January 3, 2019

Memorandum #2019-05

TO: Regional Connectors Study Working Group

BY: Camelia Ravanbakht, RCS Project Coordinator

RE: Regional Connectors Study

Attached is the agenda for the **Regional Connectors Study Working Group meeting** scheduled for **Thursday, January 10, 2019 at 10:00 am** at the **Portsmouth City Council Conference Room, Portsmouth City Hall, 6th Floor, 801 Crawford Street, Portsmouth, Virginia**.

MK/sc

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

Nonvoting Members:
Jason Flowers (Army Corps)
George Janek (Army Corps)
Robert Pruhs (Army Corps)
Ivan Rucker (FHWA)
Kevin Page (HRTAC)
Rhonda Murray (US NAVY)
Tim Dolan (US Coast Guard)
Gene Leonard (US Coast Guard)
Tony Gibson (VDOT)
Scott Smizik (VDOT)
Kit Chope (VPA)

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

Project Coordinator:
Camelia Ravanbakht

REGIONAL CONNECTORS STUDY

Agenda

Working Group Meeting

January 10, 2019

10:00 AM

Portsmouth City Council Conference Room, Portsmouth City Hall, 6th Floor

801 Crawford Street, Portsmouth, Virginia

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

   Summary Notes from December 6, 2018, Working Group Meeting
   Attachment 4

   - Recommended Action: For Approval

5. Update on RCS Phase 1 Study Tasks: Craig Eddy, MBI

   Comments Received to date on Draft Documents
   Attachment 5 & Handout

   - Recommended Action: For Information and Discussion

6. RCS Scenario Planning Draft Scope of Work and Cost: Craig Eddy, MBI
   Attachment 6A

   Comments received to date on Draft Scope of Work and Cost
   Attachment 6B

   - Recommended Action: For Review and Discussion

7. RCS Draft Scope of Services for Next Phase (2): Craig Eddy, MBI
Attachment 7 & Handout

- Recommended Action: For Review and Discussion

8. Interactions between Working Group, Consultants, and HRTPO staff: Camelia Ravanbakht, Project Coordinator

Review and Process to submit Comments on Draft Documents

Interactions between Working Group, Consultants, and HRTPO staff

Other Related Items

- Recommended Action: For Review and Discussion

9. Schedule and Next Meetings:

- **Joint Meeting of Steering (Policy) Committee and Working Group: January 29, 2019 – 10 AM**
- **Working Group Meeting: January 31, 2019 - 10 AM**
- **Steering (Policy) Committee**: **February 13, 2019 – 10 AM**

10. Adjournment

12-6-18 RCS Working Group Meeting- Minutes

Attendance (alphabetically)

Christine Armstrong	Norfolk
Keith Cannady	HRPDC
Rob Case	HRTPO
Bob Crum	HRTPO
Beth Drylie	Michael Baker
Craig Eddy	Michael Baker
Jason Flowers	US Army Corps
Brian Fowler	Norfolk
Robin Grier	VDOT
Carl Jackson	Portsmouth
Mike Kimbrel	HRTPO
Barbara Nelson	Port of Va.
Keith Nichols	HRTPO
Camelia Ravanbakht	HRTPO (retired)
Tara Reel	Va. Beach
Angela Rico	Hampton
Jason Sounders	Suffolk
Dale Stith	HRTPO
Bill Thomas III	Michael Baker
James Wright	Portsmouth

On the phone: representatives from PRR

Proceedings

1. Call to Order

Bob Crum (HRTPO) called the meeting to order at 10:03.

2. Welcome and Introductions

Attendees introduced themselves.

3. Public Comment

No public comments.

4. Minutes

Minutes were approved as submitted.

5. Update on RCS Phase 1

Craig Eddy (Michael Baker) presented slides covering the following:

Task 1 Engagement Program
- Interviews mostly completed (results provided).
- Website not completed.
- Survey completed (results provided).

Task 2 Evaluate Regional Travel Demand Model
- Most of the needed functionality is being provided through VDOT's model update.
- Brian Fowler (Norfolk) expressed concern over the ability of the model to reflect realities of the crossing (e.g. public reluctance to cross harbor unrelated to travel time). Bill Thomas (Michael Baker) responded with existing and near-future model abilities.

Task 3 Determine Scenario Planning Effort
- Scope of work for Phase 2 developed. Costs under negotiation.
- Brian Fowler (Norfolk) and James Wright (Portsmouth) expressed concern over lack of Working Group involvement in review of preliminary draft documents of the study. Camelia Ravanbakht (project manager) agreed to send such documents to the working group.

Task 4 Update Existing Conditions Information
- Summary pages completed.

Task 5 Present Findings to Working Group
- Anticipate draft Phase 2 scope and cost approval at next Working Group meeting.
- Jason Flowers (USACE) requested that the consultant hold one-on-one meetings with US Army Corps, Navy, and Coast Guard during Phase 2 to discuss permitability.

6. Travel Demand Model Technical Memo — see slides/discussion above

7. Regional Survey- Results — see slides/discussion above

8. Stakeholder Interviews- Summary — see slides/discussion above

9. Schedule
    a. Working Group: Jan. 10, 2019, 10am (at Portsmouth); Jan. 31, 2019, 10am (at HRTPO)
    b. Steering (Policy) Committee: early Feb. 2019
    c. HRTPO Board approval of Phase 2 scope and costs: Feb. 21, 2019

10. Adjournment

The meeting was adjourned at approximately 11:30am.

TRAVEL DEMAND MODEL TECH MEMO COMMENTS

Hi Brian,

Thanks for submitting your thoughts/comments on the RCS modeling evaluation. Below are our responses in red. Please let me know if you would like to further discuss any issues.

Regards,

Craig

Craig S. Eddy, PE, PTOE | Vice President | Michael Baker International
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craig.eddy@mbakerintl.com | www.mbakerintl.com

From: Fowler, Brian <Brian.Fowler@norfolk.gov>
Sent: Friday, December 07, 2018 11:35 AM
To: Eddy, Craig <Craig.Eddy@mbakerintl.com>
Cc: camelia.ravanbakht@outlook.com
Subject: EXTERNAL: RCS Modeling Evaluation comments

Craig,

Following up on the comments I made at yesterday's Working Group meeting regarding the Regional Travel Demand Model evaluation – a quick summary of my comments:

- During my previous review of model features impacting the estimation of travel between the Peninsula and the Southside, there were two items that I think need to be addressed:
    - The first of these was related to capacities coded on the HRBT links. (Following my comment Dale indicated there was something I was missing and it was being handled properly with lower capacities. I'm pretty sure I still felt something wasn't right – therefore, I'll just ask that you investigate this very closely to be sure) My recollection was that due to the use of "typical" freeway capacities on these links rather than those realized on the HRBT (significantly lower), some aspect of the model was weakened. I felt that the delay calculations in producing travel time skims was impacted, there may have been something I saw in the production of MOEs for performance reporting.... It's been quite a while..., just please investigate this. It is noteworthy that model runs conducted in the SEIS demonstrate very well the impact that the reduction in travel time predicted in the model with expanded capacity has in increasing the amount of travel across the water. We will examine roadway capacities, with an emphasis on the Harbor Crossings, as a part of our review and examination of the updated HRTPO model.

    - The model uses a travel-time increase (4.2 minutes per mile is what I have in my notes) as a surrogate means to represent the "undefinable" apparent disutility associated with the bridge-tunnel use/Hampton Roads crossing in trip distribution, otherwise reducing the likelihood of travel between the Peninsula and Southside. In the application of the model this is considered a constant. This creates a huge problem with considering future conditions, as the variables that actually do influence this behavior could change and reduce this disincentive (real or perceived). This disincentive may in fact be (all or in part) related to reliability - a trait that some alternatives may significantly improve. It may be related to other feelings that may be mitigated with the advent of CAV, or other variables. We should not go through this study considering this to be a non-malleable impediment to travel across Hampton Roads. I can envision for example that a combination of congestion and multi-route accessibility measures could provide a reliability representation influencing O-D pairing predictions in trip distribution. As part of the model update, VDOT is using empirical data from Streetlight to gauge the volume and distribution of demand associated with the Harbor Crossings. This update should inherently consider methods of model adjustment that may better reflect travel conditions into the future.

    - In dealing with these two items above the study should seek to gain a far better understanding of the variables influencing travel and/or housing/employment location choice that influences travel between the two areas, in order to better understand what's needed to improve realized accessibility. While certain updates to the HRTPO

model currently underway by VDOT may provide more information, and/or improve modeling of this aspect of travel behavior in the region, it is outside of our scope in the HRTPO Connectors Study to fundamentally re-examine the formulation of trip distribution in the HRTPO regional model.

- The model's handling of external trips (both E-E and E-I) has a large influence on the resulting assigned traffic volumes to the HRBT and MMMBT. The model's influence should be well understood and, compared to actual trip patterns, adjustments made if necessary. Part of the VDOT's model update entails using Streetlight data to gain a better understanding of external travel associated with the study area and the Harbor Crossings.

- My recollection is that the model applies some "adjustment factors" to a couple of areas in Norfolk, I recall downtown and the Navy Base? These are disconcerting and all attempts should be made to better understand the traits that are causing any such weaknesses and create improved processes to overcome those. Recommendations provided in Phase I of the HRTPO Connectors Study indicated a need to "assess need for special generator representation using available surveys and cell phone/GPS data" – this may improve model performance as cited. It is uncertain at this time if the VDOT model update will follow-up on these recommendations. Other potential remedies such as implementing an income-stratified trip distribution model are currently outside the scope of work associated with the VDOT model update and the HRTPO Connectors Study.

- I noted that there was nothing special in the model to address university traffic (e.g. – land-use category or special generator). ODU is a university that because of its location and size relative to others is particularly relevant for this study. Please see response to bullet point above.

I think that's everything I mentioned. If you have any questions please do not hesitate to call.

Brian

PHASE 2 SCOPE OF SERVICES OUTLINE COMMENTS

From: Mike Kimbrel <mkimbrel@hrtpo.org>
Sent: Thursday, December 20, 2018 3:48 PM
To: camelia.ravanbakht@outlook.com
Subject: Comments on RCS Phase 2 Scope of Services Outline

Camelia,

Upon review of the RCS Phase 2 Scope of Services Outline, HRTPO staff has the following comments:

1. Recommend performing the permitability assessments early in Phase 2, such as prior to Task 2 – Scenario Planning. There is no reason to include alternatives deemed to be unpermitable in the scenario planning and candidate project evaluation components of the study.

2. It appears that candidate projects are to be evaluated twice – once under Scenario Planning and again under Alternatives. This appears to be unnecessarily duplicative.

3. The second bullet on the last page of the outline is confusing (i.e. how exactly is the 80 runs computed)? In addition, some alternatives could be excluded from the model runs if they are deemed to be unpermitable. Recommend a rewrite of that bullet.

Thank you for coordinating the review of the draft Phase 2 Scope of Services Outline.

MK

Michael S. Kimbrel

Deputy Executive Director

Hampton Roads Transportation Planning Organization

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REGIONAL CONNECTORS STUDY

SCOPE OF SERVICES OUTLINE

PHASE 2: COMPLETE TECHNICAL ANALYSIS

Task 1 – Engagement Program

- Engagement
  - Briefings (2 sets – one shortly after alternatives have been identified and one shortly after draft report is finalized)
    - Stakeholders (35ish) and Interest Groups (20ish)
    - Summarize comments
  - Virtual Public Meetings
    - Series of 2 meetings (same timeframe as briefings above), each series would consist of 2 Peninsula meetings (Williamsburg and Hampton?) and 4 southside meetings (Norfolk, Portsmouth, Virginia Beach, Suffolk?)
    - Summarize comments
  - Communication Pieces
    - Handouts for briefings and public meetings
    - Comment sheets for public meetings
    - One-page summaries for mall kiosks
  - Involvement Approach? What are they? Examples – Website interactive surveys, focus groups, public workshops, work sessions, etc..
- Website Maintenance
  - Populate with fresh information as it becomes available (analysis results, reports, meeting dates, briefing dates, etc.)
  - Coordinate linkage to other websites

Task 2 – Regional Travel Demand Model

- Review Model Calibration/Validation
- Test Alternatives (land use and roadway network)

Commented [CR1]: Williamsburg would take care of the upper Peninsula. Hampton would satisfy the lower peninsula. Not sure if we need to have one in Newport News? We can discuss with your staff as well as the TPO's.

Commented [CR2]: What is included in the handouts? Study maps and information? Are you preparing Newsletters? Presentation materials? Any posters? Could you be more specifics?

Commented [CR3]: Do you all own these Kiosks? Or the Mall owners have them? I am just not sure..

Task 3 – Scenario Planning

- Build Base Data, Models, and Scenarios
  - Kick-off and Data Collection
  - Build GIS Base for Scenario Planning
  - Build Place Types
  - Build Virtual Present Map of Region
  - Land Suitability Analysis
  - Calibrate Virtual Present to TAZ control totals
  - Review Data on Economic Conditions and Trends
  - Identification of Economic Opportunities
  - Economic and Financial Implications of Alternative Development/Industry Mix
  - Review Data Describing Regional Travel Behavior
  - Evaluate Updated Regional Travel Demand Model
  - Defining Alternative Future Scenarios
- Defining Alternative Future Scenarios
  - Identify Framework Scenarios
  - Affirm Framework Scenarios
  - Define Draft Drivers
  - Define Scenario Socioeconomic Control Totals and Aggregate Spatial Assumptions
  - Define Scenario Changes in Travel Behavior/System Performance
  - Affirm Drivers and Scenario Parameters
- Defining Measures of Success
  - Develop Draft Performance Measures
  - Correlation with HRTPO Project Prioritization Methodology
  - Affirm Final Performance Measures and Develop Performance Dashboard
- Evaluate 2015 Regional Conditions
  - Evaluate 2015 Land Use, Economics and Travel Conditions
  - Validate Model Outputs and Data for 2015 Performance
- Modeling the 2045 Baseline Alternative
  - Developing the 2045 Virtual Future Map of the Region
  - Conduct 2045 Baseline Model Runs for Land Use, Economics, and Travel Demand Models
- Building the Alternative Scenarios
  - Develop Land Use Allocations for 3 Alternative Future Scenarios
  - Convert Land Use Allocations to TAZ Spatial Datasets for 3 Scenarios
- Evaluating the Scenarios

- Travel Demand Modeling of 3 Scenarios
- Economic Modeling of 3 Scenarios
- Land Use Modeling of 3 Scenarios
- Public and Stakeholder Vetting of Scenario Evaluations

- Evaluating the Candidate RCS Projects
  - Confirmation/Coding of Candidate RCS Projects for Testing
  - Travel Demand Modeling for 3 Scenarios (each Candidate Project)
  - Performance Evaluation of 3 Scenarios (each Candidate Project)
  - Additional Iterations to Check for Cause and Effect Relationships and Preparation of Final Results
- Reporting Results
  - Scenario Results Workshops
  - Packaging Scenario Results

Task 4 – Alternatives

- Identify evaluation criteria
- Identify alternatives for evaluation
- Identify
- Conduct permitability screening on alternatives
- Conduct constructability screening on alternatives
- Conduct economic vitality analysis on viable alternatives
- Conduct quality of life analysis on viable alternatives
- Conduct traffic analysis on viable alternatives
  - V/C ratios on interstate facilities
  - VMT
- Compare and contract analysis results
- Prepare micro simulation models for maximum of 3 viable alternatives

Commented [CR4]: Financial Feasibility?

Task 5 – Meetings (Working Group and Steering Committee)

- Assuming 15-month schedule (March 2019 – May 2020) – 8 Working Group meetings and 3 Steering Committee meetings

Task 6 - Documentation

- Draft report
- Final report

Task 7 - Project Administration

- Weekly coordination calls with HRTPO leadership
- Oversight of task managers for schedule and budget adherence
- Review of all project-related correspondence and deliverables
- File management

COMMENTS ON REGIONAL SURVEY DRAFT REPORT

Hi Craig,

I have a few comments to add to Camelia's:

1. On the cover, recommend the title say "Hampton Roads Regional Connectors Study: Regional Survey"
2. Slide 4: Purpose – I believe the first bullet describes the purpose of the survey, not the study.
3. Slide 5: Methods – That is a LOT of text. Can it be distilled down a bit into some bullets?
4. Slide 9 (Camelia's Slide 8): I think it matters and should say City or County.

Thanks

MK

Michael S. Kimbrel

Deputy Executive Director

Hampton Roads Transportation Planning Organization

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From: Camelia Ravanbakht [mailto:camelia.ravanbakht@outlook.com]
Sent: Wednesday, December 05, 2018 9:07 AM
To: Eddy, Craig; Mike Kimbrel
Subject: RE: Regional Survey Draft Report of Results

Hi Craig,

I have a few minor comments as listed below:

- Slide 3 – Remove the apostrophe after the word Connectors.
- Slide 5 – second Box – Should be Peninsula to Southside commute…?
- Slide 8 – Home Counties? There are cities and counties. Not sure if it matters but wanted to point it out.

Thanks.

Camelia Ravanbakht, PhD

RCS Project Coordinator

757.617.5685

COMMENTS ON EXISTING CONDITIONS DRAFT REPORT

Hi Craig,

I am forwarding you the attached document including the TPO staff comments on the draft graphics of existing conditions. In addition, I would like to offer a few general comments:

-The format and graphics look very nice and easy to read.

-I did not see the date for the data used throughout the document. As indicated by the TPO staff, please include the source and date of the data on each page.

-As I understood, there are four sections in the document. It would be helpful to have a short narrative at the beginning of each section describing the purpose, graphics, data used, and any other relevant text summarizing the data, if possible.

Please let me know if you have any questions regarding the comments.

Thanks,

-Camelia

Camelia Ravanbakht, PhD

RCS Project Coordinator

757.617.5685

HRTPO Staff Comments on 11/2/2018 Draft of Corridor Conditions Report, Regional Connectors Study

In order that this conditions report serve the purpose of the study—"to determine feasibility, permitability, and transportation benefits" of the subject improvements)—we recommend that you document the purpose, data source, and findings of each section of the conditions report:

-the Destinations section

-the Vehicle Splits section

-the Travel Times section

-the Segment section

Pages 1 – 12 (Destinations for vehicles...)

- Is there a reason why this was only done for "Destinations for Vehicles Originating..." and not also done for "Origins for Vehicles with a Destination of..."? I think we would want to know both origins and destinations for each activity center, not just the destinations.
- What is the geography of the colored areas?
- The maps should just say Suffolk, not Suffolk City.
- Route 13 at the Suffolk/NC State Line was omitted from each of the Heavy Vehicle Destinations maps.
- The source of this data (Michael Baker analysis of Streetlight data?) should be referenced on these maps.
- What does "FEW" and "MANY" represent on these maps? 0.1%? 1%? Describing what few and many means would be helpful.
- I would include a summary of the percentage of trips that cross the harbor for each of these activity centers.
- I would consider adding the Virginia Beach Oceanfront and Historic Triangle as activity centers. This would emphasize tourist O-Ds.
- In addition to Downtown Norfolk, I would consider adding Downtown Portsmouth, Hampton, and Newport News as activity centers.
- Page 2 – Should be referred to as Langley AFB/NASA
- Page 3 – Should be referred to as Norfolk International Terminals, not Terminal.
- Page 4 – The star for Naval Station Norfolk is (slightly) in the wrong place.
- Page 6 – Rather than just using Jefferson Labs, it would be more beneficial to expand this to the entire Oyster Point area.
- Page 7 – The proper name of Little Creek is "JEB Little Creek".
- Page 8 – The star for Virginia Beach Town Center is (slightly) in the wrong place.
- Page 9 – The star for Newport News Marine Terminal is (slightly) in the wrong place.

Pages 13-15

- Suggest labeling I-564 in Norfolk and I-64 in Chesapeake on larger maps (left side)
- Because study is not limited to corridors in Orange, suggest analyzing split at I-64/Mercury (trips going to JRB) and expanding inset #3 to include trips from US17 (same suggestion for Travel Times and Crash Rate maps)

Page 13 – Vehicle Splits

- The splits do not add up to 100% since certain movements are omitted from the graphics. Should these other movements be added so that the percentages add up to 100%?
- The source of this data should be referenced on these maps.
- The split areas should be more distinguishable from the locality boundary lines (not be black on black)

Page 14 – Regional Travel Times

- The source of the data should be referenced on these maps. Also what is the timeframe of this data? 2017?
- While travel times make sense on the following segment maps, it makes more sense to refer to this map as peak hour travel speeds rather than times.
- Adding a summary of travel times by corridor to this page would be helpful i.e. travel times on I-64 from I-664 to I-564, I-664 from I-64/I-264 to the Western Freeway, etc.
- 10% might be too low of threshold between low and moderate travel times, since most of the roadways are shown in yellow. Consider changing the low/moderate threshold to 15% or 20%.
- Another threshold showing "really high" travel times would be helpful. Possibly > 100% above free flow travel times.

Page 15 – Regional Crash Rate/Corridor Index Map

- Need to show the time period and data source for the crash rate map.
- There is an extra graphic showing up on the right side of the corridor segment index map.
- Suggest moving Corridor Segment Index Map to a separate page (with brief explanation of following individual segment maps)
- On Corridor Segment Index Map, study is not limited to the corridors shown in Orange. This needs to be clearly stated/explained.

Pages 16-46 – Segment Maps

- All maps – The source of this data (crashes, travel times, and volumes) should be referenced on the maps.
- All maps – I'm not sure why crash rates are shown for origins to destinations. It makes more sense to show crash rates for each segment rather than in an O-D manner.
- All maps – It would be beneficial to not only include the O-D volumes for the AM and PM Peak Hours but also the Daily O-D volumes as well.

- Page 16 – "Moderate crash density at merge of ramp…." also possibly due to weaving on I-664, as well as occasional queueing.
- Page 16 – Military Circle should say Military Highway.
- Page 16 – "those turning right onto I-264" should instead be "onto I-64".
- Page 17 – Instead of Military Highway, refer to this roadway as the Route 460/58/13 Connector instead.
- Page 17 – The Connector ADT seems too high. VDOT AADTs are in the 70,000 range.
- Page 18 – These crashes at I-664 and Dock Landing are due to?
- Page 19 – Portsmouth Blvd ADTs seem too high.
- Page 20 – Pughsville Rd ADTs seem too high.
- Page 21 – Western Freeway ADT is too high.
- Page 21 – "Injury crashes at exit ramp…" should refer to Bridge Road, not Route 164.
- Page 22 – Twin Pines Rd does not intersect with the Western Fwy. Both sides of this interchange are Towne Point Rd.
- Page 22 – The ADTs for both the Western Fwy and Towne Point Rd are too high.
- Page 22 – The crashes around the ramps are due to?
- Page 23 – The ADTs for both the Western Fwy and Cedar Lane are too high.
- Page 24 – The ADTs for both the Western Fwy and West Norfolk Rd are too high.
- Page 24 – The crashes around the ramps are due to?
- Page 25 – All of the ADTs are too high.
- Page 27 – Why are the two ADTs not the same?
- Page 28 – The reference to College Dr should instead be Terminal/Harbor.
- Page 29 – This map should probably refer to 25th – 28th Streets, but not Highway 60.
- Page 29 – Why is B not included as an origin in the traffic volume and travel time tables?
- Page 29 – "Turning Corner" should be changed to location.
- Page 30 – The ADTs for 35th, 36th, and Jefferson are too high.
- Page 30 – "Rashes" should be crashes.
- Page 31 – The ADTs for Roanoke and Chestnut are too high.
- Page 32 – Road should be capitalized on the crash description in the middle of the page.
- Page 32 – Aberdeen Road should probably be referenced as north/south.
- Page 33 – Powhatan Pkwy and Power Plant Pkwy ADTs are too high.
- Page 33 – "Vegetations" should say vegetation.
- Page 35 – The Mercury Blvd ADTs are way too high.
- Page 35 – Mercury Blvd should probably be referenced as east/west.
- Page 36 – The ADTs for LaSalle Ave are too high.
- Page 36 – The high crash rate is due to queues from the HRBT.
- Page 37 – The ADTs for Settlers Landing and Woodland are way too high.
- Page 37 – The crash description should say Settlers Landing Rd, not Settlers Land Rd.
- Page 38 – Franklin Blvd does not intersect with I-64. This map should only refer to Mallory St.
- Page 38 – The ADTs for Mallory St are too high.
- Page 41 – O'Conner Crescent does not intersect with I-64. The map should only refer to Fourth View St.
- Page 41 – Can remove "possibly" from the crash description.
- Page 42 – The Bay Avenue ADTs are too high.
- Page 42 – References to Ocean Ave to the west of I-64 should be removed.
- Page 43 – The ADT for Granby St is way too high.
- Page 44 – Crashes are also due to HRBT backups.
- Page 44 – The ADTs for Granby St and Little Creek Rd are way too high.

REGIONAL CONNECTORS STUDY

Scenario Planning Discussion – Startup Questions

Land Use Scenario Aspects.

Background and General Coordination Issues:

The overall purpose of the scenario planning effort for this project is to provide insight to decisionmakers regarding the need for and the benefits of alternative transportation investments in light of potential alternative future trends. The land use aspect of the scenario planning effort will do several things:

- Build an interactive map of the existing (2015) pattern of land uses and population employment patterns in the region that is correlated to the Regional Travel Demand Model's dataset of socioeconomic data.
- Build a similar for the 2045 (future) land use and population/economic data that is also correlated to the Regional Travel Demand Model's dataset of socioeconomic data.
- Build three alternative future land use patterns across the region based on the scenarios that will be identified by the Working/Steering Groups and HRTPO.
- Model the impacts of each scenario on a series of evaluation criteria that describe primarily land use and environmental characteristics to see how each scenario compares and what benefits or impacts it has on the region.

It is understood that this effort is critically dependent on the availability and quality of data to build both existing and future land use maps and there will need to be extensive interaction with technical staff at the TPO and potentially within area localities in order to be able to assemble the necessary data.

Questions:

- What is the general protocol for requests and queries about data with HRTPO staff? With area localities?
- To what extent does the Working Group need to be informed of the process of tracking down the data to be used in this effort? Do they just need status updates of where we stand on obtaining the data or do they want to follow the step-by-step process of whom we contact and how we get each piece of data?

Task 1b: Build GIS Base for Scenario Planning

Study Area for Scenario Planning:

Questions:

- Seeking affirmation that the study area for scenario planning is the full jurisdictional boundaries of those jurisdictions that are included in the TPO model, as listed below.

HRTPO Jurisdictions
City of Chesapeake
City of Franklin
City of Hampton
City of Newport News
City of Norfolk
City of Poquoson
City of Portsmouth
City of Suffolk
City of Virginia Beach
City of Williamsburg
Gloucester County
Isle of Wight County
James City County
Southampton County
York County

Scale of Base Grid:

We are required to use the Regional Travel Demand Model's TAZ geography as our primary output geography. However, some information that we may need about demographics or population characteristics is only available at different geographies, such as the Census Block Group ACS, parcel data from localities, etc.

Therefore, we will be developing a relationship layer (we will call this the basegrid layer) as the "translation" layer between different geographies. The elegance of using one unifying base grid is that it links to all data sources and becomes the core scenarios planning model layer wherein all attribute are assigned (by centroid of the basegrid cell). We anticipate starting with grid cell size somewhere between a quarter acre and 40 acres. We will test out different sizes for their impact on data availability, place type development as well as overall computer processing time.

Questions:

- None – just basic affirmation of our approach

Existing Parcel Data:

The regional parcel data that we obtained from the TPO is incomplete for all jurisdictions and lacks some basic information needed for allocating future growth, such as existing land use and zoning. There is a Future Land Use layer for the whole region but this layer seems to have no associated data about the development or population/employment on each parcel.

Land value is also important for allocating future growth in scenarios. It is used as a proxy for the redevelopment potential of land. For example, land with a very low ratio of improved value to land value is considered more favorable for redevelopment than land with a very high ratio of improved value to land value. The TPO's dataset for land value has improvement value and land value assessment

but lacks any for Norfolk and Suffolk, though some anomalies and inconsistencies exist even in the thirteen jurisdictions that have some data. We can use a proxy for the missing areas in the NLCD database that had development categories of Low Open, Low, Medium and High intensity to identify more or less developed areas. These four NLCD categories only show intensity, and don't differentiate between residential or commercial, but they can be overlaid We propose to use a combination of the TPO's land value dataset and/or the NCLD Future Land Use data to inform us of how much of a TAZ is developed or to what intensity/density, which will inform our allocation decisions for growth in the scenario development.

Questions:

- Basic affirmation of our approach
- Any additional information or sources for the missing data – existing land uses, parcel development data and land value data for missing jurisdictions.

Task 1e: Land Suitability Analysis

The Land Suitability Analysis is a necessary step in order to understand which lands are suitable for development from a regulatory, environmental and existing conditions standpoint. We have received a series of datasets from HRTPO that will allow us to conduct this analysis. Below are our assumptions and approach to the use of this data for this task:

- **Federal, state or local government-owned lands.** Our default will be to turn off automatic allocations to these areas and instead enter future change manually for federal and military TAZs. We will need some guidance from the Working Group on how to allocate growth in these areas.
- **Environmental constraints** – We will generally assume that no future development will occur in areas with severe environmental constraints. These would be water bodies and water ways as well as protected areas or trail systems, jurisdictional wetlands CBPO Protection Areas, or flood inundation zones.
- **Utilities, infrastructure and easements** – We assume that these are off limits to future development.
- **Zoning and other regulatory constraints** – We don't have comprehensive zoning for each jurisdiction. This does not exist in the parcel layer. We would need a) to obtain the coverage for the region as a whole; and b) understand if there were any zoning areas that would either target/attract future growth, or seek to limit or dissuade future growth.
- **Other constraints or factors influencing development potential** – We request guidance on any other constraints that we should consider.

Questions:

- Affirmation of our basic approach and assumptions, above.
- Are there any benchmarks or assumptions to guide our allocation of future population and employment growth (beyond that allocated in the 2045 TAZs) in military areas and federal lands?

- Guidance on availability of existing zoning datasets
- Guidance on any other constraints or factors influencing development potential

Economic Analysis/Modeling Aspects

A. TREDIS Modeling Choices (Recommendations below – need buy-in)

1. Option 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.
- We recommend using TREDIS's internal regional dynamic economic model, rather than using a TREDIS "front end" plus REMI Policy Insight "back end" – this will allow for a more streamlined and interactive process of modeling, which will better support analysis throughout the scenario modeling, but particularly for iterations of RCS projects and project combinations.

2. Freight data options that enable the connection of commodity movements to economic activity and impacts

- As described in the Task 1 scope, the vFreight county-to-county trade flow database is the default option.
- However, should the TPO have access to new Transearch data via VDOT, this is also an option.
- Nevertheless, we recommend using vFreight rather than Transearch data in the TREDIS freight module, for the following reasons:
    - *Port-level detail:* While vFreight does not provide corridor-level freight commodity mixes (i.e. at the level of links within a network), it does provide port-level detail on the relationships between port freight activity and economic activity in the region in a way that is not supported with Transearch data. This is key, given the strong influence of PoV activity on the economy and transportation system in the region.
    - *HRTPO model sufficiently characterizes truck routing:* The HRTPO travel model will provide governing freight network routing information. Combined with county-to-country trade flows from vFreight, freight-economic relationships can be sufficiently characterized.

B. Materials Needed for Task 1 Economic Subtasks:

Item	Status
2015 and 2045 regional socioeconomic data	To be requested
Documentation of REMI/regional socioeconomic forecast methodology	To be requested
Port of Virginia forecasts within travel model	[Bill Thomas to receive as part of overall model review]
PoV 2065 Master Plan	Available online[1]

[1] http://www.portofvirginia.com/wp-content/uploads/2016/02/TPOV-master-plan-2065-final-020316.pdf

Any other PoV forecasts we should review	To be requested
Information on large parcel economic development sites	Received
Target business sectors and growth goals adopted recently by the Hampton Roads Economic Development Alliance (HREDA).	Keith Cannady mentioned these (email dated 10/24) and that the competitive industries report noted below is an implementation strategy for the target sectors. Is there a formal adoption/definition we can review?
Hampton Roads Economic Development Alliance report that identified competitive industries – "Go-to-Market Strategy" from IBM-PLI	Received
HRPDC's most recent Regional Economic Development Strategy (REDS)	Available online[2] from 2015
HRPDC's most recent Regional Benchmarking Study	Available online[3] from 2018

C. Meetings/discussions outlined in Task 1 scope that will need to be coordinated (via phone/web conference)

- Meeting with PoV staff to review port forecasts
- Discussions with TPO staff on treatment of large parcel economic development sites in 2045 forecasts within the model
- 1-2 stakeholder meetings with regional economic development experts (to discuss drivers of regional economic growth)

D. Task 1 Initial Questions:

- In task 1i we said we would "conduct a scan of available research on the relationship between public sector infrastructure costs and development typologies, as a potential variable of interest." Is this something the region would indeed like to investigate?
- Apart from the Port of Virginia 2065 Master Plan, are there other long-term forecasts of port activity that we should be reviewing as part of our scenario planning process?

E. Task 2 Scenarios – Economic & Spatial Framework

Each of the alternative Future Scenarios will allocate growth that is in addition to the growth inherent in the 2045 Baseline.

The consultant team will develop "framework" scenarios in Task 2a that provide a narrative logic to this incremental growth. The economic industry sector component of this narrative will be based on the review in Task 1 of the following materials:

[2] https://www.hrpdcva.gov/departments/economics/regional-economic-development-strategy-(reds)

[3] https://www.hrpdcva.gov/uploads/docs/2018%20Hampton%20Roads%20Regional%20Benchmarking%20Study.pdf

- Regional forecasts developed using REMI for the travel model, including underlying assumptions
- HRPDC information on large parcel economic development sites in the region
- PoV Master Plan and other PoV information on port growth strategy/forecasts
- Identification of competitiveness industries in the Hampton Roads Economic Development Alliance report "Go-to-Market Strategy" from IBM-PLI
- Target business sectors and growth goals adopted recently by the Hampton Roads Economic Development Alliance (HREDA).
- HRPDC's most recent Regional Economic Development Strategy (REDS)
- HRPDC's most recent Regional Benchmarking Study

In Tasks 2b and 2c, the overall economic narrative will be translated into specific future industry compositions for the region (e.g. employment by industry).

Questions:

- Other than the economic source material outlined above, is there other critical regional-level information that should be reviewed as input to defining economic drivers for future scenarios?
- The consultant team intends to use profiles of available large development parcels in the region as a basis for understanding the spatial patterns regionally of particular development opportunities but *does not* intend to make specific assumptions about the development of individual parcels. One exception to this could be the "Chesapeake Mega Site" (aka the Williams Farms Tract). Should we explore specific definitions of this site's development future in our scenario definition?

In Task 2d, 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.

Questions:

- Prior feedback from the working group has indicated that since we are not doing fully iterative scenario planning in which we respond to accessibility changes caused by RCS projects with more growth, it's important to try to anticipate the potential growth impacts in our land use scenarios. The Phase I research (survey and stakeholder outreach) will provide some key qualitative input. We are scoped for 1-2 stakeholder meetings with regional economic development experts in Task 2 and can use these as further input to that process. Does the working group have specific recommendations on who should be consulted?

Technology Aspects

The recently-released National Research Council (Transportation Research Board) publication NCHRP 896 provides fresh guidance on nomenclature, key assumptions, and some methodological tactics for

incorporating technology drivers in long-range scenario planning. A few key points are highlighted below for information and possible discussion:

- Task 2 should result in a clear affirmation and "buy-in" of assumptions by scenario associated with CAV disruption such as private vs. distributed vehicle ownership and level of CAV adoption. We have proposed to structure these assumptions by place type as well as by scenario.
- Task 1 will need to provide the data to allow the study team to apply these assumptions about technology. In addition to place types, we may also need data such as:
    - Data allowing the inventory and evaluation of land occupied by parking structures, which we may need to account for in assumptions regarding parking re-use/re-purposing as a result of CAV adoption
    - Demographics describing mobility-limited persons such as young teens and the elderly, who will drive some 'induced' demand with CAV technology

The travel demand modeling for this study can be classified as a kind of *exploratory modeling* instead of *predictive modeling*. In the absence of having observed data to describe travel behavior under the influence of technology drivers, we will be adjusting travel demand model parameters that mimic (based on current research consensus) the influence of technology - testing the sensitivity of the regional model (calibrated to existing behavior). The NCHRP report and other emerging sources will be used to develop the parameter adjustments, and the capabilities and flexibility of the updated regional model will also in part determine what adjustments will be effective and meaningful. The study team will provide more information on this approach as it develops in the coming months.

SCENARIO PLANNING COMMENTS

To: camelia.ravanbakht@outlook.com
Cc: 'Shirley Core' <score@hrtpo.org>; Steele, Gregory C CIV USARMY CENAO (US) <Gregory.C.Steele@usace.army.mil>; Hamor, Michelle L CIV USARMY CENAO (USA) <Michelle.L.Hamor@usace.army.mil>; Lockwood, Keith B CIV USARMY CENAO (US) <Keith.B.Lockwood@usace.army.mil>; Walker, William T Jr CIV USARMY CENAO (US) <William.T.Walker@usace.army.mil>; Pruhs, Robert S CIV USARMY CENAO (US) <Robert.S.Pruhs@usace.army.mil>; Flowers, Jason R CIV USARMY CENAO (US) <Jason.R.Flowers@usace.army.mil>; Anderson, Michael L CIV USARMY (US) <Michael.L.Anderson@usace.army.mil>; Prisco-Baggett, Kimberly A CIV USARMY USACE (US) <Kimberly.A.Baggett@usace.army.mil>
Subject: Corps comments regarding Draft Scope of Work, Regional Scenario Planning, Regional Connector Study

Camelia,

Although we don't have specific comments on this draft Scope of Work, we would like to make the following comments regarding the study:

In order for an alternative or scenario to be permitted by the Corps, it must have a valid project purpose and need. Under the Corps' existing regulations, we can only permit the least environmentally damaging practicable alternative (LEDPA). We know that this is early in the Regional Connector Study, and we will continue to comment on the various alternatives and scenarios that are considered, including recommending ways to avoid and minimize impacts to waters of the U.S., including wetlands.

Furthermore, we have attached the USACE-Norfolk District Commander's letter dated June 29, 2016 to Ms. Angel Deem, Virginia Department of Transportation, that provides our comments on how the District might evaluate your proposals pursuant to a Section 408 permission. This letter provides the framework for how the District might evaluate alternatives as they relate to the potential impacts to federal civil works projects including federal navigational channels and federal facilities. Please refer to the attached letter.

Thank you for the opportunity to comment on this study and the draft SOW.

George Janek
Norfolk District Corps of Engineers
Regulatory Branch
757-201-7135

Attachment 6B

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1096

Executive Office

JUN 29 2016

Ms. Angel Deem
Environmental Division Director
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219-2000

Dear Ms. Deem:

I am replying to your letter, dated April 29, 2016, regarding the Hampton Roads Crossing (HRC) Study Supplemental Environmental Impact Statement (SEIS), which the Virginia Department of Transportation (VDOT) is preparing in conjunction with the Federal Highway Administration (FHWA) and other agency and stakeholder partners. In your letter, you request comments from the U.S. Army Corps of Engineers (USACE), Norfolk District, in accordance with our role as a National Environmental Policy Act (NEPA) "cooperating agency" for the SEIS. Specifically, you have requested comments on how the USACE might evaluate, pursuant to Section 14 of the Rivers and Harbors Act of 1899, 33 USC 408 (Section 408), the impacts of the proposed HRC project alternatives on USACE federally authorized civil works projects.

As interpreted by agency policy, Section 408 prohibits the alteration of federally authorized USACE civil works projects unless the acting party obtains USACE permission prior to making the alteration. The USACE may grant such permission where it determines that the proposed alteration will neither impair the usefulness of the civil works project nor be injurious to the public interest. The USACE has published Section 408 guidance in Engineer Circular (EC) 1165-2-216, "Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408," which provides the policy and procedural guidance for Section 408 requests.

The four proposed HCR project alternatives, identified in the Alternatives Technical Report (ATR) as "A," "B," "C," and "D," would have varying impacts on the federally authorized Norfolk Harbor and Channels Federal Navigation Project (the Norfolk Harbor Project). The Norfolk Harbor Project includes the channel elements of Channel to Newport News, Sewells Point Anchorage, Newport News Anchorage, and the Craney Island Dredged Material Management Area (CIDMMA).

While the enclosed document provides our preliminary Section 408-related comments and concerns in accordance with our role as a NEPA cooperating agency, we stress that the ATR for the HRC Project does not provide sufficient detail and information to make a Section 408 determination. Section 408 review can be

accomplished for this project once the plans have been developed to a sufficient level for our assessment of potential effects to our operation of Craney Island. EC 1165-2-216 indicates that plans should be developed to at least 60% completion in order to provide the level of detail necessary for Section 408 review of a proposal.

A copy of this letter, with enclosure, has been provided to Mr. Jim Utterback and Mr. Scott Smizik, with VDOT and Mr. Ed Sundra, with FHWA.

My staff will be happy to continue coordination on this project to assist in addressing these concerns for potential impacts to federally authorized civil works projects. If you require further information, please do not hesitate to contact Mr. Gregory C. Steele, P.E., Chief, Water Resources Division, at (757) 201-7764.

Sincerely,

Jason E. Kelly, PMP
Colonel, U.S. Army
Commanding

Enclosure

Norfolk District Corps of Engineers
Comments on the Hampton Roads Crossing Study (HRCS)
Alternatives Technical Report

1. Alternatives C and D for the HRCS surround and traverse Craney Island Dredged Material Management Area (CIDMMA) and alter the facility in the following manner:

a. The alternatives obstruct and restrict navigation to the CIDMMA. Obstructed or restricted navigable access will impair the ability of the Corps to maintain and operate CIDMMA and federal navigation channels and anchorages. Proposed alterations to the project will impact facility operation and maintenance, facility construction, contract performance periods, and result in increased costs to the Federal government and users of CIDMMA through increased tolls to deposit dredged material.

b. The proposed vertical clearance will restrict navigable access to the facility. The HRCS Supplemental Environmental Impact Statement (SEIS) Alternatives Technical Report provided to the Corps, indicates a vertical clearance for all bridge crossings of 18-feet relative to North American Vertical Datum of 1988 (NAVD 88). Restricted vertical clearance will prohibit delivery of construction materials and equipment and limit the type of vessels calling on the facility including Corps vessels and contractor vessels (i.e., tugs, derricks, barges, and cranes). The Corps will require continued unconstrained navigable access to the CIDMMA.

2. Alternatives B, C, and D traverse the east side of the CIDMMA. Proposed vertical clearance of bridge crossings on the facility will restrict access for vessels using the Craney Island Rehandling Basin (CIRB) bulkhead facility and construction lay-down area. As currently proposed cranes and similar equipment would be required to break-down and re-erect to clear the Virginia Port Authority rail and the proposed Hampton Roads Crossing (HRC) bridge structures. Proposed alterations to the project will impact facility operation and maintenance, facility construction, contract performance periods, and result in increased costs to the Federal government and users of CIDMMA through increased tolls to deposit dredged material.

3. Alternatives B, C, and D traverse the east side of the CIDMMA and propose to take land in the existing south containment cell. Relocation and reconstruction of the containment dike to the west will impair and reduce the long-term capacity of the CIDMMA. It is anticipated that the reduction of acreage within the containment cell will result in significant loss of capacity and associated lifespan of the south cell containment area. Any proposed excavation and re-deposit of south cell dredged material into containment cells from site work in the area will further reduce long-term capacity. Redeposit of excavated dredged material located in the south containment cell will require an evaluation to determine if the material may be redeposited at the CIDMMA. Additionally, any excavated material proposed for redeposit into CIDMMA may require evaluation and testing to insure the material meets Clean Water Act (CWA) and facility requirements. Additionally, relocation and reconstruction of the containment dike to the west may render the cell unable to accept dredged material for many years.

4. Alternatives B, C, and D will restrict dredge pipeline alignments for dredged material placement operations during maintenance of Federal navigation channels. Access for pipelines and tender vessels will be required at multiple locations under bridge structures. Perpetual easements for dredge pipelines will be required for alignments along proposed bridge structures. Constraining dredge pipeline alignments for dredged material placement operations at CIDMMA will result in increased costs to the Federal government and users of CIDMMA. Construction methods for the HRC project will need to be performed in a manner that minimizes impacts to Corps contractor's ability to install and maintain submerged and floating pipelines and ancillary equipment supporting maintenance dredging of Federal navigation channels and anchorages.

5. Alternatives B, C, and D will eliminate contractor lay-down area located at the CIRB bulkhead. Loss of the contractor lay-down area will require an alternate location for contractor access and lay-down area. It should be noted that lay-down areas provided to the north of the CIRB will require significant maintenance due to elevated land subsidence of the areas northward. This will result in increased costs to the Federal government through additional maintenance and to contractors who will not have access or lay-down areas proximate to operations at the bulkhead facility.

6. Alternatives B, C, and D will have impacts to United States Government property. Real estate coordination and real estate instruments will be required to construct the project on government property. Perpetual easements will need to be provided to support maintenance dredging, dredged material placement operations, and facility maintenance and construction.

7. Alternatives A, B, C, and D will each have tunnel elements that impact multiple Federal navigation channels and anchorages. Tunnel clearances in the Federal navigation channels will need to meet or exceed the clearance of the existing Hampton Roads Bridge Tunnel (HRBT). Tunnels will need to be protected to withstand all potentially foreseen impacts from navigational emergencies and dredging operations. Tunnel armament and depth must consider spud and anchor embedment depths and potential vessel strikes.

8. Alternatives A, B, C, and D will have impacts to designated Federal project anchorages. Construction methods and scheduling for project construction including any proposed use of Federal navigation anchorages during construction will need to be performed in a manner that minimizes impacts to navigation to a level acceptable to the navigation community. Loss of anchorage areas will reduce anchorage capacity, availability, and reduce vessel scheduling, access, and maneuverability.

9. Alternatives B, C, and D will have impacts to navigation and operations during construction of the project. Construction methods and scheduling for the project, especially features crossing navigation channels and facilities, will need to be performed in a manner that minimizes impacts to navigation to a level acceptable to the navigation community.

10. Alternatives B, C, and D will have impacts to maintenance and construction on the CIDMMA facility. Construction methods and scheduling for the HRC project will need to be performed in a manner to minimize impacts to dredging, dredged material placement operations, facility maintenance, and construction to a level that accommodates timely dredged material placement by the Corps and other stakeholders using the facility. HRC construction on CIDMMA will need to be performed to not interfere with containment dike raising, dredged material borrow operations, and construction and maintenance of other facility infrastructure.

11. Alternatives B, C, and D propose to construct a roadway adjacent to an existing utility corridor on CIDMMA. The project design and construction will need to be performed to ensure the stability and differential loading and movement that may result on the utilities (i.e., Virginia Natural Gas pipeline, U.S. Navy JP-5 line).

12. Impacts to navigation for the selected alternative (A, B, C, or D) must be vetted and approved by the U.S. Coast Guard (USCG) Sector Hampton Roads.

From: Barbara Nelson <bnelson@PortofVirginia.com>
Sent: Friday, November 16, 2018 4:54:49 PM
To: Camelia.ravanbakht@outlook.com
Subject: RCS Input and Scenario Scope Comments

Good afternoon, Camelia,

The Port of Virginia appreciates the opportunity to have provided input during the Regional Connectors Study (RCS) stakeholder interview on September 26. As Phase I is focusing on establishing the goals and objectives for subsequent study phases and to balance the study with the region's expectations and priorities, we wanted to provide a brief summary of key port/freight-related issues from the interview, the additional follow-up discussion from October 23, and comment on the draft scenario scope.

Summary of Port/Freight-related Comments from Stakeholder Interview

- The HRTPO Freight Technical Advisory Committee (FTAC) is in the process of being reconstituted and the next meeting will be held on December 12, 2018. As the HRTPO has defined the FTAC as the committee that will assist the TPO in explaining and raising awareness of the importance of freight related transportation in the region and to collect/provide public input on these matters, it is important to reserve an opportunity for FTAC comment and input as an integral partner in the RCS. It was agreed that the FTAC involvement was important and FTAC would be identified as a study stakeholder for this phase of the study and subsequent phases of the RCS.
- The port and freight community share many of the same interests as other users of the transportation system: a need for improving system performance through the reduction of recurring congestion, optimization of all modes of transportation and deploying technology to benefit the entire system.
- While truck transport is essential in the first and last mile of goods movement, as well as long-haul moves, the RCS should also identify rail system investments that will provide the opportunity to shift cargoes from the roadways to the rail system. The Route 164 Rail Connector to the future Craney Island Marine Terminal is an important connection that should be included in this study.
- The alliances between shipping lines is a significant shift and an emerging issue. The result of the larger ships calling the terminals in Hampton Roads will have create an increase in the surge or pressure in gate moves. This increase in import and export cargoes can create economic opportunities across the region as well as pressures on the regional transportation network and locally in proximity to the terminals.

Additional Stakeholder Interview Follow-up Comment

While the purpose of the study is to evaluate the feasibility, permitability and transportation benefits of the alternatives that were presented and not advanced as the preferred alternative in the Hampton

Roads Crossing Study and Supplemental Environmental Impact Statement, it is also important to evaluate the economic impacts of the proposed transportation investments. While all projects compete for funding, those projects that can demonstrate a system performance benefits and demonstrate how the transportation investment induces economic activity will have a higher likelihood of successfully competing for constrained regional, state or federal funds.

Comment on the Scenario Planning Scope

- During the presentation on November 8 on the tasks associated with the Scenario Planning Task, an example of place-types was provided for illustration purposes. As the port and the related economic activity is a major driver the region's economic vitality, it is important that all exploratory scenarios include a port/industrial as a key component of the plausible future. In addition to warehouse and distribution impacts associated with these futures, the scenario should also plan for and describe manufacturing opportunities as these types of jobs will have a different impact on job types, educational requirements, and the potential for increased income. All of these factors will impact the value proposition for choosing one set of solutions over alternatives as the RCS moves into picking and prioritizing projects.
- As noted above, there has been a significant change in frequency and size of ultra large container(ULC) vessels that will are and will be calling on this region. By mid-2019 the total number of ULC vessels that can be worked at the same time will have increased from two to six ULC vessels. This capacity will create economic opportunities and transportation system impacts that have not been anticipated in past long-range transportation plans. Additionally, the port has participated in a modeling exercise that evaluates handling 22,000 TEU ships at berth – whereas today, we are handling 14,000 TEU ships.
- The scenario analysis should also take into consideration the port's interest and need in receiving and pushing out more cargo by rail to maximize the efficiency of the transportation system.

Again, we appreciate the opportunity to be a partner in this study and the related efforts with the 2045 long-range plan update and the revisions to the prioritization tool. Please let me know if you have any questions about our comments.

Best wishes,

Barbara

Barbara Nelson

Vice President, Government Affairs and Transportation Policy

Virginia Port Authority

600 World Trade Center

Norfolk, VA 23510

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Cell: (804) 874-0140

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From: Dale Stith <dstith@hrtpo.org>
Sent: Friday, November 16, 2018 3:58:33 PM
To: camelia.ravanbakht@outlook.com
Cc: Mike Kimbrel
Subject: RCS Scenario Planning draft scope of work - HRTPO comments

Hi Camelia,

HRTPO staff has reviewed the updated draft RCS scenario planning scope of work and below are our comments of the version dated 10.31.18:

- When describing/listing public outreach tasks, deliverables, meetings, etc., please reference the RCS Engagement/Outreach Plan for more details.
- Under Task 1k (page 6): I'm still not convinced about the need to evaluate the 2015 model similar to the evaluation of the 2009 model. In speaking with Bill Thomas (a couple weeks ago), he explained that there may be some things that they will need to adjust/tweak in the delivered 2015 model to ensure it can perform to the RCS objectives. Perhaps they can reword this section to indicate that they don't necessarily need to evaluate the 2015 model similar to their evaluation of our current 2009 but instead they will evaluate to determine if additional adjustments need to be made to the 2015 model to ensure it can perform to meet objectives of the RCS (or something like that).
- Under Task 5b (page 14): Add 'economic models' to Deliverables

- I also made some minor corrections throughout the attached word document (using the official name of the HRTPO Project Prioritization Tool, adding references to permitability screening (to drive that home), and consistently using "candidate" projects).

As we discussed before, I am impressed and appreciate how well this draft scope is written (making this complex process easier to digest and understand).

Keith Cannady informed me that he has comments to submit as well. I will forward those once I receive them from him (probably Monday).

Thanks and have a great weekend!

Dale M. Stith, AICP, GISP

Principal Transportation Planner

Hampton Roads Transportation Planning Organization

The Regional Building | 723 Woodlake Drive | Chesapeake, VA 23320

dstith@hrtpo.org | www.hrtpo.org | Phone: 757.420.8300 | Fax: 757.523.4881

REGIONAL CONNECTORS STUDY

DRAFT SCOPE OF WORK

Regional Scenario Planning

Introduction

The future is always uncertain, but long-range planning requires forecasting in the face of uncertainty. Our forecasts typically rely on assumptions about how economic, demographic, and technological trends will play out over an extended timeframe. To do long-range planning in the context of risk and uncertainty, a proven technique is scenario planning – testing potential impacts of future trends by analyzing alternative future scenarios. Scenario planning provides an opportunity to bracket assumptions about plausible futures and test the impacts of alternative trends on regional goals and objectives such as quality of life, mobility, accessibility and environmental resiliency.

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 in light of 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 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. A potential benefit of this process will be 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 RCS 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 RCS 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.

Task 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 good 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 conversion of large 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 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 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 a number of 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 ~~(or Tracts)~~
- 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 1c: Build ~~Placetype~~Place types

The land use allocation aspect of the Scenario Planning process will be conducted through a "~~Placetype~~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 ~~Placetype~~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 ~~Placetype~~Place types will involve several steps, including:

- Profiling existing and future land use types in the region to develop a unified set of ~~Placetype~~Place types that describe regional development patterns
- Developing quantitative summaries of each ~~Placetype~~Place type that summarize land uses, developed areas, and environmental data for each
- Developing summary 3-D visualizations of each ~~Placetype~~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 ~~Placetype~~Place types, and they will be checked against air photos and parcel data from sample locations in the Region to calibrate the ~~Placetype~~Place types to existing conditions.

Task 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 ~~Placetype~~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 have the ability to 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 ~~Placetype~~Place types, with resulting data derived from the ~~Placetype~~Place types about land use, environmental features, accessibility and transportation characteristics.

Task 1e: Land Suitability Analysis

The Land Suitability Analysis is a necessary step in order to build future scenarios and land use allocations. In order 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 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 ~~Placetype~~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 ~~existing~~ 2015 land use data and the socioeconomic data in the Travel Demand Model.

Task 1g: Review Data on Economic Conditions and Trends

In order 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 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. In particular, 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 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 particular attention given to different potential economic diversification futures.

Task 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 ~~Placetype~~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 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.

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

- Evaluate travel patterns associated with major facilities and harbor crossings. With respect to this study, it will be particularly important to understand and have the model represent well the travel markets that use the Harbor crossings.

- Evaluate and update external travel (XX, XI, IX) with respect to the region.
- Assess need for special generator representation. Determine travel patterns associated with the ports and any other major freight traffic generators in the region.

Task 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 similar to the evaluation conducted in Phase I of this study for the previous version of the Regional Model.

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. ~~In addition to verifying model performance as documented, the Consultant Team will also compare performance to standards defined in the VTM Policies and Procedures Manual.~~

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 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
- ~~Placetype~~Place type Dataset
- 3-D Visualizations of ~~Placetype~~Place types
- Virtual Present GIS Mapping
- Land Suitability GIS Mapping
- TAZ Calibration of ~~Placetype~~Place types
- Presentation materials, posters and slide decks of Deliverables for public outreach process

Task 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 in reality, 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 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. ~~For example, it is likely that the starting point for the three economic scenario drivers will be 1) high military growth, 2) high non-military growth, and 3) blend of military and non-military growth, with the specific economic growth sectors of each scenario to be defined via the research in Tasks 1 and 2.~~

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

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 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) ~~Placetype~~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 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 and zero occupant vehicle (ZOV) trips) and other factors/behaviors related to mode share
- parking location
- traveler values-of-time
- trip rates (reflecting induced demand and mobility by seniors, children, and disabled)
- trip lengths
- effective capacity of roadway infrastructure (due to platooning, higher density traffic flows)

Some of these variables will vary by ~~Placetype~~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 2f: Affirm Drivers and Scenario Parameters

In this task, the Consultant Team will use a similar process as in task 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 general 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 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	Location of sensitive but	A composite of natural

OBJECTIVE	MEASURE	METRIC	DATA SOURCE
	natural areas or green infrastructure	unprotected natural areas; developed, or development near (1/4 mile).	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 3a: Develop Draft Performance Measures

In this task, a set of 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.

Task 3b: Correlation with HRTPO Project Prioritization Methodology

A key aspect of the performance measures that will be explored in this task will be ~~potential~~ integration with HRTPO's Project Prioritization Tool. ~~Any potentials for C~~coordination between the Scenario Planning process and the HRTPO's project prioritization process will be ~~explored~~ 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.

Task 3c: 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 general 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)

Attachment 6B

Meetings:

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

Deliverables:

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

Task 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 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 as a result 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 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 4b: Validate Model Outputs and Data for 2015 Performance

Once an initial set of 2015 performance outputs has 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 ~~today~~for 2015. The Consultant Team will compare the 2015 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 ~~calibration~~ 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 5: Modeling the 2045 Baseline Alternative

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" alternative 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. [FOR DISCUSSION:]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. In order to correlate to HRTPO's long range transportation planning process, we will ensure the following assumptions for the 2045 Baseline Alternative:

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- 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 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 ~~Placetype~~Place types according to the 2045 land uses 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 ~~Placetype~~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 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 future 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 ~~Technical Committee and~~ 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.

Timing:

- 6 weeks

Meetings:

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

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

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Task 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

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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 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 ~~Placetype~~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 ~~Placetype~~Place types. Based on that economic future, we will allocate to ~~Placetype~~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 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 ~~Placetype~~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 ~~Placetype~~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.

Timing:

- 2-3 months

Meetings:

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

Deliverables:

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

Task 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 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 Task 6b and parameters associated with the technological assumptions for the scenarios vetted in Task 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 7b. Economic Modeling of 3 Scenarios

In this task, each of the Travel Demand Model outputs for the 3 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 7c. Land Use modeling of 3 Scenarios

In this task, each of the land use allocations for the 3 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 7d. Public and Stakeholder Vetting of the Scenario Evaluations

Once all the model runs for the 3 Scenarios have been completed and the outputs summarized, the Consultant Team will use outreach approaches to bring the public and key stakeholders into a process of understanding and vetting the results of the Scenario Evaluation. We will work with the Working Group to confirm the involvement approach which may include website interactive surveys, focus group sessions, public workshops and work sessions with the Working Group ~~and Technical Committee~~.

The result will be a public awareness of the conclusions of the Scenario Evaluation and support for proceeding with the next task, which will involve testing each of the Candidate Regional Connector projects (screened for permitability) against the Scenarios.

Timing:

- 3 months (possible extension overlapping Task 8 for ongoing outreach)

Meetings:

- Meetings with HRTPO staff: 3
- Working Group Meetings: 1
- Steering Committee Meetings: 1
- Other/Stakeholder Meetings: 0

Deliverables:

- Land Use, Economic and Travel Demand model runs for 3 Future Scenarios
- Dashboard Outputs for Model Runs
- Tech Memo on Scenario Evaluation
- Presentation materials, posters and slide decks of Deliverables for public outreach process

Task 8: Evaluating the Candidate RCS Projects

Overview

The final step in the scenario analysis is the assessment of transportation investment impacts by scenario. In this task, the Consultant Team will run each candidate RCS project (screened for permitability) for each scenario. The Consultant Team will scope up to 20 model runs per scenario that will be a combination of runs used to develop demand estimates associated with each candidate RCS project and additional runs to check for cause and effect relationships (such as particular pairings of RCS projects). The schedule assumes the component candidate RCS projects will have already been coded into the travel demand model network in the main RCS study process prior to the beginning of this task.

Task 8a: Confirmation/Coding of Candidate RCS projects for testing

Transportation improvements defined by the candidate RCS projects will be "coded" into the Existing + Committed network using planning data available from HRTPO. Coding will include information such as facility description, alignment, and capacity information associated with improvements. Network coding will also specify locations of toll assessment and toll values, if applicable. The Consultant Team will review and confirm project coding assumptions with HRTPO. There will be one project network for each candidate RCS project. Note, the schedule assumes the component candidate RCS projects will have already been coded into the travel demand model network by Michael Baker some time prior to the beginning of this task.

Task 8b: Travel Demand Modeling for 3 Scenarios (each ~~individual~~ Candidate project)

Using the networks developed in Task 7a and scenario specific socio-economic data and parameters, run the TDM for each candidate project over each of the 3 scenarios. Provide quality control checks on associated output. The modeling results for the newly coded candidate projects will be compared against results of similar projects or benchmarks (if available) to determine appropriateness of the results. Ad-hoc sensitivity testing may be performed under certain circumstances if the results of the projects are not intuitive. The results for each candidate project will be compared against all project scenarios and the Existing + Committed network demand estimates to uncover and flag any potential issues in the results.

Task 8c: Performance Evaluation of 3 Scenarios (each ~~individual~~ Candidate project)

In this task, the Consultant team will complete the performance dashboard for each candidate RCS project, though not necessarily each model run due to the large volume of information. The Consultant Team will work with HRTPO staff to identify the most meaningful comparisons to share with the Working Group and will then determine any further iterations to run to explore cause-and-effect in performance in Task 8c. Also, the Consultant Team~~?~~ will provide all necessary input data for HRTPO staff to run the HRTPO Project P~~p~~rioritization T~~t~~ool for each set of candidate RCS projects under each scenario to provide a ranking of each candidate project by scenario, as illustrated in the table below. This information will provide an important basis for assessing how robust the RCS alternatives are for potential future conditions.

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Project Rank	2045 Baseline E+C	Scenario 1 E + C	Scenario 2 E + C	Scenario 3 E + C
E+C + RCS 1	5	8	15	8
E+C + RCS 2	4	6	4	2
E+C + RCS 3	5	3	20	15
...E+C + RCS 20	8	9	3	9

HRTPO seeks to evaluate the transportation benefits of RCS candidate projects and the extent to which they achieve the goal of enhancing economic vitality and improving the quality of life in the region. To do so, the Consultant Team will use TREDIS to translate travel model results describing travel time, distance, reliability, and market access, into regional economic impacts expressed in terms of jobs, labor income, business sales, and GDP, with detail available by industry sector, and over time. The TREDIS FREIGHT module will allow targeted analysis of the implications of transportation performance for freight-reliant industries. Given the number of RCS projects, and the desire to test performance of every project under the baseline as well as all alternative scenarios, the Consultant Team will make use of TREDIS's batch mode to support easy import of project details and export of key economic performance results.

Task 8d: Additional iterations to check for cause and effect relationships and preparation of final results

After the initial testing of individual candidate projects, the Consultant Team will hold a workshop with the Working Group and HRTPO staff to identify any final questions to be addressed with final model runs and/or extraction of data (such as select link analysis) from the model set. After this meeting, the Consultant Team will conduct any final iterations and will prepare the final results for presentation to the Working Group and Steering Committee. In these meetings, these groups will provide input on the most relevant data, insights, and 'story lines' to be carried forward in final reporting.

Timing:

- 4 months

Meetings:

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

Deliverables:

- Travel Demand model, economic model, and prioritization tool runs
- Dashboard Outputs for Model Runs
- Tech Memo on RCS project evaluation
- Final s~~S~~cenario planning land use and travel demand model files ~~for HRTPO staff use~~

Task 9: Reporting Results

Overview

In this final task, the Consultant Team will work with HRTPO Staff, the Working Group, and the Steering Committee to distill the insights from the scenario process and package them for sharing with the public. The schedule assumes the HRTPO staff will carry the results forward into further outreach, but this effort can be undertaken with Consultant Team support if desired.

Task 9a Scenario Results Workshops

In this task, the Consultant Team will take the materials and input generated in Task 8 and prepare a work session to be held individually or jointly with the Working Group and Steering Committee to discuss the scenario analysis results and to provide input on investment, policy, and other recommendations to carry forward from the analysis.

Task 9b Packaging Scenario Results

The Consultant Team will document the results of the Task 9a workshop in the form of a presentation, website content, and a draft report that capture the full scenario planning steps and findings. This information will be used by HRTPO staff for ongoing outreach. After a period of initial outreach and input, the Consultant Team will present final findings to the Working Group and Steering Committee at the conclusion of Task 9.

Timing:

- 3 months (possibly extended for public outreach)

Meetings:

- Meetings with HRTPO staff: 3
- Working Group Meetings: 2
- Steering Committee Meetings: 2
- Other/Stakeholder Meetings: TBD

Deliverables:

- Draft and final presentation of scenario planning results
- Draft and final website content of scenario planning results
- Draft and final scenario planning report

~~Schedule:~~

~~The following schedule shows the anticipated timeline in blue with key milestones of committee meetings and deliverables shown. A hypothetical "compressed" schedule is shown in orange, primarily to illustrate the fastest possible course that could meet the LRTP process timeline. However, this schedule assumes a theoretically very quick input and turnaround time for the Working Group and~~

~~Steering Committees. Based on our experience with other regions, this type of schedule constraint is not advisable in getting a solid base of consensus in a complex regional effort like this project and the Consultant Team does not believe this schedule allows adequate interaction with the Working Group to alter methods and deliverables.~~

From: Keith Cannady
Sent: Friday, November 16, 2018 4:51 PM
To: Dale Stith
Cc: Mike Kimbrel; Rob Case; Keith Nichols; Kendall Miller
Subject: RE: RCS Scenario Planning Draft Scope of Work

Dale,

Sorry for not responding sooner with my comments on the draft scope for scenario planning. As mentioned, I am very impressed with the consultant's work and looking forward to the process and outcomes.

My comments:

1. Under Task 1i on page 5, the consultant will "conduct a scan of available research on the relationship between public sector infrastructure costs and development typologies, as a potential variable of interest". I believe this will have a very high level of interest and value for our local governments and would also suggest that the consultant research the relationship between public sector revenue generation (real estate tax revenues, etc.) and development typologies. This could provide some valuable information on the overall net fiscal impact of different development typologies.

2. General comment/question: will this planning effort incorporate projected sea level rise in the region (for example, recent PDC adopted planning and policy approach)?

Keith

REGIONAL CONNECTORS STUDY

PHASE 2 – TECHNICAL ANALYSIS

SCOPE OF WORK

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 to April 2021. 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 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 engagement team will conduct stakeholder outreach tasks to engage regional stakeholders as directed and approved by HRTPO. 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 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 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 Consultant Team; categorizing all comments for inclusion in comment analysis or reports and creating the public outreach comment table summary for inclusion in the Engagement Report.

Task 1.3b Stakeholder Briefings and Presentations

The engagement team will schedule and conduct two rounds of stakeholder briefings with up to 40 regional stakeholders approved by HRPTO in Phase 1 (just before the first round of public meetings and after initial screening of alternatives and a second round after release of the draft final report) and up to 25 community, nonprofit and business interest groups/organizations surrounding each meeting series. Briefings and presentations task elements will include the development of handouts, PowerPoint presentations, maps, and the recording of meeting minutes as appropriate. A maximum of 130 briefings and presentations will be conducted in Phase 2.

Task 1.3c Brochures, Factsheets and Handouts

The engagement team will prepare a maximum of 2 meeting brochures to report on key project elements, milestones, and meeting dates. Two brochures would be distributed at public meetings and made available on the project website. The content will include background information, schedule, study area maps, and other pertinent project information to support full participation by the public at the meetings. In addition, the engagement team will prepare two postcards or rack cards to be featured as informational kiosks at community facilities. These smaller, more portable formats, could highlight topics or special interests and could be distributed at outreach event, community facilities, and as notification tools in advance of public meetings.

The engagement team will develop posters, flyers and meeting presentation templates for the study. The team will generate up to 10 comment cards, fact sheets and/or flyers that highlight topics, promote events, or announce key milestones in the process. They may target specific audiences or interests or be oriented more generally. The fact sheets and flyers will support and supplement key messages throughout the process to keep the public and stakeholders informed.

Task 1.3d Public Meetings

The engagement team will work with HRPTO to plan, host and facilitate two rounds of seven public meetings during Phase 2 of the study. Each meeting will have an informational component and targeted and purposeful input opportunities. Meetings will be developed in a way that manages stakeholder expectations, promotes transparency and accountability for the process, creates understanding, and builds consensus for decisions and recommendations. The team anticipates each meeting series to be held as follows: 3 Peninsula meetings (Williamsburg, Newport News, and Hampton) and 4 Southside meetings (Norfolk, Virginia Beach, the Churchland/Western Branch area, and Suffolk). The engagement team will identity meeting locations for HRPTO approval, conduct onsite walk through and verify ADA accessibility, book meeting locations, provide refreshments, book court reporters, advertise meetings in various media (newspapers, ad buys, etc.) and secure, if required, any sign language interpreter and/or language translator as appropriate.

The engagement team will work with HRTPO to offer an online open house or live stream session for each meeting series for a total of two online events. Meeting notifications will be made in accordance with HRTPO policies and will use the full mailing list and locality networks. Social media and web announcements will be used. Additionally, in advance of the first set of meetings, a printed ad announcement with meeting information will be published in local media as approved by HRTPO.

An online open house is very much like a traditional public open house, but information and community discussions are offered through a web forum or webinar. A variety of options is available. With a webinar option, participants can register using the GoToMeeting software. Once registered for the online open house, participants can access a library of information, view a PowerPoint presentation, and ask questions of staff through an interactive messaging feature. Interactive polling is also available. Another option is to live stream a public meeting via Facebook or another online tool. Providing these easy and accessible online tools will encourage community members to convene online to learn more about a project, share their ideas, and provide input to decision-makers.

Task 1.3e Regional Connectivity Symposium

To engage traditionally underserved populations the engagement team will plan in coordination with HRPTO staff a symposium with the HRTPO EJ Roundtable, students and faculty from local Historically Black Colleges and Universities, and Title VI advocacy groups. The two- to three-hour meeting will be a facilitated conversation focused on regional connectivity for the purposes of informing the study recommendations and priorities.

The engagement team will assist HRTPO to plan the Regional Connectivity Symposium, select event location, develop an event management plan, speaker talking points, review of collateral materials, and provide day-of-event coordination.

Task 1.3f Community Events and Outreach

The engagement team will plan up to 5 informal in-person pop-up events to introduce the project and to obtain stakeholder perspectives on regional mobility, transportation planning, and connectivity.

The engagement team will plan up to 5 regional pop up events, select event locations, schedule, develop event activity plans, determine required staffing, and review collateral material.

In addition, the engagement team will investigate the use of ad space on ziosks in the region to be priced for HRTPO consideration and approval.

Task 1.3g Engagement Summary Report

The final outreach documentation for the project will clearly highlight all activities, what we heard, and how it was considered and addressed. The final outreach summary will aid in communications for the project by telling the story of the engagement process and how the plan represents an inclusive and community-supported vision for the future.

Task 1.4 Website Upgrades and Maintenance

The team will develop content for use and subsequent uploading to the study website by HRTPO staff. This effort includes initial content for review by the project management team and HRPTO along with regular content updates at project milestones and content updates regarding public meetings and other pertinent events.

Task 1.4a Prepare Website Content

The Consultant 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 PRR team.

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:

- 28 months

Meetings:

-
- 14 public meetings
- 5 "pop-up" meetings
- Regional Connectivity Symposium
- Meetings with HRTPO staff: 2
- Working Group Meetings: 2
- Steering Committee Meetings: 2
- Other/Stakeholder Meetings: 130

Deliverables:

- Study mailing list (electronic format)
- Comment database (electronic format)
- Brochures, fact sheets, and handouts and comment sheets for public meetings
- Engagement Summary Report
- Website deliverables

TASK 2 – Development of Preliminary Alternatives

The intent of this task is to develop preliminary alternatives to a sufficient level of detail to enable construction, right-of-way, and utility relocation planning-level costs to be developed, as well as to be able to determine each alternative's potential to be permitted and constructed. Permitability and constructability are two criteria that will be used to help screen the preliminary alternatives down to candidate alternatives. More information on that screening is provided in Task 3.2.

It is assumed that a maximum of ten (10) preliminary alternatives will be developed. They will include the five (5) corridors not programmed for funding in the HRCS SEIS which are:

- I-664
- I-664 Connector
- I-564 Connector
- VA 164
- VA 164 Connector

In addition to these five preliminary alternatives, an additional five (5) alternatives will be developed as a result of suggestions made at stakeholder interviews and comments received during other project engagement activities.

To the greatest extent possible, the Consultant team will use existing information available for the conceptual design of the alternatives, which includes: typical cross sections, alignments for roadways on new location, and geometric configurations of connection points to existing roadways.

The Consultant team will develop alternatives at a conceptual level in MicroStation format utilizing aerial photography and available GIS data. Elements of the conceptual development of the alternatives will include the following subtasks.

Task 2.1: Develop Geometry of Preliminary Alternatives

Task 2.1a Design Criteria
Engineering design criteria for the Preliminary Alternatives will be established based on VDOT and AASHTO standards for the design speed and type of facility. Alignments will be developed to minimize known environmental impacts, minimize the need for right-of-way, minimize costs, and accommodate forecast traffic volumes. Horizontal alignments and vertical profiles will follow existing geometry where existing roadways are being widened. Apparent geometric deficiencies will be identified, and anticipated design waivers and exceptions will be listed. The beginning and ending stations of the alignments will be tabulated as well as proposed curve data.

The design of the alternatives will also include traffic analyses of connection points to existing facilities. These analyses will be undertaken to ensure that the design can adequately accommodate projected traffic volumes. The traffic analyses will be limited to Highway Capacity Manual (HCM) methodologies for merge, diverge, and weave sections on freeways and capacity analyses for arterial intersections. They will not include micro-simulation analyses (these will only be performed on the Candidate Alternatives).

Task 2.1b Typical sections and cross-sections
Typical sections for each alternative will be developed to meet VDOT and AASHTO requirements. Materials will match existing facilities (concrete or asphalt pavement). A description of the proposed pavement design will be developed, including proposed pavement depths for construction cost development. New facilities will be assumed to be asphalt pavement, unless otherwise directed. Cross-sections will be developed at 500' intervals for the purposes of developing earthwork quantities. Additional cross-sections will be developed at 200' intervals through interchanges from end-of-ramp to end-of-ramp and at critical locations to assist in determining tie-in points and environmental and right-of-way impacts.

Task 2.2: Hydraulics and Hydrology

Conceptual analysis will be performed for major drainage structures (Q_{100} > 500 cfs), to determine feasibility and cost impacts. A description of floodplain impacts will be included where there is proposed encroachment on a floodplain. Roadway drainage will generally be assumed to be an open system (ditches). Where bridge structures, roadway barriers, sound walls, or retaining walls are

required, closed drainage systems (inlets and pipes) will be assumed. These areas and approximate limits will be determined as part of the alternative development. Stormwater management will be estimated based on pollutant loading calculations for new impervious area. Approximate sizing of Stormwater management facilities to mitigate increases in Stormwater runoff will be performed based on "rule of thumb" estimates, but no design will be performed.

Task 2.3: Structures

Any new, widened, or reconstructed structures will be described. The approximate type, size and location of proposed bridge work will be developed at a conceptual level. The location, limits, and height of retaining walls and sound walls will also be developed at a conceptual level.

Task 2.4: Utilities and Railroad Crossings

Any major overhead utilities (such as electrical transmission lines, and transformer stations) will be identified, and the impact of any conflicts will be discussed. Any railroad crossings within the proposed roadway improvements will be identified and impacts described.

The conceptual plans will be turned into graphics for inclusion into the study report.

Task 2.5: Planning Cost Estimates

A planning level cost estimate (present year costs) will be developed for each preliminary alternative based on the conceptual designs and potential mitigation estimates. Quantities for major items such as roadway pavement, drainage structures, bridges and walls will be based on the conceptual plans. The quantities will be multiplied by the average unit costs for the Hampton Roads District to arrive at the construction cost for these items. The cost of the remaining disciplines will be based on allowances or lump sum costs as follows:

- Mobilization
  - Mobilization will be presented as a lump sum cost based on a percentage of construction cost.
- Traffic Control & Maintenance of Traffic (MOT)
  - Ground Mounted signs will be estimated on a "per mile" basis
  - A planning level estimate will be prepared for an ITS system where HOT lanes are proposed. The ITS system will be presented as a lump sum amount.
  - Traffic MOT will be based on a percentage of the total construction cost of the project, typically 4-5% of construction cost.
  - Lighting will be based on a "per mile" basis where applicable.
- Ground improvements
  - Proposed roadway ground improvements will be estimated based on available soil surveys and geotechnical information from adjacent projects.
- Stormwater Management, E&S and Wetlands
  - It will be assumed that Nutrient Credits will be purchased for approximately 25% of the increased pollutant load, unless a nutrient bank is not readily available for the watershed where the proposed improvements are located.

    - Plantings for constructed wetlands or bioretention facilities will be based on a lump sum cost based on VDOT District averages.
    - The presence of wetlands and streams will be based on publicly available wetland inventories (NWI) and topographic maps. The impacts will be based on limits or disturbance. Wetland mitigation costs will be based on a per acre cost; stream impacts will be based on a linear foot cost.
    - Erosion & Sediment Control (E&SC) costs will be presented as a lump sum cost.
- Preliminary Engineering (Design) costs will be based on a percentage of the total construction cost of the project.
- Right-of-Way estimated costs will be determined by categorizing the property (residential vs. commercial), quantifying the right-of-way taking and applying per acreage costs for partial takes. Total takes will include relocation costs where applicable. Unit costs for right-of-way and relocation costs will be based on VDOT unit costs for the Hampton Roads District.
- Utility Protection and Relocation costs will be based on observations of above ground features, and record research. Utilities will be aggregated by type (water, sewer, power, gas, communication) and assigned to a range of sizes. An allowance will be made for smaller utilities/distribution lines. Larger utilities/transmission lines will be based on a linear footage basis.
- Railroad crossings – A cost for railway flaggers and watchperson service will be estimated for proposed railroad crossings. The cost will be presented as a lump sum cost.

For any ferry service alternative, a planning level estimate will be prepared for the capital costs and operating costs of ferry service. This estimate will be based on a life cycle cost analysis. The length of the period used for life cycle analysis will be determined in conjunction with the HRTPO, prior to development. The design ferry vehicle will be the Pocahontas which is the largest ferry vehicle on VDOT's Jamestown-Scotland ferry route and can carry tractor trailers up to 56,000 pounds. Capital costs will be developed for major items, with allowances for smaller, aggregated items. Major capital costs will include the cost of ferries and ferry infrastructure, including the cost of docks and bulkheads, approach roadways/parking lots, right-of-way and support buildings with communications and other utilities. Operating costs will include ferry and support staff, and O&M costs for the ferries and supporting infrastructure.

Timing:

- 10 months

Meetings:

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

Deliverables:

- Roadway typical sections
- Roadway alignment plans
- Cost estimates

TASK 3 – Determination of Candidate Alternatives (Screen 1)

Evaluation criteria will be determined for use in screening the Preliminary Alternatives down to Candidate Alternatives. The criteria will include, but not be limited to:

- Congestion relief
- Permitability
- Constructability

The intent of this initial screening is twofold. First, it will eliminate from consideration any alternative whose permitability is questionable. Second, it will eliminate any alternative that does not compare favorably to the other alternatives in these criteria. An alternative matrix will be prepared to illustrate the characteristics of each Preliminary Alternative and to facilitate comparison between them.

Task 3.1 Conduct Congestion Relief Assessments

Congestion relief performance measures are to be determined through interaction with the Working Group and HRTPO staff, but could include:

- Percent reduction of Average Annual Daily Traffic (AADT) and delay on existing Hampton Roads crossings (Hampton Road Bridge Tunnel, Monitor Merrimac Memorial Bridge Tunnel, and the James River Bridge)
- Percent reduction in Average Daily Vehicle Miles Traveled (VMT)

These assessments can be made from travel demand model output generated as part of the Scenario Planning task. The comparison of these measures is part of the screening of the Preliminary Alternatives.

Task 3.2: Conduct Permitability Assessments

Overview

The purpose of this task is to evaluate the regulatory permitability of preliminary alternatives. All regulatory permitability evaluations will be conducted by reviewing Federal, State, and Local regulatory requirements in conjunction with existing environmental conditions. The study team will determine potential regulatory fatal flaws as well as develop a prioritization tool for the analyzed alternatives.

Task 3.2a. Data Collection Review

The focus of this task will be to review and analyze environmental (natural and cultural resources) data created to develop the regional mapping, with the goal of establishing a unified dataset for GIS based environmental alternatives review. The regional mapping and environmental overlays will define where sensitive natural and cultural resources are located to determine if preliminary alternatives can avoid and /or minimize impacts as part of the risk analysis. In addition, should resources not be able to be avoided and/or minimized, mitigation concepts will be evaluated as part of the analysis. This information will form the basis for regulatory permitability evaluations as part of the alternatives

analysis. The data will be evaluated to provide regional leaders and analysts with accurate information from which to make strong, technically-supported decisions regarding regulatory viability.

Task 3.2b: Develop permitability requirements and evaluation parameters
In this task, a set of evaluation parameters will be developed to evaluate environmental and regulatory viability of the alternatives. Each evaluation parameter will relate to the targeted environmental resources and potential impacts in conjunction with Federal, State, and Local laws and regulations to create a framework for risk analysis, fatal flaw analysis, and alternative prioritization.

In addition, this task will establish a series of regulatory permitability factors that will be used to measure how each alternative contributes to the direct and indirect environmental impacts to ensure there is not a negative environmental impact to the resources of the region. The factors will serve as the measures of effectiveness against which to test each alternative. A matrix will be developed that aligns each metric according to an established objective for the region.

A key aspect of the evaluation parameters that will be explored in this task will be integration with HRTPO's Project Prioritization Tool 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 final performance measures will be vetted with the Working Group and HRTPO staff and, as needed, and 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 regulatory evaluation of each of the alternatives.

Task 3.2c: Evaluate Preliminary Alternatives
The next step in the regulatory permitability analysis is to evaluate environmental factors in conjunction with the design and construction factors. The goal of this task is to assemble and evaluate the performance measures for each Scenario based on land use/environmental metrics, design alternatives, and reasonable constructability. This is a key step in understanding the comprehensive environmental impacts of each alternative.

All regulatory permitability parameters and evaluations will be conducted by reviewing Federal, State, and Local regulatory requirements in conjunction with existing environmental conditions. This information will be used to determine potential regulatory fatal flaws as well as develop a prioritization tool for the analyzed alternatives.

Task 3.2d: GIS based environmental alternatives review to identify risk factors for permitability and fatal flaw analysis
At this point in the process, all the environmental conditions and regulatory drivers will have been assembled to allow the alternative evaluation process to begin. The purpose of this evaluation will be:

1. Establish the interaction between design and constructability requirements with exiting environmental conditions
2. Evaluate potential high level direct and indirect environmental impacts for each alternative
3. Evaluate potential regulatory fatal flaws
4. Create a framework for comparison to establish a prioritization of alternatives

Task 3.3: Conduct Constructability Assessments

Constructability assessments will consist of a cost/benefit (C/B) analysis using the planning level cost estimates prepared in Task 2.5 and costs associated with mitigation measures identified in the permitability assessment. The benefit criteria will be determined as part of the Scenario Planning Task 4.3 – Defining Measures of Success. A threshold for an acceptable C/B ratio will be determined through interaction with the Working Group and HRTPO staff and subsequently used as a determinant in the screening of the Preliminary Alternatives.

Timing:

- 9 months

Meetings:

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

Deliverables:

- Alternative Matrix
- Memo Summarizing Environmental Drivers and Parameters for Evaluation
- Memo Summarizing Environmental Data and Regulatory Permit Review
- Presentation materials, posters and slide decks of Deliverables for public outreach process

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 in light of 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 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. A potential benefit of this process will be 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 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.

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 <u>new</u> 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 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:

- Evaluate travel patterns associated with major facilities and harbor crossings. With respect to this study, it will be particularly important to understand and have the model represent well the travel markets that use the Harbor crossings.
- Evaluate and update external travel (XX, XI, IX) with respect to the region.
- Assess need for special generator representation. Determine travel patterns associated with the ports and any other major freight traffic generators 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.

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

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 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. 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)

OBJECTIVE	MEASURE	METRIC	DATA SOURCE
	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: Develop Draft Performance Measures

In this task, a set of 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.

Task 4.3b: Correlation with HRTPO Project Prioritization Methodology

A key aspect of the performance measures that will be explored in this task will be integration 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.

Task 4.3c: 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.

Timing:

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

Meetings:

- Meetings with HRTPO staff: 3
- Working Group Meetings: 1
- Steering Committee Meetings: 1 (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

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" alternative 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 Alternative:

- 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 the 2045 land uses 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 future 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.

Timing:

- 6 weeks

Meetings:

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

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.

Timing:

- 2-3 months

Meetings:

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

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 Task 6b and parameters associated with the technological assumptions for the scenarios vetted in Task 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 Scenarios

In this task, each of the Travel Demand Model outputs for the 3 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 Scenarios

In this task, each of the land use allocations for the 3 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 4.7d. Public and Stakeholder Vetting of the Scenario Evaluations

Once all the model runs for the 3 Scenarios have been completed and the outputs summarized, the Consultant Team will use outreach approaches to bring the public and key stakeholders into a process of understanding and vetting the results of the Scenario Evaluation. We will work with the Working Group to confirm the involvement approach which may include website interactive surveys, focus group sessions, public workshops, and work sessions with the Working Group.

The result will be a public awareness of the conclusions of the Scenario Evaluation and support for proceeding with the next task, which will involve testing each of the Candidate Regional Connector projects (screened for permitability) against the Scenarios.

Timing:

- 3 months (possible extension overlapping Task 8 for ongoing outreach)

Meetings:

- Meetings with HRTPO staff: 3
- Working Group Meetings: 1
- Steering Committee Meetings: 1
- Other/Stakeholder Meetings: 0

Deliverables:

- Land Use, Economic and Travel Demand model runs for 3 Future Scenarios
- Dashboard Outputs for Model Runs
- Tech Memo on Scenario Evaluation
- Presentation materials, posters and slide decks of Deliverables for public outreach process

Task 4.8: Evaluating the Candidate RCS Projects

Overview

The final step in the scenario analysis is the assessment of transportation investment impacts by scenario. In this task, the Consultant Team will run each Candidate Alternative (screened for permitability) for each scenario. The Consultant Team will scope up to 20 model runs per scenario that will be a combination of runs used to develop demand estimates associated with each Candidate Alternative and additional runs to check for cause and effect relationships (such as particular pairings of Candidate Alternatives). The schedule assumes the component Candidate Alternatives will have already been coded into the travel demand model network in the main RCS study process prior to the beginning of this task.

Task 4.8a: Confirmation/Coding of Candidate RCS projects for testing

Transportation improvements defined by the Candidate Alternatives will be "coded" into the Existing + Committed network using planning data available from HRTPO. Coding will include information such as facility description, alignment, and capacity information associated with improvements. Network coding will also specify locations of toll assessment and toll values, if applicable. The Consultant Team will review and confirm project coding assumptions with HRTPO. There will be one project network for each Candidate Alternative. Note, the schedule assumes the component Candidate Alternatives will have already been coded into the travel demand model network by Michael Baker some time prior to the beginning of this task.

Task 4.8b: Travel Demand Modeling for 3 Scenarios (each Candidate project)

Using the networks developed in Task 7a and scenario specific socio-economic data and parameters, run the TDM for each Candidate Alternative over each of the 3 scenarios. Provide quality control checks on associated output. The modeling results for the newly coded Candidate ALternatives will be compared against results of similar alternatives or benchmarks (if available) to determine appropriateness of the results. Ad-hoc sensitivity testing may be performed under certain circumstances if the results of the Candidate Alternatives are not intuitive. The results for each Candidate Alternative will be compared

against all project scenarios and the Existing + Committed network demand estimates to uncover and flag any potential issues in the results.

Task 4.8c: Performance Evaluation of 3 Scenarios (each Candidate project)

In this task, the Consultant team will complete the performance dashboard for each candidate RCS project, though not necessarily each model run due to the large volume of information. The Consultant Team will work with HRTPO staff and the Working Group to identify the most meaningful comparisons and will then determine any further iterations to run to explore cause-and-effect in performance in Task 4.8c. Also, the Consultant Team will provide all necessary input data for HRTPO staff to run the HRTPO Project Prioritization Tool for each set of Candidate Alternatives under each scenario to provide a ranking of each Candidate Alternative by scenario, as illustrated in the table below. This information will provide an important basis for assessing how robust the Candidate Alternatives are for potential future conditions.

Project Rank	2045 Baseline E+C	Scenario 1 E + C	Scenario 2 E + C	Scenario 3 E + C
E+C + RCS 1	5	8	15	8
E+C + RCS 2	4	6	4	2
E+C + RCS 3	5	3	20	15
...E+C + RCS 20	8	9	3	9

HRTPO seeks to evaluate the transportation benefits of Candidate Alternatives and the extent to which they achieve the goal of enhancing economic vitality and improving the quality of life in the region. To do so, the Consultant Team will use TREDIS to translate travel model results describing travel time, distance, reliability, and market access, into regional economic impacts expressed in terms of jobs, labor income, business sales, and GDP, with detail available by industry sector, and over time. The TREDIS FREIGHT module will allow targeted analysis of the implications of transportation performance for freight-reliant industries. Given the number of Candidate Alternatives, and the desire to test performance of every alternative under the baseline as well as all alternative scenarios, the Consultant Team will make use of TREDIS's batch mode to support easy import of project details and export of key economic performance results.

Task 4.8d: Develop Microsimulation Models (NEW TASK)

<u>Existing Conditions Microsimulation Model</u>

This task will involve developing a VISSIM model based on the traffic conditions for the existing study area roadway network completed as part of Phase 1. The most important aspect of this existing conditions model is to accurately model existing roadway operations and driving behavior so that these characteristics can be carried forward when the model is updated with future land use travel patterns and future traffic data. This will involve calibrating the microsimulation using the queue lengths obtained from INRIX data and travel times developed as part of Phase 1. This task may also involve some adjustment of the model inputs and additional model runs to ensure that the existing conditions microsimulation model accurately outputs known measurable conditions in the Region.

2045 Baseline Microsimulation Model

Similar to the task of updating the Regional Travel Demand Model to a 2045 baseline scenario, the existing conditions VISSIM model will be updated to establish a baseline 2045 microsimulation model. This will include adding committed roadway projects and updating traffic volumes and travel patterns based on the outputs from the Regional Travel Demand Model for the 2045 baseline scenario. It is important that this task be coordinated with 2045 regional model updates so that the baseline scenarios for both components (microsimulation model and regional model) correlate with the HRTPO's Long Range Transportation Plan. Simulations will be prepared at the six (6) system-to-system interchanges in the Hampton Roads region (I-64/I-664, I-64/I-564, I-64/I-264, I-64/I-464, I-64/I-264/US 58, and I-664/164).

This task will also involve affirming the assumptions and outputs to-date with the Working Group as an important check before proceeding to the next steps.

2045 Microsimulation for 3 Scenarios (3 No-Build Conditions)

Similar to the alternative scenarios that will be coded into the Regional Travel Demand Model, it is important to note that each of the alternative Future Scenarios will allocate traffic volume growth that is in addition to the growth inherent in the 2045 Baseline microsimulation model. This means that each Scenario is dealing with an additional increment of traffic increases above and beyond the assumed growth for the 2045 baseline microsimulation model. The 2045 baseline VISSIM microsimulation model will be updated by adding the traffic volumes and traffic patterns for each of the three alternative scenarios. This is a necessary step because it is assumed that one of the three alternative land use scenarios will occur with or without the preferred Candidate Alternative(s).

The outputs from these three 2045 Scenario **No-Build** microsimulations will used for comparison against the three 2045 Scenario **Build** microsimulations to determine the congestion relief for each planning scenario/Candidate Alternative pair. This will maintain consistency and provide an 'apples-to-apples' comparison among Candidate Alternatives for each planning scenario.

Simulations will be prepared at the six (6) system-to-system interchanges in the Hampton Roads region.

Task 4.8e: Evaluate Candidate Alternatives

Candidate Alternatives will be coded into the VISSIM microsimulation model for each future land use scenario (4). The microsimulations for these alternatives will only include the major highways and system-to-system interchanges and not the entire study area roadway network. The outputs of these microsimulations will be compared to the 2045 baseline outputs to evaluate the congestion relief in much greater detail than the regional model scenario comparison.

Candidate Alternatives will be coded along with the same Existing + Committed roadway network as the microsimulation models for the 2045 Baseline Scenario and 2045 No-Build scenarios. This will maintain

consistency and provide an 'apples-to-apples' comparison among Candidate Alternatives for each scenario planning option.

Timing:

- 10 months (concurrent with other tasks to the extent possible)

Meetings:

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

Deliverables:

- VISSIM models
- Technical Memorandum on microsimulation analysis results

Task 4.8f: Additional iterations to check for cause and effect relationships and preparation of final results

After the initial testing of individual candidate projects, the Consultant Team will hold a workshop with the Working Group and HRTPO staff to identify any final questions to be addressed with final model runs and/or extraction of data (such as select link analysis) from the model set. After this meeting, the Consultant Team will conduct any final iterations and will prepare the final results for presentation to the Working Group and Steering Committee. In these meetings, these groups will provide input on the most relevant data, insights, and 'story lines' to be carried forward in final reporting.

Timing:

- 4 months

Meetings:

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

Deliverables:

- Travel Demand model, economic model, and prioritization tool runs
- Dashboard Outputs for Model Runs
- Tech Memo on RCS project evaluation
- Final scenario planning land use and travel demand model files

Task 4.9: Reporting Results

Overview

In this final task, the Consultant Team will work with HRTPO Staff, the Working Group, and the Steering Committee to distill the insights from the scenario process and package them for sharing with the public. The schedule assumes the HRTPO staff will carry the results forward into further outreach, but this effort can be undertaken with Consultant Team support if desired.

Task 4.9a Scenario Results Workshops

In this task, the Consultant Team will take the materials and input generated in Task 4.8 and prepare a work session to be held individually or jointly with the Working Group and Steering Committee to discuss the scenario analysis results and to provide input on investment, policy, and other recommendations to carry forward from the analysis.

Task 4.9b Packaging Scenario Results

The Consultant Team will document the results of the Task 4.9a workshop in the form of a presentation, website content, and a draft report that capture the full scenario planning steps and findings. This information will be used by HRTPO staff for ongoing outreach. After a period of initial outreach and input, the Consultant Team will present final findings to the Working Group and Steering Committee at the conclusion of Task 4.9.

Timing:

- 3 months (possibly extended for public outreach)

Meetings:

- Meetings with HRTPO staff: 3
- Working Group Meetings: 2
- Steering Committee Meetings: 2
- Other/Stakeholder Meetings: TBD

Deliverables:

- Draft and final presentation of scenario planning results
- Draft and final website content of scenario planning results
- Draft and final scenario planning report

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 months

Meetings:

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

Deliverables:

- Power Point slides and meeting handouts

TASK 6 – Prepare Documentation

Task 6.1: Draft Study Report

The study report will include summaries of Phase 1 and Phase 2 activities and be supplemented via appendices, which will include, but not be restricted to, the technical reports and technical memorandums for each of the major tasks in Phase 1 and Phase 2. The report outline is shown below:

- Executive Summary
- Introduction
- Existing Conditions
- Regional Survey
- Stakeholder Interviews
- Travel Demand Model
- Engagement
- Scenario Planning/Alternatives
- Recommendations

Review comments will be solicited from the Working Group, Steering Committee, and HRTPO staff. Comments from the Working Group, the Steering Committee, and HRTPO staff will be discussed in the respective Working Group and Steering Committee meeting forums (unless a joint meeting is preferred). Those meetings will provide direction regarding the revisions to be made to the draft report that will subsequently be made available to the public prior to the second round of public information meetings. An electronic version of the draft report will be made available through channels outlined in the engagement plan.

Following the second round of public meetings, comments received at the meetings will be presented to the Working Group, Steering Group and HRTPO staff for discussion that will lead to decisions regarding the revisions to be made. If the revisions are substantive (i.e. – new alternatives are agreed to be studied, or more detailed analyses are required), another draft report will be prepared for review by the Working Group, Steering Committee, and HRTPO staff. An electronic version of the revised draft report will be made available. 50 hard copies will be produced, complete with appendices.

If the revisions are not substantive, the Consultant Team will initiate the preparation of the final report.

Task 6.2: Final Study Report

Following discussion of the comments received on the Draft Report and the notice to proceed on the preparation of the Final Report from the Working Group and Steering Committee, the Consultant Team will prepare the Final Report.

An electronic version of the final report will be made available through engagement channels. 200 hard copies will be produced, complete with appendices.

Timing:

- 10 months

Meetings:

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

Deliverables:

- Draft study report (200 Executive Summaries and 50 complete reports)
- Final study report (20 Executive Summaries and 50 complete reports)
- Draft and final study report appendices (50 copies for draft and 50 copies for final)
- Draft and final website content of study report

TASK 7 – Manage the Project

Task 7.1: Weekly Coordination with HRTPO leadership

Consultant Project Manager will participate in weekly coordination calls with HRTPO Project Manager and other HRTPO staff (assume 100 conference calls).

Task 7.2: 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 7.3: Quality Assurance of Deliverables

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

Timing:

- 28 months

Meetings:

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

Deliverables:

- Coordination meeting minutes

Schedule:

The attached schedule shows the anticipated timeline in blue with key milestones of committee meetings and deliverables shown. This schedule, if commenced in January, is anticipated to meet HRTPO's requirements for coordination with the LRTP process. Note that the schedule depends on receiving the 2015 regional travel demand model in January/February, the 2045 regional travel demand model in April, and completing the Phase 2 RCS Study permitability/constructability screening by January 2020.

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:

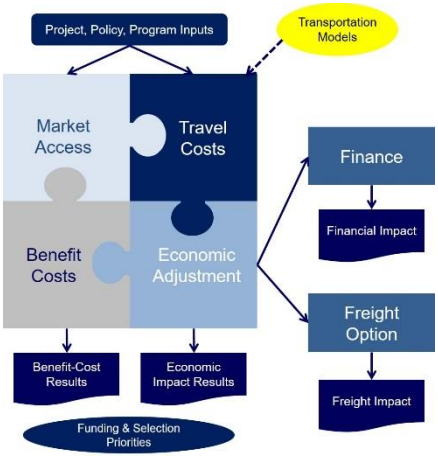
= 2 x ($22,300 + $10,000) = $64,600

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

Regional Connectors Study - Phase 2
Schedule

Task No.	Task	2019 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	2020 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	2021 JAN	FEB	MAR	APR
TASK 1	EXECUTE ENGAGEMENT PLAN																												
1.1	Task Management																												
1.2	Engagement Plan Review																												
1.3	Implementation of Engagement Plan																												
1.3a	Study Mailing List and Comment Database																												
1.3b	Stakeholder Briefings and Presentations																												
1.3c	Brochures, Factsheets, and Handouts																												
1.3d	Public Meetings																												
1.3e	Regional Connectivity Symposium																												
1.3f	Community Events and Outreach																												
1.3g	Engagement Summary Report																												
1.4	Website Upgrades and Maintenance																												
TASK 2	DEVELOPMENT OF PRELIMINARY ALTERNATIVES																												
2.1	Develop Geometry of Preliminary Alternatives																												
2.2	Hydraulics and Hydrology																												
2.3	Structures																												
2.4	Utilities and Railroad Crossings																												
2.5	Planning Cost Estimates																												
TASK 3	DETERMINATION OF CANDIDATE ALTERNATIVES (SCREEN 1)																												
3.1	Conduct Congestion Relief Assessments																												
3.2	Conduct Permitability Assessments																												
3.3	Conduct Constructability Assessments																												
TASK 4	CONDUCT SCENARIO PLANNING																												
4.1	Building the Base Data, Models, and Scenarios																												
4.2	Defining Alternative Future Scenarios																												
4.3	Defining Measures of Success																												
4.4	Evaluate 2015 Current Regional Conditions																												
4.5	Modeling the 2045 Baseline Alternative																												
4.6	Building the Alternative Scenarios																												
4.7	Evaluating the Scenarios																												
4.8	Evaluating the RCS Projects																												
4.9	Reporting Results																												
TASK 5	PREPARE FOR AND ATTEND MEETINGS (WORKING GROUP AND STEERING COMMITTEE)																												
5.1	Working Group Meetings																												
5.2	Steering Committee Meetings																												
TASK 6	PREPARE DOCUMENTATION																												
6.1	Draft Study Report																												
6.2	Final Study Report																												
TASK 7	MANAGE THE PROJECT																												
7.1	Weekly Coordination with Study Leadership																												
7.2	Schedule and Budget Oversight																												
7.3	Quality Assurance of Deliverables																												

Draft Deliverables
Final Deliverables
Steering Committee Meetings and Presentations
Working Group Coordination Meeting

Continuous Task
Draft Task Schedule
Scenario Planning Related Outreach
Extended Microsimulation

HRTPO to approve updated Prioritization Tool
2015 Regional Travel Demand Model available
2045 Regional Travel Demand Model available