

Alternative A-1: US 250 Overpass

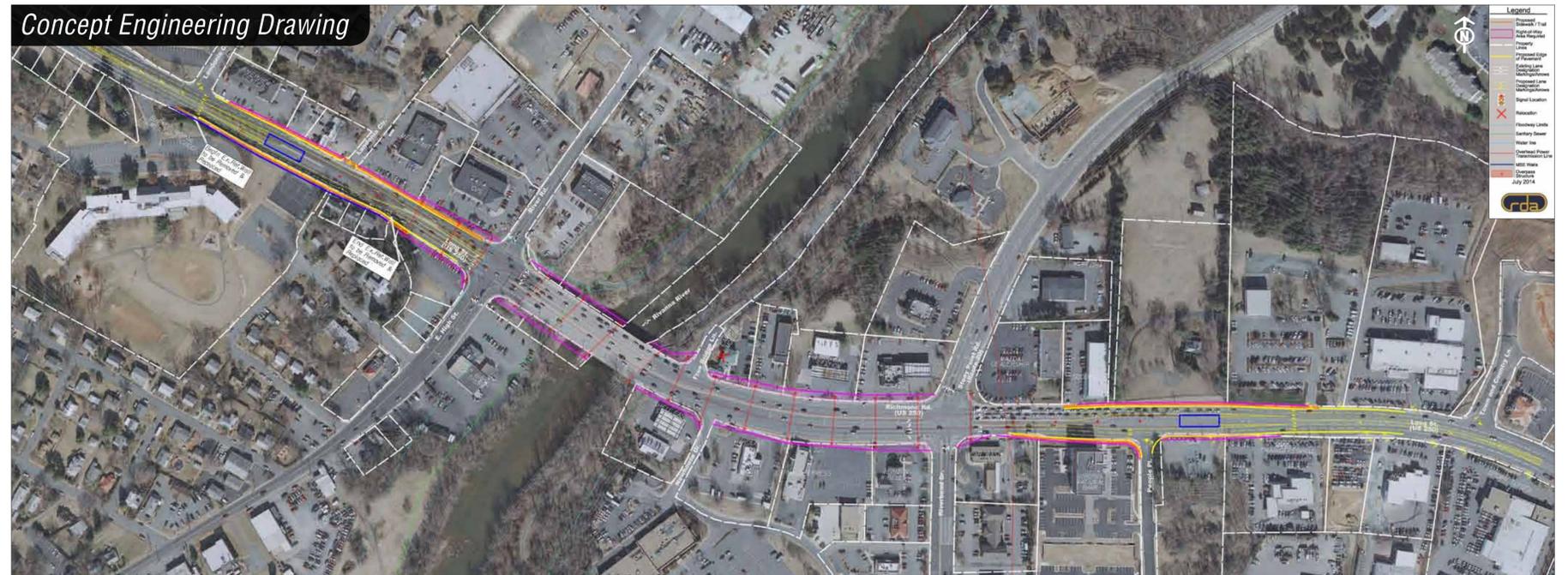
► Alternative Description

Alternative A-1 is intended to reduce congestion at the US 250 and High Street intersection by providing a means for east and west bound US 250 through traffic to bypass the intersections and Free Bridge.

This alternative would involve the construction of a new two lane (one west bound one east bound) elevated road structure above the existing bridge and roadway. The flyover would meet back up with the existing grade at Landonia Circle in the City and Flow Volkswagen in Albemarle. The existing intersections, bridge and roadways would remain below the new structure. This would continue to allow “local” traffic to access businesses and side streets in the vicinity of the project.

Based on best available information and sound engineering judgment this alternative would provide a *high degree of congestion relief* in the vicinity of Free Bridge.

- The overpass lanes would provide added capacity for traffic traveling through the Free Bridge intersections.
- This alternative would have a significant price tag of approximately \$141,244,826 (2014 dollars).
- Since construction would be primarily limited to the existing right-of-way impacts on the environment would be limited to additional structures within the river and floodplain.
- Additional considerations include the impacts on local businesses and properties, as well as impacts during construction on traffic flow.



► Environmental Impacts

The alternative would require the construction of bridge piers within the floodplain and possibly within the main channel of the Rivanna River. Any impacts to the water body of the floodplain would need to be mitigated. Special attention would need to address the possibility of James Spiny mussel (*Pleurobema collina*), a federally listed endangered species with known populations in the Rivanna River Watershed.

Average REF Score* (Mean)	3
100 Year Flood (acres)	12.1
Wetlands (acres)	2
Buildings (number)	1
Parkland (acres)	1.6



► Cost

This alternative would have a significant price tag of approximately

\$141.2 Million

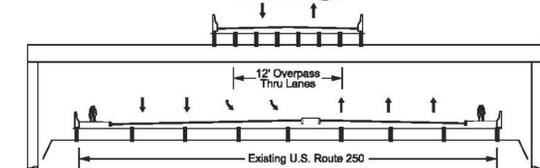
(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$13,791,000
Right of Way	\$7,000,344
Construction	\$120,453,482
Total	\$141,244,826



Typical Section Free Bridge



► Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts			X
Access Impacts			X
Utility Impacts			X
Park Impacts	X		
Trail Impacts	X		
Railroad Impacts	X		
Maintenance of Traffic Impacts			X
Bridges			X
Floodway Influence	X		
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities	X		
Earthwork/Terrain	X		
Retaining Walls			X
Construction Feasibility	X		
Expected Congestion Relief at Free Bridge*			X
Expected Cost			\$141,244,826
Environmental Impacts (REF)	X		

* Based on sound engineering judgment, but may require additional traffic analysis to validate

Alternative A-2: High Street Jug Handle

Alternative Description

Alternative A-2, the “Jug handle” attempts to reduce congestion at the US 250 and High Street intersection by redirecting left turns from US 250 west bound onto High Street. This alternative would see ‘left turn’ traffic routed through the intersection and back around to River Road via a new jug handle road around CVS and Tractor Supply.

The alternative would also include a new signal at Belleview Avenue which would be synced with the US 250 intersection. This alternative would include the construction of a new west bound right turn lane just west of the High Street intersection. The right turn lane would then turn into a single lane road where Landonia Circle exists today. The single lane would pass behind the houses in the 900 block of Coleman Ave before turning east and joining up with a realigned two way stretch of Belleview Ave.

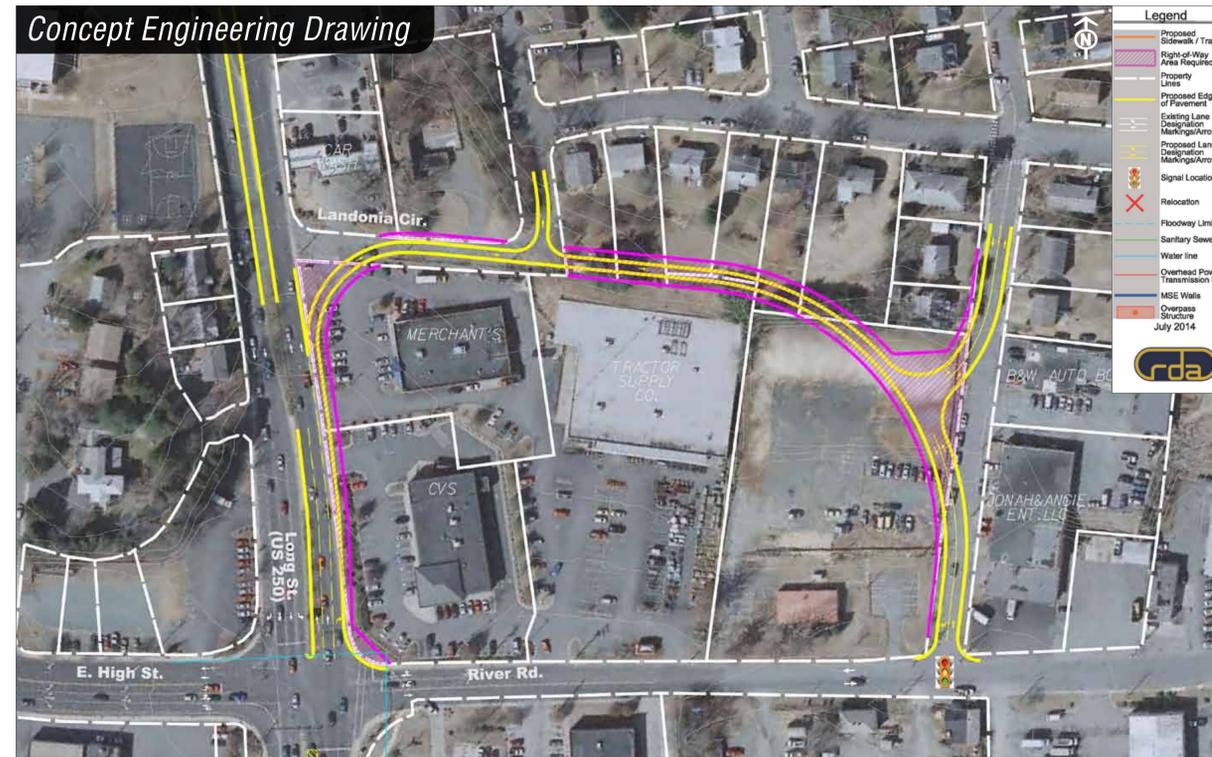
Based on best available information and sound engineering judgment this alternative would provide a *low degree of congestion relief* in the vicinity of Free Bridge.

- The alternative provides more room for stacking vehicles as they dwell before travel south on High Street. However, it would not provide any additional capacity to move vehicles through the High Street intersection.
- The cost of this alternative would be relatively low at \$ 9,077,175 (2014 dollars).
- The environmental impacts would also be relatively low. Most of the construction would involve changes to existing roads, which are mostly outside of the floodplain.
- Additional considerations include the acquisition of additional right of way behind the 900 block of Coleman Avenue.

Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts		X	
Access Impacts		X	
Utility Impacts		X	
Park Impacts	X		
Trail Impacts	X		
Railroad Impacts	X		
Maintenance of Traffic Impacts	X		
Bridges	X		
Floodway Influence	X		
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities	X		
Earthwork/Terrain	X		
Retaining Walls		X	
Construction Feasibility			X
Expected Congestion Relief @ Free Bridge	X		
Expected Cost	\$9,077,175		
Environmental Impacts (REF)	X		

* Based on sound engineering judgment, but may require additional traffic analysis to validate



US 250 at High Street looking west



Left turn traffic on Free Bridge

Environmental Impacts

The environmental impacts would be mostly confined to additional asphalt and the loss of some tree canopy and open grassy areas. River road is partially within the 100 year floodplain and thus there would be some minimal construction in the floodplain in the form of new curbs and traffic signal equipment at Belleview Ave and River Road.

Average REF Score* (Mean)	2
100 Year Flood (acres)	2.9
Wetlands (acres)	0
Buildings (number)	0
Parkland (acres)	0



Cost

The cost of this alternative would be relatively low at approximately

\$9.1 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$823,855
Right of Way	\$4,508,527
Construction	\$3,744,793
Total	\$9,077,175



Alternative B: Rivanna Multi Use Trail

► Alternative Description

Alternative B, the “Rivanna Multi Use Trail” is intended to reduce congestion by providing an alternative means for people to reach Charlottesville from the Pantops and other points east of the Rivanna River.

This alternative would include the construction of a new park & ride lot at VDOT’s Facility at Shadwell. Persons wishing to enter the city could then do so via a new hard surface trail that would run between the railroad tracks and the river. The trail would then cross the Rivanna River on a Bike/pedestrian bridge at Riverview Park.

Based on best available information and sound engineering judgment this alternative would provide a **low degree of congestion relief** in the vicinity of Free Bridge.

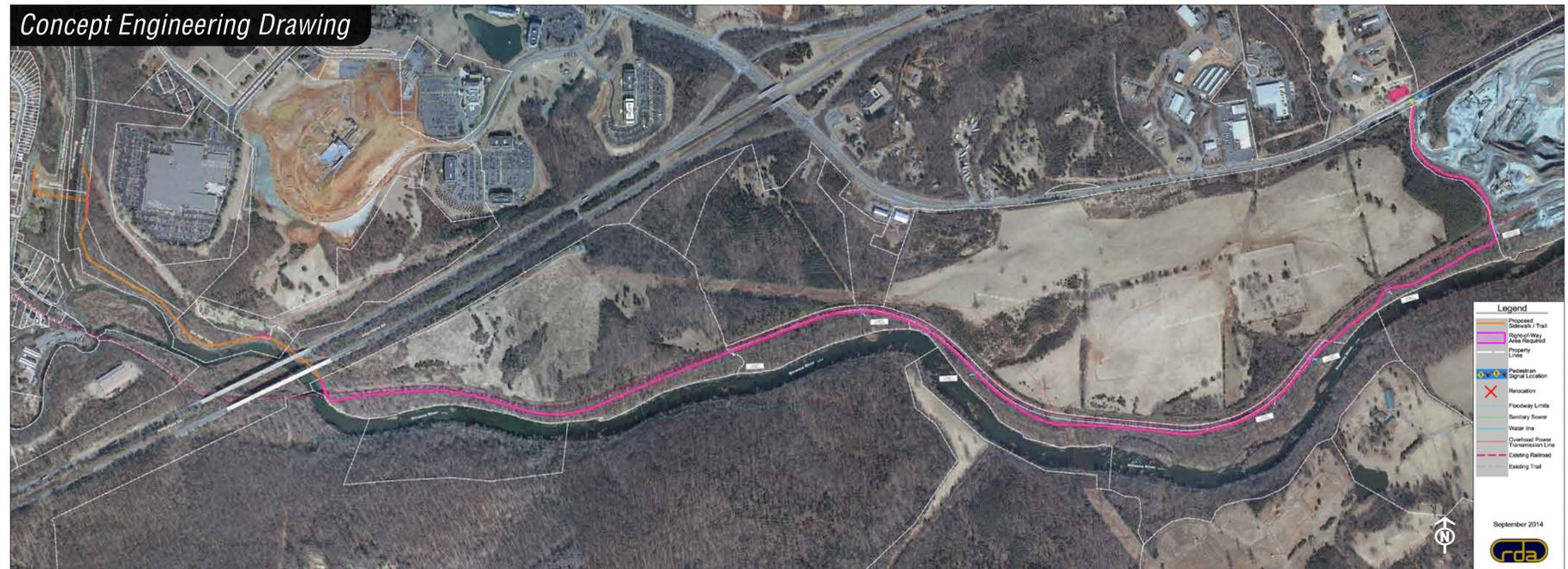
- While the alternative would provide transportation options it would only slightly reduce the number of vehicles crossing Free Bridge.
- However, the alternative does increase connectivity for residents and employees moving between the Pantops area and the City.
- The cost of this alternative would be relatively low at \$11,905,350 (2014 dollars).
- The environmental impacts would also be moderate to high. The alternative’s proximity to the river present the opportunity for environmental impact. A significant portion of the trail would be within the 100 year floodplain. Additionally, the trail would cross a number of small creeks and gullies that would have to be spanned with bridges or put in culverts.
- Additional considerations include working with land in conservation easements and possible historic resources along the riverbank.

► Evaluation Matrix

	LOW	MODERATE	HIGH
Property Impacts			X
Access Impacts	X		
Utility Impacts	X		
Park Impacts		X	
Trail Impacts	X		
Railroad Impacts		X	
Maintenance of Traffic Impacts	X		
Bridges		X	
Floodway Influence		X	
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities		X	
Earthwork		X	
Retaining Walls		X	
Construction Feasibility		X	
Expected Congestion Relief @ Free Bridge	X		
Expected Cost	\$11,905,350		
Environmental Impacts (REF)			X

* Based on sound engineering judgment, but may require additional traffic analysis to validate

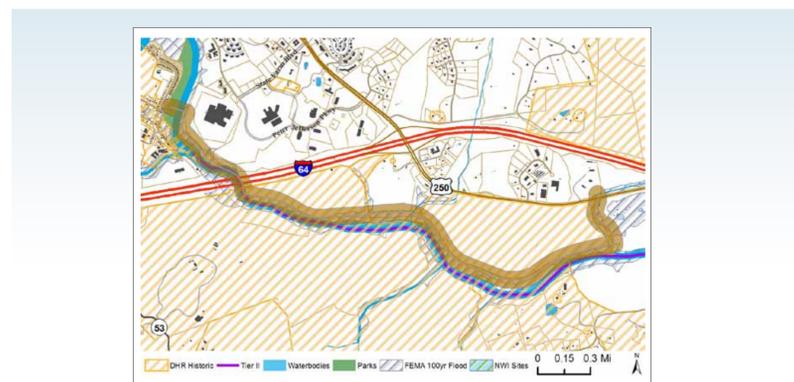
Concept Engineering Drawing



► Environmental Impacts

The environmental impacts would be the result of constructing a new hard surface trail along the left bank of the river. Impacts would include building in the 100 year floodplain, construction work adjacent to possible James Spinemussel (*Pleurobema collina*) habitat, a federally listed endangered species with known populations in the Rivanna River Watershed.

Average REF Score* (Mean)	10.9
100 Year Flood (acres)	126
Wetlands (acres)	31.2
T & E Species Waters (miles)	2.8
Buildings (number)	0
Parkland	0



► Cost

The cost of this alternative would be relatively low at approximately

\$11.9 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT’s PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT’s Construction Division’s District Wide Averages.

Preliminary Engineering	\$1,710,748
Right of Way	\$519,371
Construction	\$9,675,231
Total	\$11,905,350



Alternative D-2: Rivanna River Parkway

► Alternative Description

Alternative D-2, “Rivanna River Parkway” is designed to reduce congestion by providing an additional east west crossing of the Rivanna and a connection between the Pantops and the US 29 north corridor.

This alternative is similar to the previously studied Eastern Connector concept. The road cross-section would be similar to that of the John Warner Pkwy (2 lane urban parkway with bike lanes). In addition to creating a new corridor the project would require upgrades to be made on Rio Road.

Based on best available information and sound engineering judgment this alternative would provide a moderate degree of congestion relief in the vicinity of Free Bridge.

- The alternative would provide an alternative crossing and connection between 29 and Pantops transportation.
- However transportation modeling has shown that this project would reduce daily trips at Free Bridge by 8,500 daily trips, which falls short of the 22,000 reduction needed to bring Free Bridge within an acceptable trip capacity level.
- The cost of this alternative of this alternative would be relatively high at \$68,041,997 (2014 dollars).
- The environmental impacts would also be moderate to high. The alternative traverses the Rivanna River and Meadow Creek. It also would have significant impacts on Darden Towe and McIntire Park, and several established neighborhoods including the loss of several existing structures.
- Additional considerations include several new developments that are planned in the project area.

► Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts			X
Access Impacts	X		
Utility Impacts			X
Park Impacts			X
Trail Impacts	X		
Railroad Impacts	X		
Maintenance of Traffic Impacts		X	
Bridges			X
Floodway Influence			X
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities			X
Earthwork/Terrain			X
Retaining Walls			X
Construction Feasibility		X	
Expected Congestion Relief at Free Bridge*		X	
Expected Cost			\$68,041,997
Environmental Impacts (REF)		X	

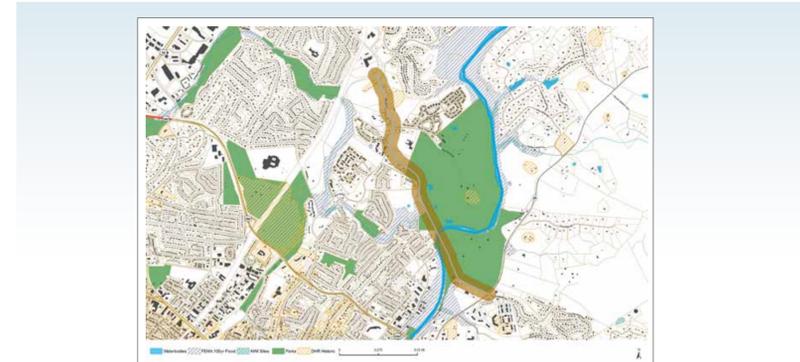
* Based on sound engineering judgment, but may require additional traffic analysis to validate



► Environmental Impacts

The environmental impacts would be the result of constructing a new roadway through Darden Tow Park This would impact open space, and recreation opportunities. The alternative would also require construction to take place in the 100 year floodplain on both the Rivanna River and Meadow Creek. The project would also be in the vicinity of possible James Spiny mussel (Pleurobema collina) habitat, a federally listed endangered species with known populations in the Rivanna River Watershed.

Average REF Score* (Mean)	3.62
100 Year Flood (acres)	30.3
Wetlands (acres)	4.6
Buildings (number)	4
Parkland (acres)	52.6



► Cost

This alternative would have a significant price tag of approximately

\$68 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$6,750,000
Right of Way	\$9,386,604
Construction	\$51,905,393
Total	\$68,041,997



Alternative F: Increased Capacity on Free Bridge

► Alternative Description

Alternative F, “Increased capacity on Free Bridge” is designed to reduce congestion by providing an additional east west capacity on Free Bridge and through the intersections at 20 and High Street. This alternative would involve adding an additional east and west bound lane across free bridge and extending east and west on 250.

The new three lane sections would extend west to St Clair Ave and East to Flow Volkswagen. In order to add the additional lanes to Free Bridge the existing sidewalks would have to be removed and relocated to a new bike and pedestrian bridge just downstream.

Based on best available information and sound engineering judgment this alternative would provide a moderate degree of congestion relief in the vicinity of Free Bridge.

- The alternative would provide additional capacity across Free Bridge and through the two intersections. This would allow more vehicles to pass through. It would not increase the capacity for vehicles making turning movements at the intersections.
- The cost of this alternative would be moderate at \$ 20,544,335 (2014 dollars).
- The environmental impacts would also be low. The majority of the work would be within the existing road right of way and existing span. The alternative traverses the Rivanna River and Meadow Creek. It also would have significant impacts on Darden Towe and McIntire Park, and several established neighborhoods including the loss of several existing structures.
- Additional considerations include several new developments that are planned in the project area.

► Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts			x
Access Impacts	x		
Utility Impacts		x	
Park Impacts	x		
Trail Impacts	x		
Railroad Impacts	x		
Maintenance of Traffic Impacts		x	
Bridges			x
Floodway Influence	x		
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities	x		
Earthwork/Terrain	x		
Retaining Walls	x		
Construction Feasibility		x	
Expected Congestion Relief at Free Bridge*		x	
Expected Cost		\$20,544,335	
Environmental Impacts (REF)	x		

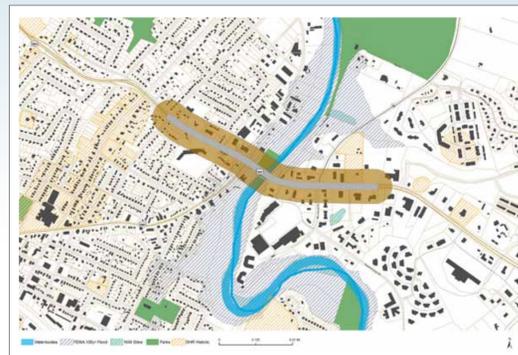
* Based on sound engineering judgment, but may require additional traffic analysis to validate



► Environmental Impacts

Since most work will be confined to the existing roadway, any impacts on the environment would be related to the construction of the new bike and pedestrian bridge. Construction of the bridge would have the potential for impacts on the 100 year floodplain as a result of installing new bridge foundations and piers. The project would also be in the vicinity of possible James Spiny mussel (*Pleurobema collina*) habitat, a federally listed endangered species with known populations in the Rivanna River Watershed.

Average REF Score* (Mean)	3.16
100 Year Flood (acres)	11.8
Wetlands (acres)	2.03
Buildings (number)	2
Parkland (acres)	0



► Cost

This alternative would have a moderate price tag of approximately

\$20.5 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$1,850,000
Right of Way	\$7,820,216
Construction	\$10,874,119
Total	\$20,544,335



Alternative G: South Pantops Drive Connector

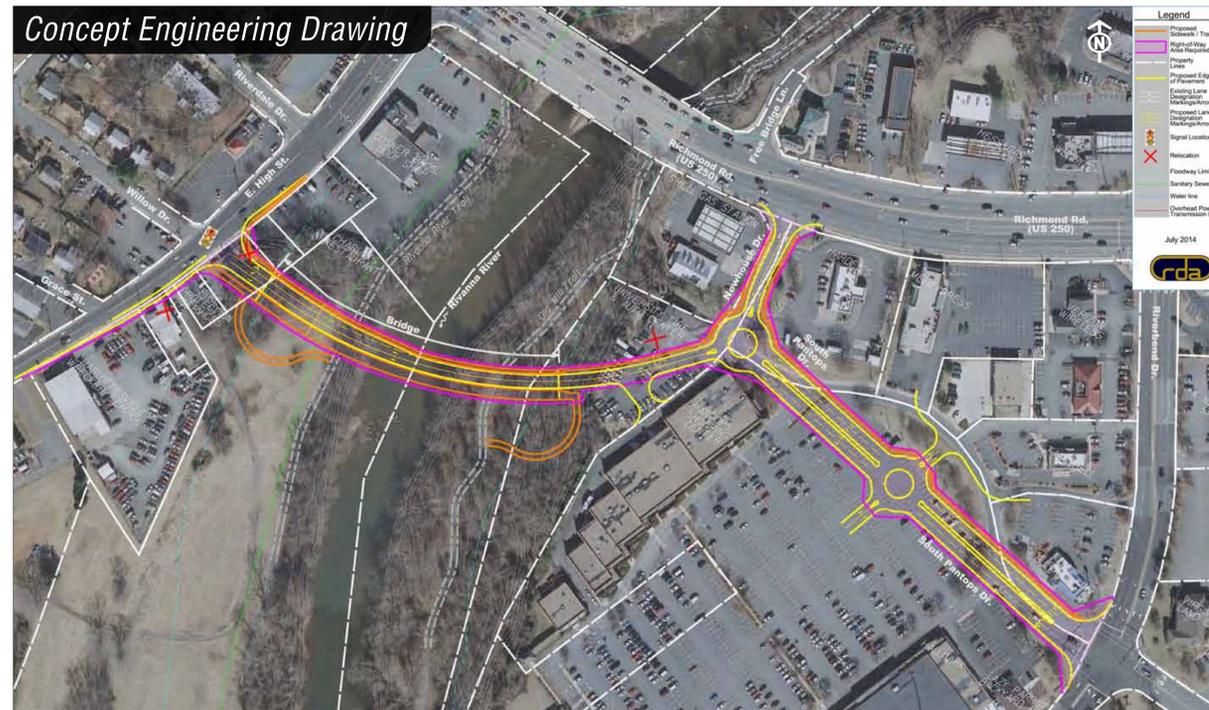
► Alternative Description

Alternative G, “South Pantops Drive Connector”. This alternative is designed to reduce congestion by providing an additional crossing south of Free Bridge. This alternative would provide a linkage between South Pantops Drive and High Street via a new alignment through the Pantops Shopping Center.

The bridge would be a two lane urban style design that would include two vehicle travel lanes with bike and pedestrian infrastructure. Additionally, the alternative also includes a new traffic light at Willow Drive and two new roundabouts within the confines of the Pantops Shopping Center.

Based on best available information and sound engineering judgment this alternative would provide a moderate degree of congestion relief in the vicinity of Free Bridge.

- While the option does provide an alternative route and additional capacity across the Rivanna River it would only provide minor congestion relief at Free Bridge.
- The close proximity to the existing crossing provides little relief for existing congestion on High Street. The benefit of the alternative is that it provided a more direct route for traffic traveling to and from points on South Pantops Drive.
- The cost of this alternative of this alternative would be moderate at \$ 27,106,079 (2014 dollars).
- Environmental impacts would also be moderate. The majority of the project would involve constructing a new bridge spanning the Rivanna River and 100 year floodplain. Since this alternative would be a new road it will require a significant amount of alignment to be acquired. This included the relocation of three businesses in addition to major changes to the access roads through the Pantops Shopping Center.



CAPTION: Pantops Shopping Center looking west



CAPTION: High Street in vicinity of bridge terminus

► Environmental Impacts

With most of the project alignment being new and in close proximity to the river there is the potential for environmental impacts. The impacts would be the result of constructing bridge piers, approaches, and superstructure in the 100 year floodplain. The project would also be in the vicinity of possible James Spiny mussel (*Pleurobema collina*) habitat, a federally listed endangered species with known populations in the Rivanna River Watershed. Other environmental impacts include some loss of tree canopy on the Pantops side of the river.

Average REF Score* (Mean)	4.52
100 Year Flood* (acres)	10.24
Wetlands* (acres)	1.93
Buildings (number)	3
Parkland* (acres)	n/a



► Cost

The cost of this alternative would be relatively moderate at approximately

\$27.1 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$2,740,000
Right of Way	\$6,098,514
Construction	\$18,267,565
Total	\$27,106,079



► Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts			X
Access Impacts		X	
Utility Impacts	X		
Park Impacts	X		
Trail Impacts	X		
Railroad Impacts	X		
Maintenance of Traffic Impacts		X	
Bridges		X	
Floodway Influence		X	
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities	X		
Earthwork/Terrain	X		
Retaining Walls		X	
Construction Feasibility			X
Expected Congestion Relief @ Free Bridge	X		
Expected Cost		\$27,106,079	
Environmental Impacts (REF)		X	

* Based on sound engineering judgment, but may require additional traffic analysis to validate

Alternative I: Intersection improvements- High St. & Route 20

► Alternative Description

Alternative I, "Intersection improvements at High Street and Route 20". This alternative is designed to reduce congestion by making improvements to the US 250 intersections at High Street and Route 20. The improvements would involve adding additional left turn lanes at Riverbend Drive, Route 20 and East High Street.

The additional lanes would allow the traffic light cycles to be adjusted to allow for concurrent signaling (simultaneous left turn movements from side streets). This would increase intersection capacity throughput by increasing efficiency.

Based on best available information and sound engineering judgment this alternative would provide *no additional roadway capacity* in the vicinity of Free Bridge.

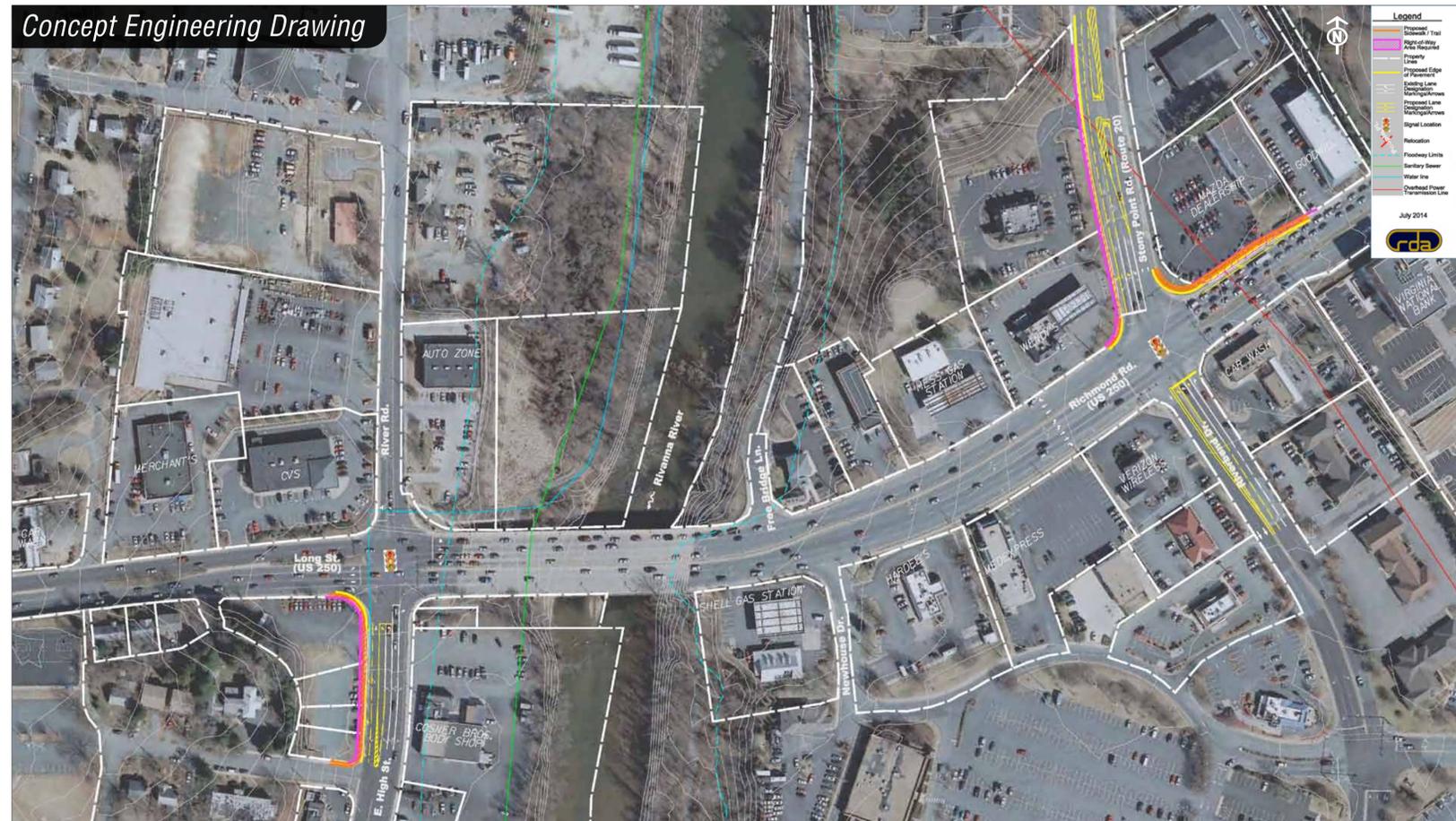
- However, it does improve intersection efficiency, by increasing the number of cycles that can occur in a given period of time. The efficiency is gained by giving each movement a dedicated lane, this then allows the left turn phase to occur simultaneously on the side streets.
- The benefit of the alternative is that it improves efficiency at the intersections east and west of Free Bridge.
- The cost of this alternative would be relatively low at \$7,420,443 (2014 dollars).
- The environmental impacts would also be low. The majority of the project would be limited to the existing right of way area. Some right of way would have to be acquired on the west side of high street and on the west side of Route 20.
- Impacts on businesses would be minimal and access would be maintained after construction.

► Evaluation Matrix*

	LOW	MODERATE	HIGH
Property Impacts		X	
Access Impacts	X		
Utility Impacts		X	
Park Impacts	X		
Trail Impacts	X		
Railroad Impacts	X		
Maintenance of Traffic Impacts	X		
Bridges	X		
Floodway Influence	X		
Drainage Structures i.e. Box Culvert, Stormwater Management Facilities	X		
Earthwork/Terrain	X		
Retaining Walls		X	
Construction Feasibility			X
Expected Congestion Relief at Free Bridge*	X		
Expected Cost	\$7,420,443		
Environmental Impacts (REF)	X		

* Based on sound engineering judgment, but may require additional traffic analysis to validate

Concept Engineering Drawing



► Environmental Impacts

With all of the construction occurring in a developed area the impacts on natural resources would be very low. The project might cause a small increase in stormwater runoff that would have to be captured and treated.



Average REF Score* (Mean)	2.88
100 Year Flood* (acres)	6.9
Wetlands* (acres)	0
Buildings (number)	0
Parkland* (acres)	0

► Cost

The cost of this alternative would be relatively low at approximately

\$7.4 Million

(2014 dollars)

Project Cost (2014 dollars). Cost was calculated by an engineering consultant who used VDOT's PCES tool. For projects not deemed suitable for PCES, consultant staff calculated cost by using quantities of major construction items and unit prices from VDOT's Construction Division's District Wide Averages.

Preliminary Engineering	\$1,063,712
Right of Way	\$942,437
Construction	\$5,414,294
Total	\$7,420,443



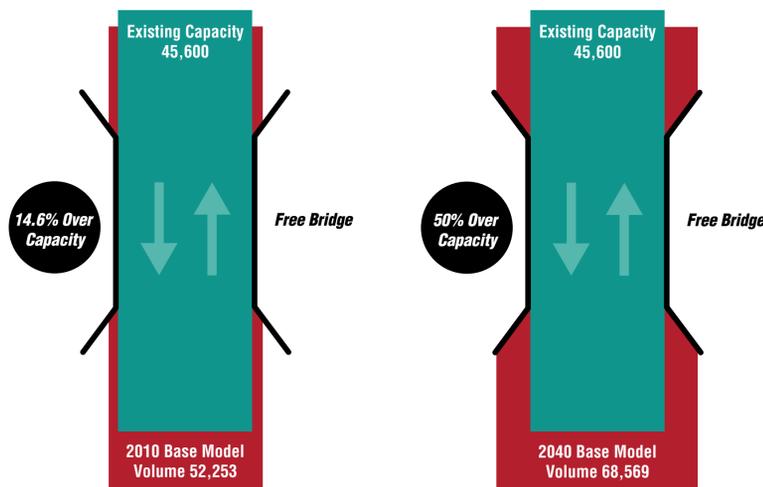
Eco-Logical Pilot Project: Free bridge Congestion Relief

► Problem

The US 250 link across the Rivanna River known locally as Free Bridge. This bridge is a key connection for local and regional traffic, but continued use of this link will result in more congestion, economic development and public safety issues that must be addressed.

Congestion levels are currently at 53,000 vehicles per day on Free Bridge which gives the bridge a level of service grade of F. The MPO's travel demand model estimates that Free Bridge will have a daily traffic volume of approximately 70,000 vehicles a day in 2040, making Free Bridge's already failing level of service 25 percent worse.

Free Bridge Capacity (2010 versus 2040)



Total Trips Crossing Free Bridge (68,569 trips)



► Project Components

This project has two key elements:

1 The first is testing the *Eco-Logical Process*, an ecosystem-based approach to infrastructure planning. This process fosters interagency cooperation, as well as stakeholder involvement, in the development of new infrastructure. The goal of the process is to collaboratively develop project ideas in an effort to address significant impacts early on in the project development process.

2 The second is the implementation and enhancement of the Regional *Eco-Logical Framework (REF)* Tool. This tool is a mapping resource that identifies and establishes numeric values of ecological resources in the TJPDC region. The tool also provides a way for planners to identify important ecological areas early on in the project planning process.

► Stakeholder Approach

- Identify key stakeholders and begin the process to engage the key stakeholders in the project planning discussion as early as possible.
- Work collaboratively with key players to develop a feasible project that meets the varying needs of the overall community.
- Key to the success of the stakeholder process was engaging the Institute for Environmental Negotiation (UVA) to provide meeting facilitation and consensus building services at the stakeholder meetings.

► Types of Stakeholders

Citizen Stakeholders: Citizen stakeholders are representative who live within the project study area and represent various neighborhoods potentially affected by the project. The representatives were drawn equally from both Albemarle and Charlottesville neighborhoods.

Resources Representatives: Representatives who have expertise regarding environmental, social and cultural resources in the study area or representatives who do not represent the key resources but are essential for transportation planning, including local staff, VDOT, FHWA, Army Corps of Engineers and so on.

► Membership

- Elected Officials
- Transportation/Planning Staff
- Parks and Recreation Staff
- Local Non Profits
- National Non Profits
- VDOT
- FHWA
- State Agencies
- Neighborhood Associations
- Businesses
- Residents

► Planning History

- Early 1990s, Initial Western Bypass Alignment Study
- Early 2000s, Eastern Planning Initiative
- Late 2000s, Eastern Connector Study

► Historical Notes

1. Free Bridge was built in 1801 at the site of Moore's Ford.
2. By 1870, a covered bridge was built. It was the fifth bridge on the site.
3. In the 1950s the bridge was replaced again with a modern 4-lane bridge as part of the 250 Bypass.
4. In 1993 the bridge was replaced and expanded to 7 lanes.

► Process

Meeting 1, November 18, 2013: Project Scoping, History, Goals and Discussion

Meeting 2, January 15, 2014: Introduction to the Eco-Logical Process and Discussion of the Regional Ecological Framework evaluation tool

Meeting 3, March 19, 2014: Identification of ten transportation alternatives for evaluation

Meeting 4, May 21, 2014: Feasibility analyses and estimated cost of constructing alternatives identified at the 3rd meeting. *(Cost and feasibility review conducted by Rinker Design Associates, Engineering firm on Contract with TJPDC)*

Meeting 5, July 15, 2014: Revised feasibility and detailed planning level cost estimation for the alternatives. First test for consensus.

Meeting 6, September 17: Discussion of Regional Ecological Framework Tool impact analyses. Review of project ranking matrix.

Meeting 7, November 19, 2014: Final test for consensus, review and comments on process, recommendation of alternative(s) for further consideration.

Eco-Logical Pilot Project: The REF Tool

► What is the REF tool?

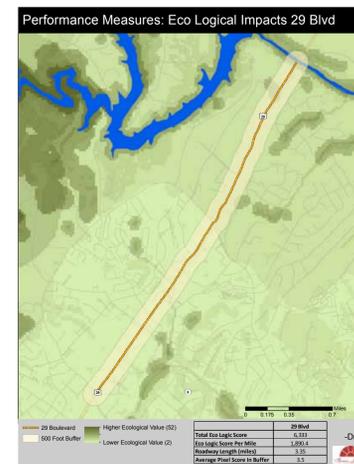
- The **Regional Ecological Framework** or REF is a GIS based model and tool.
- Designed to be used during the planning phase of project development (pre NEPA screening) as a way to estimate how a project might impact a region's natural and environmental resources.
- The model was created by taking existing inventories of natural resources and combining them together using GIS. The result of which was a heat map where each of the data points on the map represents a unique habitat value.
- These data point values range from a high of 52 to a low of 2, with higher values indicating the presence of more overlapping resources, or the presence of individual high value resources.
- This heat map acts as the primary input for the analyses tool side of the REF. Using a standard set of analyses functions in GIS a project path can be analyzed against the REF.
- It is the combination between the heat map and the GIS tools which allow the REF to function. The tool and input datasets were vetted by a panel of local and state experts. It was also reviewed by the Free Bridge Stakeholder group.

	DATASET	DESCRIPTION
1	DGIF Tiered Species Habitat (terrestrial and aquatic)	The dataset highlights wildlife conservation opportunities in the Commonwealth. The data focuses on tier I and tier II listed species with mapped potential habitat.
2	DGIF Threatened & Endangered Species Waters	The dataset Identifies water bodies that contain documented occurrences of Federal or State listed threatened or endangered species.
3	DGIF Species Observations - Diversity, # of Species Present	The dataset contains species observation data derived from various data sources and surveys.
4	DCR Virginia Natural Landscape Assessment (VaNLA)	The dataset contains statewide information on natural lands. The dataset was derived from satellite imagery and identifies large cores of intact habitat. Cores are ranked based on size and ecological integrity
5	DCR Priority Conservation Sites	The dataset is a tool for identifying key areas that are worthy of protection stewardship action because of the natural heritage resources that they contain.
6	Audubon Important Bird Areas	The dataset identifies areas that are vital to birds and their biodiversity.
7	USFWS National Wetlands Inventory	The dataset provides current geospatially referenced information on the location and extent of wetlands.
8	DCR VCLNA Watershed Integrity Model	The dataset shows the relative value of land as it contributes to watershed or water quality integrity.
9	NHD 1:100,000 streams	The dataset is a comprehensive database that contains information about the location and type of water bodies in the United States.
10	DGIF Cold Water Stream Survey - Classes I - IV - 100' buffer	The dataset is the results of DGIF's efforts to survey streams for trout suitability.

► Environmental Impacts

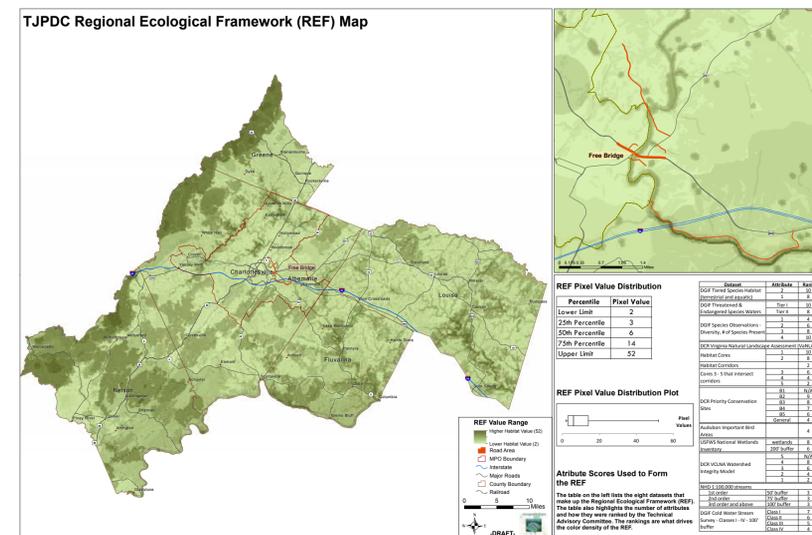
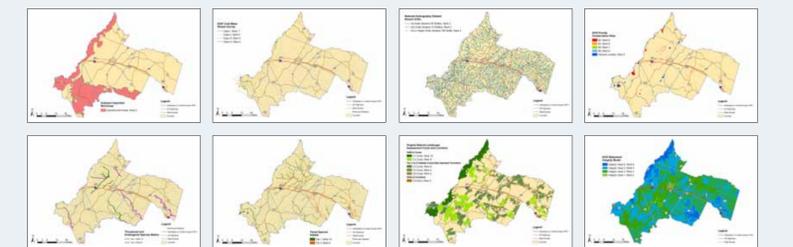
The tool has four different ways that it can be used when evaluating a project.

1. Is to suggest a least environmentally damaging alignment between a start and end point
2. Provide an environmental score for project alternatives
3. Provide a foundation for deciding if an where environmental mitigation should happen in a regional context.
4. Identify resources that might be impacted by a project i.e. wetland impacts when building a new bridge.



What is GIS?

A geographic information system is a combination of computer software and hardware platforms that links locational (spatial) and database (tabular) information and enables a user to visualize patterns, relationships and trends. This process gives the data being analyzed an entirely new perspective that cannot be seen in a tabular or list format.



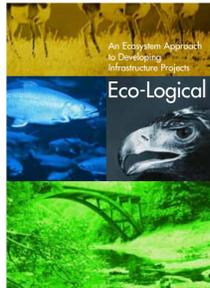
Eco-Logical: What is it?

► The Framework

The Eco-Logical approach lays out a basic framework for identifying the greatest conservation needs associated with the development of infrastructure projects.

It is meant to help transportation planning agencies join in partnership with resource agencies and act as a catalyst for greater stakeholder cooperation and coordination. Using the Eco-Logical approach, infrastructure improvements can be advanced in productive harmony with the restoration of fragmented habitats, reduction of wildlife mortality, and other cooperative conservation goals.

► The Process



The Process encourages stakeholders to integrate environmental solutions and goals into planning for infrastructure development and to implement an efficient, predictable and open process for the review and management of ecological effects of infrastructure projects. The approach offers a non-prescriptive approach that enables Local, State, Tribal and Federal partners involved in infrastructure planning, design, review, and construction to work together

to make infrastructure projects more sensitive to wildlife and their ecosystems. The approach is centered on three defining principals that encourage an open collaborative approach between stakeholders.

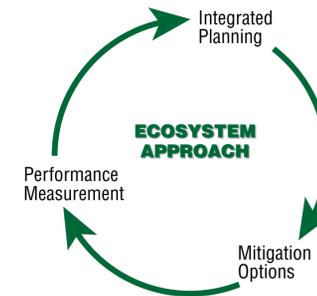
Eco-Logical:

“An Ecosystem Approach to Developing Infrastructure Projects was developed by the Federal Highways Administration, in conjunction with other federal infrastructure and environmental/natural resource agencies.”

It was developed in response to the 2002 Executive order (EO)13274 *Environmental Stewardship and Transportation Infrastructure project Reviews*, signed by then President George W. Bush.

► What is the Eco-Logical approach?

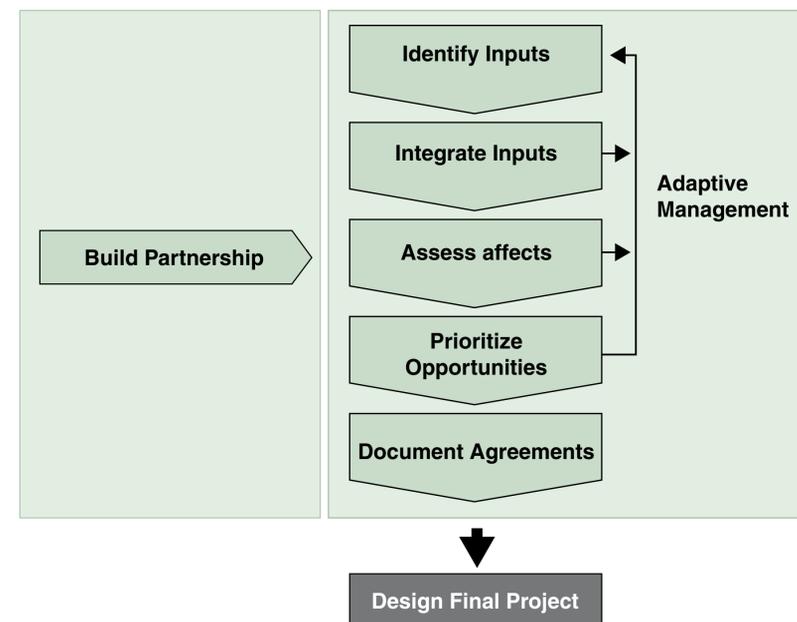
“Eco-Logical offers a non-prescriptive approach that enables Local, State, Tribal and Federal partners involved in infrastructure planning, design, review, and construction to work together to make infrastructure projects more sensitive to wildlife and their ecosystems.”



The Eco-Logical approach is grounded in three defining principals:

1. Integrate planning between natural resource and transportation agencies.
2. Mitigation options that enhance the Regional Ecological Framework. (Mitigation in the context of regional habitats and ecology)
3. Performance measures that balance predictability and adaptive management.

FHWA's Eco-Logical Approach Framework:



► How is the Eco-Logical Approach Different?

- **Establish and Prioritize Opportunities**
 - Use the REF to establish priority conservation areas and priority mitigation areas.
- **Document Agreements**
 - Work with agencies and partners to reach a consensus and strive to develop agreements with resource agencies.
- **Design Projects Consistent With Regional Ecosystem Framework**
 - Ensure that the final project keeps within the scope of what was discussed in the context of the REF analysis.
- **Balance Predictability and Adaptive Management**
 - Predictability in the process is fostered through open communication and understanding between parties.
 - Adaptive management involves continuously learning from the results of previous decisions in order that these decisions can be adjusted to produce even better outcomes.

The approach provides an eight step framework for integrated planning.

Eco-Logical's Eight Step Framework for Integrated Planning:

1. **Build and Strengthen Collaborative Partnerships**
 - Local, Regional, State, and Federal
2. **Identify Management Plans**
 - Local, State and Federal (Green Infrastructure Plan, VA Wildlife Action Plan, Chesapeake Bay Program, etc.)
3. **Integration of Plans**
 - Plan priorities combined to create the 'Regional Ecosystem Framework (REF)
4. **Assess Effects**
 - Study how the proposed project could impact ecologically important areas
5. **Establish and Prioritize Opportunities**
 - Use the REF to establish priority conservation areas and priority mitigation areas.
6. **Document Agreements**
 - Work with agencies and partners to reach a consensus and strive to develop agreements with resource agencies.
7. **Design Projects Consistent With Regional Ecosystem Framework**
 - Ensure that the final project keeps within the scope of what was discussed in the context of the REF analysis.
8. **Balance Predictability and Adaptive Management**
 - Predictability in the process is fostered through open communication and understanding between parties.
 - Adaptive management involves continuously learning from the results of previous decisions in order that these decisions can be adjusted to produce even better outcomes.