of Engagement Program**

The study engagement team will conduct stakeholder outreach tasks to engage regional stakeholders as directed and approved by HRTPO and the Working Group. This will consist of outreach to the targeted stakeholders representing or living in the jurisdictions covered by HRTPO agreements. Activities to be implemented by the engagement team include:

Task 1.3a Study Mailing list and Comment Database

The study engagement team will create, organize, and maintain a project database and mailing list to house contact details for agency representatives, elected officials, civic groups, businesses, and other important stakeholders. The engagement team will work closely with HRTPO to develop the agency and locality mailing list. The list will be used to disseminate project status information such as a study brochure and to notify people of upcoming in-person and online engagement opportunities.

Throughout the course of the study, the engagement team will expand and update the list by encouraging interested parties to refer others to the list or through mailing list signups via the study website. The engagement team will utilize database software such as MailChimp to maintain the database.

This database can also be used to house public meeting comments for extraction and future response development. The engagement team will accept all public comments submitted during public outreach efforts and at public meetings. This effort will include: developing a public comment section of the database; collecting and cataloging all correspondence sent to the study team; categorizing all comments for inclusion in comment analysis or reports and creating the public outreach comment table summary for inclusion in the Engagement Summary Report.

~~Task 1.3b Community Briefings and Presentations~~

**Task 1.4 Website Upgrades and Maintenance**

The study engagement team will develop content for use and subsequent uploading to the study website by the study team. This effort includes initial content development to be reviewed and approved by the Working Group and HRPTO along with the development of content updates by the study team at project milestones and other pertinent events.

Task 1.4a Prepare Website Content

The study team will develop a creative brief for Phase 2 to orient readers to the Regional Connectors Study and its phases.

As a part of Phase 2, the study website will be populated with fresh information as it becomes available, including analysis results, meeting dates, reports, and meeting/briefing dates. Updates and reporting documents such as one-pagers will be shared as they become available. Templates for these updates will be designed and developed as a part of this task. New content, including microsimulation of alternatives' traffic operating conditions, will be integrated into the site, and new components will be added to the site as needed to accommodate this content. Original copywriting will be delivered as a part of these updates, and publication will be managed by the study team. Regular hosting and maintenance of the study website will also be covered under this scope.

A key feature of Phase 2 will be the development of an Interactive Map, which will require coordination to establish visual goals, data sources, and other content needs. Once designed, this map will be integrated into the existing study website.

Phase 2 will also feature a new Scenario Planning Page Template which will appear at the top-level navigation on the site. New copy will be developed, and technical analysis elements performed by team members will be uploaded. This page will be designed to feature animations and other graphical elements.

As the Study gathers momentum, a plan will be created to report events on a regular schedule, and a post template for these events posts will be created.

Finally, survey results will be shared in the form of a final report. Survey-generated publications will be added, and categories for these publication types will be created and added to the website backend.

*Timing:*

- 13 months

*Meetings:*

- ~~7 public meetings~~
- Working Group Meetings: ~~2~~0
- Steering Committee Meetings: ~~2~~0

~~Other/Stakeholder Meetings: 65~~

- Study mailing list (electronic format)
- Comment database (electronic format)
- ~~Meeting notes for stakeholder meetings~~
- Website deliverables

~~TASK 2 – Development of Preliminary Alternatives~~

TASK 4 – Conduct ~~Alternatives Analysis via~~ Scenario Planning

**Commented [EC2]:** Norfolk comment (agreed to by Portsmouth, Virginia Beach, and Chesapeake) - We have reviewed the revised Scope and we would like to ask for some reductions to this scope. This would alleviate some concerns that we have regarding content and order of certain work activities, which can be addressed when the Working Group convenes again. These changes would still allow the Consultant to move forward with critical items related to the Scenario Planning and continue elements as needed for refinement and maintenance of the Engagement efforts, while further scope development take place. We believe this request still results in the intent of a "bridge" scope as was supported by the Steering Committee's vote at yesterday's meeting.

Since time is short, we will skip any lengthy explanations and simply ask that the following Tasks/Subtasks be removed from the Scope: 2, 3, 4.3 c-f, and 4.5.

**Commented [EC3]:** Norfolk comment - From what I can gather from a quick review, our comments have not been understood correctly. What we intended was to reduce costs and unnecessary modeling/evaluation of alternatives, not increase them as the response suggests. We specifically did not want any "new" alternatives substantively developed until after the Scenario Planning evaluation of the remaining "new connector" links from the SEIS, which results in at most 3 network scenarios on top of the Existing-plus-Committed network. A "first tier" evaluation of the benefits of these options coupled with an initial permitability assessment would be the end of this phase, and create the "starting point" for the approach to the next phase.

**Commented [EC6]:** Norfolk comment – Task 3/3.1 seems to suggest that the first level of screening /permitability analysis will only consider some measure of congestion relief on the benefits side of analysis, rather than applying some level of analysis of the full evaluation criteria emerging from Task 4.3.

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**Commented [EC7]:** Norfolk comment – In the scope there appears to be virtually no relationship between the Development of Alternatives and the Scenario Planning Tasks. These are in fact inextricably linked. For consideration of inclusion in the Financially Constrained LRTP, the first criteria that a major project should meet is that it is consistent with the Vision Plan. The Scenario Planning process exists to provide crucial input into the development of the Vision Plan. It is only after the initial alternatives (remaining segments from the SEIS) vetting and results of the Scenario Planning/Vision Plan process, that a truly productive identification-development of new or modified alternatives can take place.

The Regional Connectors Study (RCS) Regional Scenario Planning process will provide insight to decisionmakers regarding the need for and the benefits of alternative transportation investments considering potential alternative future trends. The Scenario Planning process will consider a baseline 2045 scenario and three alternative 2045 scenarios that present plausible futures with respect to economic, demographic and technology drivers. The scenarios will be developed in Phase 2, but not analyzed until Phase 3. ~~The scenario analysis will link alternative future economic and demographic trends with land use, and the resulting socioeconomic forecasts will be tested with the regional travel demand model to understand the impacts to transportation and other performance measures. The scenario outcomes will provide a series of benchmarks against which to test the resilience of different transportation investments. The purpose of the scenario planning process is to identify those transportation investments and projects that fare best in the analysis - that provide the most cumulative benefit to the region regardless of which alternative future scenario is tested. This will be done by testing each of the Preliminary Alternatives against each scenario to gauge how robust each investment is with respect to the range of possible futures.~~

Throughout the RCS Regional Scenario Planning process, the RCS Working Group will work closely with HRTPO staff and the Consultant team to provide guidance, affirm scenarios, select drivers and performance measures, and evaluate interim and final results. The RCS Steering Committee that is overseeing the overall RCS process will also be updated on the progress on the Regional Scenario Planning effort. ~~and will receive the results of the scenario testing of Candidate Alternatives for evaluation and consideration in the overall RCS process. The results will also be shared with the public to provide input as part of the final assessment of investment and policy insights in the study.~~

The economic modeling tasks require model access and data license charges that are detailed in Appendix A.

## Task 4.1: Building the Base Data, Models, and Scenarios

**Overview**

The purpose of this task is to build a series of datasets and maps that will be used as the basis for the Scenario Planning effort. It will require close coordination with technical staff from the HRTPO and effective communication with the Working Group to ensure that each step is documented and vetted, particularly because the data gathered in this task will be the foundation for all the scenario and modeling work in the following months. The Consultant team will obtain all readily available data that localities have provided to HRPDC and will also coordinate any additional land use data collection efforts with local government planning and economic development staff.

The conversion of substantial amounts of data into useful information is a significant challenge that requires clear and concise data analysis and synthesis. The Consultant Team's planning process will be built upon developing an accurate, living library through assembling the compiled data into an organized structure and accessible formats, and by analyzing the data in a coordinated, comprehensive manner. The data collected and used in this study will be updated to provide regional leaders and analysts with accurate information from which to make strong, technically-supported decisions.

**Task 4.1a. Kick Off and Data Collection**

The focus of this task will be to review and analyze available data (much of it collected in Phase 1), with the goal of establishing a unified dataset for analysis of future scenarios, as well as to enable a foundational "benchmarking" of the core indicators of success in the Region. In addition, in this task we will hold a kick off meeting with the Working Group to guide the start of the technical and analytic process.

**Task 4.1b: Build GIS Base for Scenario Planning**

In this task, the Consultant Team will build a layered base, using GIS data, of the entire region to be used as the platform for spatial allocations in the Scenario Planning model. The initial data we anticipate assembling (some of which has been collected in Phase 1) includes information on demographics, housing, transportation, environment, infrastructure, governance, employment, education, finance and a host of other measures. In addition, we will organize this data in spatial terms, as layers on the regional GIS base map for future analysis.

A key step in building this base will be the determination of the scale of the "grid" to be used as the surface for the analysis of the region. There are several options for this grid, based on how the region is broken down into modules for different analytic purposes. These include:

- The TAZs used in the Regional Model
- Census Block Groups
- Existing parcel data
- An overlay grid of equal squares sometimes used for analysis purposes – usually ranging from 30x30 meter squares to 40-acre squares.

The type of grid used for the land use allocations will be determined once all the data is assembled to see which scale of grid is most conducive to data collection and analysis. In all cases, however, regardless of the primary grid chosen for analysis purposes, all data will of necessity be translated to the TAZ geography ultimately for use in the Travel Demand Model.

**Task 4.1c: Build Place Types**

The land use allocation aspect of the Scenario Planning process will be conducted through a "Place type" approach. This involves converting the existing and future land use data categories in the region into a series of typical community or "place" types, with names such as residential suburban community, agricultural community or high-density mixed-use community with a commercial or residential focus. These Place types will be used both to profile the existing land use pattern in the region and to construct each of the future land use scenarios.

The process of building a set of Place types will involve several steps, including:

- Profiling existing and future land use types in the region to develop a unified set of Place types that describe regional development patterns
- Developing quantitative summaries of each Place type that summarize land uses, developed areas, and environmental data for each

- Developing summary 3-D visualizations of each Place type, to clearly explain them to stakeholders and the public

Available HRTPO datasets of existing and future land uses will be used as the basis for the Place types, and they will be checked against air photos and parcel data from sample locations in the Region to calibrate the Place types to existing conditions.

**Task 4.1d: Build "Virtual Present" Map of the Region**

The Virtual Present map is a picture of where development is currently located in the Region. Building the Virtual Present involves allocating the Place types onto the GIS base map of the region to match the existing pattern of development and land uses on the ground today. The existing parcel-based land use data from HRTPO will be used for this, but where there are any potential gaps in the parcel dataset, we can use National Land Cover data to fill in the missing areas. The output will be a GIS map of the Region that converts the existing land uses to Place types, with resulting data derived from the Place types about land use, environmental features, accessibility and transportation characteristics.

**Task 4.1e: Land Suitability Analysis**

The Land Suitability Analysis is a necessary step to build future scenarios and land use allocations. To be able to allocate new development based on growth scenarios, it is necessary to understand which lands are suitable for development from a regulatory, environmental and existing conditions standpoint. In this task, a series of new data layers will be added to the Regional GIS base that describe the suitability of the land for development or redevelopment based on:

- Federal, state or local government-owned lands
- Environmental constraints
- Utilities, infrastructure and easements
- Zoning and other regulatory constraints
- Flood and inundation zones
- Value of land and improvements (if parcel level data is available in GIS)
- Other constraints or factors influencing development potential

Together, the Virtual Present map and the Land Suitability Analysis overlays will define where new growth is both feasible and (to some extent) likely to occur. This information will form the basis for allocating future growth for the land use portion of the scenario development process.

**Task 4.1f: Calibrate "Virtual Present" to TAZ control totals**

An important aspect of this process will be to calibrate the allocations of land use to the control totals for socioeconomic data in the Travel Demand Model for each TAZ. This task will involve modifying the Place type allocation in the Virtual Present so that the population and industry employment totals match the controls in each TAZ according to the Travel Demand Model. This will ensure that the Virtual Present map exactly matches the spatial distribution of population and employment data that is used in the Travel Demand Model so that the Scenario Planning model and the Travel Demand Model are in synch. This will also highlight any significant differences between the 2015 land use data and the socioeconomic data in the Travel Demand Model.

**Task 4.1g: Review Data on Economic Conditions and Trends**

To support later development of economic "drivers" for use in scenario planning, the Consultant Team must first develop a baseline understanding of current economic conditions as well as key trends and drivers of future economic conditions. To this end, the Consultant Team will review HRTPO's 2015 profile of socioeconomic data and its 2045 regional socioeconomic forecasts, developed with the use of the Regional Economic Models Inc. (REMI). HRTPO will provide the Consultant Team with methodological documentation.

The Consultant Team will review and document trends and forecasts of several critical socio-economic and demographic variables, including employment by sector, population, population by age, households, household size, labor force participation, and migration by county. The Consultant Team will discuss the forecast process and results with the~~Greg Grootendorst,~~ Chief Economist of HRPDC, as needed. To support interpretation of these forecasts, they will be benchmarked against other sources of information, such as Federal and State data, as well as proprietary sources such as Moody's Economy.com. The Consultant Team will further outline and discuss the transportation implications of the socio-economic and demographic changes identified, as well as the key underlying assumptions within the REMI model or other parts of the forecasting process that drive outcomes. The Consultant Team will review embedded assumptions related to the types of economic drivers that will subsequently define alternative scenarios, to ensure divergent futures can be correctly "pivoted" from the baseline forecast, and to identify any key sources of uncertainty.

In addition to the broad regional review, the Consultant Team will conduct a specific review of expected trends at Port of Virginia facilities. This will include a review of port demand forecasts contained in the travel model and documented in PoV's 2065 master plan and a meeting with PoV staff. This review will ensure alignment between the travel model and the port's expectation and will support the option for integrating shifts in port activity (including mode shifts) as potential scenario drivers later in the process.

**Task 4.1h: Identification of Economic Opportunities**

In this task, the Consultant Team will review available information on identified economic development opportunities within the region that may affect spatial and industry patterns of long-term regional growth. This is expected to include a review of information collected by HRTPO regarding potential large parcel economic development sites, as well as discussions with staff concerning the way in which these sites are treated in the TPO's future forecasting process. In addition, the Consultant Team will review the Hampton Roads Economic Development Alliance report that identified competitive industries that could drive additional regional growth including advanced manufacturing & logistics, shared services (e.g. ADP), and IT. The Consultant Team will also review HRPDC's most recent Regional Economic Development Strategy (REDS) and Regional Benchmarking Study and will hold 1-2 stakeholder meetings with regional economic development experts. This information ~~together~~ will provide a basis for defining potential scenario economic drivers that are specific to the Hampton Roads Region, with attention given to different potential economic diversification futures.

**Task 4.1i: Economic and Financial Implications of Alternative Development/Industry Mix**

The Consultant Team will conduct an initial review of data and tools available to connect alternative development (by Place type or industry) and transportation scenarios to likely economic and financial

outcomes. This preliminary research will help parameterize the range of economic performance measure options available, to be further refined in Task 3. At a minimum, this will involve coordinating with TPO staff regarding options to use the TREDIS economic modeling system with or without REMI. TREDIS's modular framework enables economic impact evaluation either with the built-in Regional Dynamics economic model, or through integration with REMI. As part of this TREDIS review, the Consultant Team will coordinate with TPO staff regarding freight data options that enable the connection of commodity movements to economic activity and impacts. The vFreight county-to-county trade flow database will be the default option. However, should the TPO have access to new Transearch data via VDOT, this option can be considered as well.

The Consultant Team will also review data on average square feet per employee and development value per square foot by different development types. This can support definition of scenarios in both development and employment terms. ~~In addition, the economic Consultant Team will conduct a scan of available research on the relationship between public sector infrastructure costs and development typologies, as a potential variable of interest.~~

**Task 4.1j: Review Data Describing Regional Travel Behavior**

The Consultant Team will assess the data underlying the updated (2015/2045) HRTPO travel model for its adequacy in sustaining the performance of the model and for use in developing the identified potential model enhancements and extensions. The Consultant Team's data assessment will [a] identify shortcomings, if any, of existing data, [b] prioritize needed data collection, and [c] describe alternative data collection methods for cost-efficiently updating the underlying model data. The Consultant Team will prepare a preliminary cost estimate and schedule for acquiring any needed data. The assessment will include a review of any available information including previous studies, surveys, and reports characterizing personal and commercial travel behavior in the region.

~~Because of the model evaluation completed in Phase I of this Study, there were several recommended actions based on acquiring GPS origin-destination data:~~

**Task 4.1k: Evaluate Updated Regional Travel Demand Model**

HRTPO model modifications are currently underway by VDOT and its consultants, including a base year update to Year 2015 - accommodating HRTPO's long range planning process. The Consultant Team is actively coordinating with VDOT and their consultants to incorporate recommendations deemed critical to this study for this model update. Once the model update is complete, the Consultant Team will conduct an evaluation of the updated model targeted to the application of the model for use in the RCS.

The Consultant Team will review available documentation describing the updated HRTPO model and associated performance. The review will include an examination of currently available base and future year model sets reflecting the updates, and the Consultant Team will execute the model set(s), mechanically verifying results and the implementation of updates as described in the documentation, as well as model performance, as needed to conduct a study-focused validation to ensure the model well represents the travel markets that use the Harbor crossings.

The Consultant Team will review and summarize the current model structure, modeling procedures, software, hardware, run scripts, and data flows. The Consultant Team will also review various model parameters, including vehicle and truck trip generation rates. Based on its review, the Consultant Team

will describe the types of analysis that the model process is currently capable of supporting. If necessary, in concert with feedback from HRTPO staff, the Consultant Team will identify potential enhancements and extensions to the modeling process that will broaden and/or integrate the model's analysis capabilities to address study needs. The list of potential model enhancements will be prioritized by the Consultant Team. The Consultant Team will outline the steps and actions needed to implement each enhancement.

This review may recommend further modification and testing of the model sets and will produce a list of recommended enhancements for implementation. The Consultant Team will summarize review findings and recommendations in a technical memorandum. After allowing HRTPO sufficient time to review the draft recommendations, two Consultant Team members will meet with HRTPO staff at the HRTPO office to discuss and finalize any necessary model modifications.

*Timing:*

- 3+ months (note that the 2045 regional travel demand model will need to be available for some parts of Task 4.1)

*Meetings:*

- Meetings with HRTPO staff: 3
- Working Group Meetings: 3
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 3-4

*Deliverables:*

- Scenario Planning Methodology White Paper
- Memo Summarizing Economic Trends and Opportunities
- Memo Summarizing Travel Behavior Data Review
- Memo Summarizing Travel Demand Model Evaluation
- GIS Base for Scenario Planning Model
- Place type Dataset
- 3-D Visualizations of Place types
- Virtual Present GIS Mapping
- Land Suitability GIS Mapping
- TAZ Calibration of Place types
- Presentation materials, posters and slide decks of Deliverables for public outreach process

## Task 4.2. Defining Alternative Future Scenarios

**Overview**

This task is a crucial one in the overall process as it defines the set of alternative future scenarios that will be the basis for all the subsequent analysis and modeling in the project. There are two broad aspects to defining alternative scenarios. One is the engagement aspect and the other is the technical aspect. Each one is outlined below separately but, these two aspects will need to work together, with each major technical milestone having full input and vetting from the HRTPO staff, the Working Group and the Steering Committee.

It is assumed that there will be up to three Alternative Future Scenarios, in addition to the 2045 Baseline Scenario described in Task 5 below. As discussed in Phase 1 of this project, the 2045 Baseline Scenario is assumed to be HRTPO's 2045 forecast that is being finalized for the Travel Demand Model. The Alternative Future Scenarios will assume a level of growth that is in addition to the 2045 baseline growth in the model.

**Task 4.2a: Identify Framework Scenarios**

In this task, the Consultant Team will collaborate with the Working Group to define and affirm up to three draft "framework" scenarios. The Framework Scenarios will be simplified narrative descriptions of each scenario in plain language that describe the storyline for each alternative future. Through a series of work sessions with HRTPO staff and the Working Group, a set of draft frameworks will be developed, each of which profiles a different economic and growth future for the region. Some work has been done on this already in the region and the Consultant Team will be mindful not to reinvent the wheel but start with whatever has already been vetted with stakeholders to date.

**Task 4.2b: Affirm Framework Scenarios**

In this task, the Consultant Team will involve the Working Group and Steering Committee in a process of vetting and affirming the Framework Scenarios. Various techniques may be used to build consensus and affirmation in this task, including:

- Website questionnaires and interactive surveys (if broader exposure/input is desired)
- Focus group sessions with stakeholder groups
- Work sessions with the Working Group and Steering Committee

The result will be consensus on the part of the Working Group and Steering Committee on the three Alternative Future Scenarios that will go forward in this project, described in basic framework terms, without any quantitative analysis at this stage in the process.

**Task 4.2c: Define Draft Drivers**

Once the Framework Scenarios have been defined and vetted, the Consultant Team will use its research and technical expertise to propose a set of draft Drivers that will be used to develop the future scenarios. These drivers will be major change parameters in basic categories such as:

1. Demographics and location choice
2. Economy
3. Technology

Each category will have a set of quantitative drivers associated with it that will be used to construct the alternative future scenarios. Examples of the quantitative aspects of the drivers include things like:

- Population change by age cohort
- Place type location preference by age cohort
- Employment change by industry
- Adoption rate of transportation technology by Place type and/or age cohort

Given the importance of resiliency (sea level rise/storm surge/recurrent flooding) to the Hampton Roads region, the study team will incorporate assumptions regarding resiliency in the scenarios, the specifics of which will be determined through stakeholder engagement. Note, the scope and budget does not currently include any environmental drivers in the alternative scenarios beyond the incorporation of one sea level rise assumption consistent with HRPDC policy, to be applied across all scenarios. If the engagement process leads to the incorporation of additional variables and data in the model set, the cost of those additions will need to be added.

Drivers can sometimes be paired or interrelated to identify a potential outcome of interest. As an example, an increase in the number of workers with a college degree could be a driver of growth in knowledge-intensive industry sectors. Similarly, trends towards e-commerce can yield changes in the composition of truck trips and mileage on the transportation system.

The result of this task will be a set of Draft Drivers that can each be quantified and serve as model inputs for constructing the quantitative aspect of each of the future scenarios.

**Task 4.2d: Define Scenario Socioeconomic Control Totals and Aggregate Spatial Assumptions**

The Consultant Team will use the Drivers and the Framework Scenarios to create a set of socioeconomic control totals and aggregate spatial assumptions for each future scenario. The control totals will set the future levels of population and employment by industry for each scenario. Aggregate spatial assumptions will describe the decision-rules for spatial allocation of employment and population and will be developed by relating economic drivers to some combination of (a) Place types, (b) Specific major development sites, and (c) Existing clustering dynamics of industries within the region.

Once we identify drivers for each scenario, we will scan the academic literature and regional information collected in Task 1 to understand how each is related to changes in employment, population, and the spatial distribution of activity. This means that if the selected driver is, for example, level of educational attainment, we will use existing research to estimate the expected increase in regional employment associated with a certain change in the number of workers with a college degree. Similarly, a driver of reduced military spending would result in targeted decreases in the defense sector at military sites in the region. A successful diversification scenario might then also add employment to identified competitive industries, with spatial assumptions derived from the literature or based on existing clustering dynamics. Adjustments like these are what will differentiate the baseline scenario from a set of alternative scenarios.

This task will involve close coordination with technical staff to ensure that each scenario's control totals are realistic, plausible and fit within the storyline of each Framework Scenario defined in task 2a above. We will also fine-tune the scenario drivers if we find that the anticipated effects of different drivers within the same scenario may have opposite effects, thereby diluting the overall impact of the scenario.

For the purpose of having apples-to-apples comparisons among scenarios, our starting assumption is that all three Alternative Future Scenarios will have the same overall regional control total for population and employment, although the spatial distribution and type of employment will vary for each scenario. However, this will need to be affirmed with staff and we are flexible if the staff's desire is to use different control totals for the scenarios, as long as the implications of this for the scenario analysis are clear for all.

**Task 4.2e: Define Scenario Changes in Travel Behavior/System Performance**

Changes in travel behavior are dictated by the nature and spatial allocation of activity, changes in perceived and actual costs of travel, availability of personal transportation modes, freight modal preferences associated with industry mix, and the efficiency of the transportation infrastructure in accommodating demand. Once we identify drivers for each scenario, we will scan the academic literature and regional information collected in Task 1 to understand how each is related to changes in all independent variables affecting travel behavior. The Regional Travel Demand Model, in conjunction with appropriate input data and parameter adjustments, will account for these behavior changes. With respect to drivers such as demographics and the economy, socio-economic data inputs to the travel model will reflect changes to travel behavior. Advances in technology such as ITS and connected/autonomous vehicles (C-AVs) will also impact the spatial allocation of land use. Technology will induce travel behavior changes that will depend on scenario assumptions regarding:

- market penetration of these technologies
- level of auto ownership (affects number of privately owned vs. shared C-AVs, zero occupant vehicle (ZOV) trips and other factors/behaviors related to mode share)
- parking location
- traveler values-of-time (and their effect on average trip lengths)
- trip rates (reflecting induced demand and mobility by seniors, children, and disabled)
- effective capacity of roadway infrastructure (due to platooning, higher density traffic flows)

Some of these variables will vary by Place type or other driver such as age cohort, facilitating assessment of the relationships between land use allocation and transportation performance. This task will involve close coordination with technical staff to ensure that each scenario's assumptions are realistic, plausible and fit within the storyline of each Framework Scenario defined in Task 2a. above.

**Task 4.2f: Affirm Drivers and Scenario Parameters**

In this task, the Consultant Team will use a similar process as in task 4.2b, above, to reconnect with the advisory groups to affirm each Scenario again in a quantified format with control totals, aggregate spatial assumptions, and changes in travel behavior for each. The result will be a consensus on the total amount and types of growth that each scenario will analyze in the subsequent tasks, as well as high-level parameters governing spatial distribution across the region and changes in travel behavior that will subsequently be reflected in the travel model.

*Timing:*

- 2-3 months

*Meetings:*

- Meetings with HRTPO staff: 2
- Working Group Meetings: 2
- Steering Committee Meetings: 1-2
- Other/Stakeholder Meetings: 2

*Deliverables:*

- Tech Memo on Framework Scenarios

- Infographics and Visualizations of Framework Scenarios
- Tech Memo on Drivers
- Tech Memo on Control Totals, Aggregate Spatial Assumptions, and Travel Parameters

## Task 4.3: Defining Measures of Success

**Overview**

This task will establish a series of economic, land use and transportation factors that will be used to measure how each scenario contributes to a successful future for the Hampton Roads region. The factors will serve as the measures of effectiveness against which to test the overall regional impact of each scenario. It is anticipated that there will be numerous measures, but they will be grouped according to broad goals and objectives derived from the LRTP and RCS planning processes. Alignment with the HRTPO Project Prioritization Tool measures is also a priority. . In addition to measures for evaluating the scenarios, this task will include the development of all measures used to evaluate the RCS alternatives, including permitability and constructability.

A matrix will be developed that aligns each metric according to an established objective for the region. The example below is purely for illustration and the objectives and metrics will be developed in coordination with staff and Working Group and relate to the overall vision for the region:

| OBJECTIVE | MEASURE | METRIC | DATA SOURCE |
|---|---|---|---|
| **Improve Regional Accessibility** | Labor market access | Population within a 40-minute travel time of employment centers | Travel demand model (population and travel time skims) |
| | Job accessibility of low-income residents | Jobs accessible within a 40-minute travel time | Travel demand model (population and travel time skims) and/or network-based accessibility measure |
| **Preserve the environment and enhance resiliency** | Resilient development patterns | Square feet of development in non-flood-prone areas | Land use allocation model and GIS data on flood-resilient areas |
| | Impact on unprotected natural areas or green infrastructure | Location of sensitive but unprotected natural areas; developed, or development near (1/4 mile). | A composite of natural features, development footprints |
| **Enhance economic vitality** | Cost of congestion | Monetized reliability costs borne by travelers | TREDIS and travel demand model to analyze VMT/ VHT subject to congestion |
| | Economic impacts of congestion | Forfeited jobs, wages, income, or GRP | TREDIS and travel demand model |
| | Good jobs | Average wages per worker | REMI and Adjusted Scenario Industry Composition |

**Task 4.3a: Establish Goals and Objectives for the RCS Evaluations**

In this task, the Consultant Team will coordinate with the Working Group to establish goals and objectives for the RCS evaluations, upon which the performance measures will be based. The goals and

**Commented [EC8]:** Norfolk comment – This is an extremely critical portion of the project. Some aspect of this seems to be addressed in Task 2, 3, and 4, with some inconsistencies. What is described in Task 4.3 seems to be on the right track. Notably, we believe that it may be necessary to incorporate some "new" analysis methodologies to support critical criteria, and this task could take longer than proposed. Further, we believe at a minimum the evaluation criteria should include innovative or advanced methods for assessing accessibility and reliability.

objectives will be derived from the study Vision statement and input from stakeholders and the public in Phase I. The Consultant Team will ensure that the objectives are measurable and will provide a basis for meaningful performance measures. The goals and objectives will be reviewed and refined with the Working Group and presented for approval to the Steering Committee.

**Task 4.3b: Develop Draft Scenario Performance Measures**

In this task, a set of scenario performance measures will be developed in four categories – land use, environmental, transportation, and economic. They will each relate to the specific modeling methodology used – the land use model and related GIS data, the Travel Demand Model, and the economic models (including TREDIS, REMI, and spreadsheet "models"). Many of these measures will be of aggregate regional performance. However, the Consultant Team also expects some subset of targeted measures related to cross-harbor connections, in support of understanding the need for improved regional connectors. The Consultant Team will take great care to consider new data sources and the available modeling tools to derive insightful and credible performance measures.

~~**Task 4.3a: Develop Draft Performance Measures**~~

The final performance measures will be vetted with the Working Group and HRTPO staff and, as needed, will be reviewed with the Steering Committee. The result will be a consensus on the methods and metrics that will be used to gauge success in the evaluation of each of the scenarios in subsequent tasks.

Once the final performance measures have been affirmed, the Consultant Team will develop a user-friendly interface to display the performance measures in a graphic dashboard format for use in public presentations and on the project website. The performance dashboard will allow a consistent way of comparing the scenarios and will show quantitatively how well each scenario helps the Region achieve its overall vision and goals for the future. It will be delivered in a format that allows HRTPO staff to use and update it later.

*Timing:*

- 2 months (measures)
- 1 month (dashboard)

*Meetings:*

- Meetings with HRTPO staff: 3
- Working Group Meetings: ~~1~~3
- Steering Committee Meetings: ~~1~~ 2 ~~(optional)~~
- Other/Stakeholder Meetings: 0

*Deliverables:*

- Tech Memo on Performance Measures
- Performance Dashboard
- Infographics for Performance Measures

## Task 4.4: Evaluate 2015 Regional Conditions

**Overview**

At this point in the process, all the elements will have been assembled to allow the scenario modeling process to begin. The first step in this process is to model and evaluate current (2015) conditions as a benchmark for future comparisons. The purpose of this initial model run is threefold:

1. To verify the modeling approach and outputs of the three modeling efforts – land use, economic and travel demand models – and make sure they are working in concert
2. To establish a picture of the region today using the approved Performance Measures to profile current conditions in the region for comparison against future scenarios
3. To calibrate the scenario model inputs and perform a "reality check" so that the model outputs plausibly profile current conditions from the standpoint of stakeholders

**Task 4.4a: Evaluate 2015 land use, economics and travel conditions**

Under this task, the Consultant Team will evaluate current regional conditions using information from the land use, economic and travel demand models and organize the outputs based on the approved performance measures and the Performance Dashboard as described above. In the case of the land use model, this involves calibrating and running the model to reproduce current conditions. The Travel Demand Model will be calibrated in Task 1k. above, so this task will just organize the outputs into the Performance Dashboard. Economic evaluation/modeling will involve a hybrid approach of spreadsheet-based evaluations and TREDIS-based modeling of the economic implications of avoidable transportation costs experienced by transportation system users and non-users because of system performance. The latter analysis will be supported by standard transportation data available from the regional travel demand model (e.g. network skims, O-D matrices, and V/C ratios).

While the exact nature of this analysis will be determined collaboratively within task 4.3, this analysis can potentially quantify the forfeiture of travel time and operating costs driven by congestion, lack of reliability, and other network constraints, as well as additional societal costs associated with degradation of environmental or safety conditions. It may also visualize and quantify forfeited labor and freight markets, as well as identify which facilities within the regional network contribute the most to the loss of regional accessibility and associated business productivity.

**Task 4.4b: Validate Model Outputs and Data for 2015 Performance**

Once an initial set of 2015 performance outputs have been generated from the models, this task will involve a validation of the data to ensure that it is a plausible portrayal of conditions in the Region for 2015. The Consultant Team will compare the 2015 land use model outputs against available data on regional economic and demographic conditions as well as other documented areas of performance to ensure that they generally match. This task may involve some adjustment of the model inputs and additional model runs to ensure that the 2015 model accurately outputs known measurable conditions in the Region.

*Timing:*

- 5 weeks

*Meetings:*

- Meetings with HRTPO staff: 2
- Working Group Meetings: 1
- Steering Committee Meetings: 0

- Other/Stakeholder Meetings: 0

*Deliverables:*

- Land Use, Economic and Travel Demand model runs/evaluations for 2015 Current Conditions
- Dashboard Outputs for Model Runs
- 2015 Land Use Allocation and Transportation Model sets for HRTPO use

~~Task 4.5: Modeling the 2045 Baseline Alternative~~

## TASK 5– Prepare for and Attend Meetings (Working Group and Steering Committee)

### Task 5.1: Working Group Meetings

The Consultant team will be represented by the Project Manager at all meetings (barring unforeseen conflicts) and supplemental team members depending upon the type of expertise being presented/discussed at each meeting. Discipline experts have estimated the number of Working Group meetings they will attend in each of the task/subtask summaries in this scope of services.

### Task 5.2 Steering Committee Meetings

The Consultant team will be represented by the Project Manager at all meetings (barring unforeseen conflicts) and supplemental team members depending upon the type of expertise being presented/discussed at each meeting. Discipline experts have estimated the number of Working Group meetings they will attend in each of the task/subtask summaries in this scope of services.

*Timing:*

- ~~28~~ 13 months

*Meetings:*

- Meetings with HRTPO staff: 0
- Working Group Meetings: ~~15~~8
- Steering Committee Meetings: ~~10~~5
- Other/Stakeholder Meetings: 0

*Deliverables:*

- Power Point slides and meeting handouts

## TASK 6 – Manage the Project

### Task 6.1: Weekly Coordination with HRTPO leadership

Consultant Project Manager will participate in weekly coordination calls with RCS Project Coordinator~~HRTPO Project Manager~~, other interested parties, and ~~other~~ HRTPO staff (assume 56 conference calls).

### Task 6.2: Schedule and Budget Oversight

Consultant Project Manager will monitor schedule and budget on monthly basis and make changes to schedule, as needed. Budget monitoring will occur monthly during preparation of monthly progress reports so that any budget issues can be included in those reports.

### Task 6.3: Quality Assurance of Deliverables

Consultant PM will review all documentation and deliverables before they are forwarded to the RCS Project Coordinator~~HRTPO Project Manager~~ for distribution to the Working Group and HRTPO staff.

*Timing:*

- 13 months

*Meetings:*

- Meetings with HRTPO staff: ~~2~~1
- Working Group Meetings: 0
- Steering Committee Meetings: 0
- Other/Stakeholder Meetings: 0

*Deliverables:*

- Coordination meeting minutes

~~Schedule:~~

**Commented [EC10]:** Norfolk comment – Please provide a project schedule that applies a CPM approach. This would ensure that he sequence of the events and the Task durations are logically thought out and the proposed schedule is achievable. This should include reasonable times for Working Group, Steering Committee, public, and other key collaborations that will be necessary for success. The Working Group in particular needs time to consume task an subtask products for consideration and subsequent guidance.

# APPENDIX A: ECONOMIC MODELS & DATA

## Cost Assumptions

12-month TREDIS subscription for HRTPO region (13-counties)

= $19,800 for 12-months up to 8 counties + $500 x 5 additional counties = $22,300

Either vFreight add-on OR Transearch connection (if Transearch data available through VDOT)

= $10,000

Task 1i includes a decision point to select among these:

As part of this TREDIS review, the Consultant Team will coordinate with TPO staff regarding freight data options that enable the connection of commodity movements to economic activity and impacts. The vFreight county-to-county trade flow database will be the default option. However, should the TPO have access to new Transearch data via VDOT, this option can be considered as well.

Given duration of project effort, assume 2-year subscriptions:

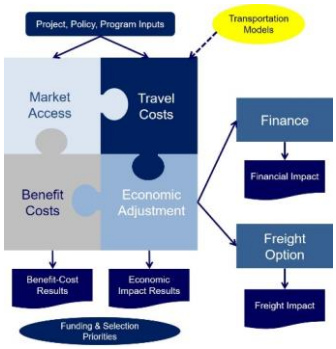
= 2 x ($22,300 + $10,000) = $64,600

Note: If HRTPO would prefer, the subscription can be billed in 1-year increments. These costs are currently included in Task 4.1.

| TREDIS PACKAGE | Term | Study Areas | Users | Training & Support | Subscription Cost $US |
|---|---|---|---|---|---|
| US Regional MPO Subscription | 12 months | Up to 8 counties | Up to 3 | 10 hours | $19,800 |
| **Optional Add-ons** | | | | | |
| vFreight county level freight data | 12 months | 1 state | -- | -- | $10,000 |
| Transearch connection | 12 months | 1 state | -- | -- | $10,000 |
| Additional county | 12 months | 1 county | -- | -- | $500 |

**HRTPO Independent Use:** Note that the TREDIS subscription comes with 3 independent log-ins. HRTPO could independently use TREDIS as well as take advantage of the designated training and project/program support via phone, email, and web meeting. All subscriptions include unlimited technical support.

## Model Background




**TREDIS Model:**

TREDIS® is the ***transportation economics suite*** – a unique decision support system for transportation planners that spans economic impact analysis, benefit-cost analysis, and financial analysis, as well as freight and trade impact analysis. It is the only system applicable for all modes – covering passenger and freight transport via aviation, marine and rail modes, as well as truck, car, bus, bicycle, and pedestrian travel. It is widely recognized for its high level of documentation, which is backed by published research, and its transparency, allowing users to trace the calculation of results. TREDIS is the most widely used system for economic impact analysis of transportation projects in the US and Canada.

Fact sheet on using TREDIS for economic impact analysis: http://tredis.com/images/pdf-docs/datasheets/TREDIS-Economic%20Impact%20Analysis%202014.pdf

**TREDIS Freight:**

The TREDIS FREIGHT module provides State DOTs, MPOs and transportation organizations with unsurpassed analysis capabilities that support freight planning, strategy development, project prioritization, economic impact assessment, and benefit-cost evaluation as well as meeting several other Federal requirements. These capabilities are enabled by a clearly laid-out framework that (a) brings together available transportation, economic and trade data, and (b) integrates industry, commodity and modal perspectives.

TREDIS Freight can be set up with one of two data options:

**TREDIS vFreight** provides data on county-to-county freight flows by 2 or 3-digit SCTG commodity level and both domestic and international mode. This data is integrated within the TREDIS economic impact module to enable more accurate and detailed industry impact evaluations based on the specific composition of commodity flows at the county level. It can also be used to identify existing freight dependence within a region.

**TREDIS Fueled by Transearch®** integrates IHS Global Insight Transearch data (purchased separately) into the TREDIS model. This enables corridor-level analysis of freight flows and economic reliance on/impacts of freight.