REVIEW MATERIALS

During the workshop on February 9, 2012, Council Members will be given a hands-on opportunity to imagine the future of Routes 53 and 120. Please review the contents in preparation for the meeting.

TABLE OF CONTENTS

AGENDA

9:00 – 9:30	Introductions
9:30 – 10:15	Overview: purpose, desired outcomes, and background information
10:15 – 11:00	Presentation and discussion of the scenarios and their evaluation
11:00 – 11:45	Presentation and discussion of transportation test matrix and lessons learned
11:45 – 12:00	Public comments
12:00 – 12:30	Lunch break
12:30 – 1:00	Discussion and instant polling on concepts and ideas introduced in the morning
1:00 – 1:15	Workshop Instructions
1:15 – 3:00	Group map exercise
3:00 – 4:00	Group presentations of workshop results
4:00 – 4:45	Wrap-up and discussion of common themes, instant polling of leading concepts
4:45 – 5:00	Public comments
5:00	Closing remarks

LOCATION:
Chicago Metropolitan Agency for Planning (CMAP)
233 South Wacker Drive, Suite 800
Chicago, IL 60606

WORKSHOP INSTRUCTIONS

INTRODUCTION

The Illinois Tollway created a Blue Ribbon Advisory Council to to guide the planning and potential building of an IL-53/120 North Extension in the Central Lake County Corridor. The Council is responsible for developing regional consensus on whether the Tollway should move forward, the scope and configuration, the design and elements, and how to finance the project. The Council will present its initial recommendations to the Illinois Tollway Board of Directors by spring 2012.

This workshop is being held near the mid-point of the Council's process, and is intended to challenge members with the task of comparing various scenarios for how an extension of the Route 53/120 corridor could be designed. Considerations include access, roadway and intersection design, environmental enhancements, and land use policies for adjacent development.

Five scenarios have been developed to provide a starting point for discussions about the Route 53 and Route 120 corridors. The scenarios are not recommendations, but provide a number of approaches for comparison purposes. Members will be asked to grapple with the issues and trade-offs related to the options available, and will be encouraged to think creatively and combine elements to create their own "hybrid" scenarios.

The workshop will not result in a detailed design for the route. It should, however, assist Council members in crafting a common vision for the future of the corridor.

The Day’s Events

Council members will be given a hands-on opportunity to imagine the future of Routes 53 and 120. The morning session will include presentations of potential options and their corresponding trade-offs related to issues including transportation, land use, economic development and environmental health. After lunch, Council members will have an opportunity for questions, discussion, and feedback via instant polling. Council members will work together in groups at their table to create their “vision” for the corridor and then share their vision with the larger group. The day will end with a discussion of common themes and instant polling on leading concepts. Members of the public are welcome to attend and observe. Public comment periods will be included during the workshop.

THE WORKSHOP PROCESS

During the map exercise, you will work hands-on with others at your table to decide how to design the roadway corridors of Routes 53 and 120, as well as the number of lanes, how and where to place access points, the character of adjacent new development, and environmental enhancements along the corridor. You will communicate these decisions on the map using a library of chips to represent various types of corridor design and development. A trained facilitator will guide you through the activity, and will help to make sure all voices are heard, and keep the group on schedule.

1. **[10 minutes] Establish goals and ground rules.** Take a moment to make introductions at the table and discuss ground rules for the group. Consider what you and others at your table would like to accomplish with the exercise. The scenarios are likely to have sparked many ideas related to community integration, congestion relief, wetland protection, noise impact mitigation, etc. As a group, discuss what the most important considerations are. Write down your goals; they will be helpful to refer back to as the group designs the scenario.

2. **[5 minutes] Familiarize yourself with workshop materials.** Each table will have a base map, the five scenarios, chips (transportation, environment, land use), scissors, glue, and markers and pens to write and sketch ideas. The base map will clearly depict the corridors for Route 53 and 120, a potential bypass along 120, intersection locations (but not intersection type), developed areas; parks, wetlands; roads and highways. The chips include:
    a. Transportation
        i. Lanes and travel speed
        ii. Intersection design/control
        iii. Tolling
    b. Environment
        i. Best Practice enhancements
    c. Land Use
        i. Single-use and mixed-use development types
    d. Cross-Section Exercise
        i. 300’ right of way
        ii. Roadway elements, e.g. drive lanes, managed transit lanes, shoulders, medians, stormwater facilities, vegetation.

    Your group may want to use one of the scenarios as a starting point, but modification and/or creation of a hybrid scenario is encouraged.

3. **[40 minutes] Modify the roadway as desired.** Begin cutting apart the “transportation” chips and designing the roadway: choose an alignment, number of lanes, travel speed, and intersection types. Your table will receive copies of the five scenario alternatives, which show a few of the many possible roadway configurations, and illustrate the decisions to be made. Refer back to your group’s goals when discussing how the roadway should function. Now is the time to begin placing the chips on the map, <u>but do not glue them down yet!</u>

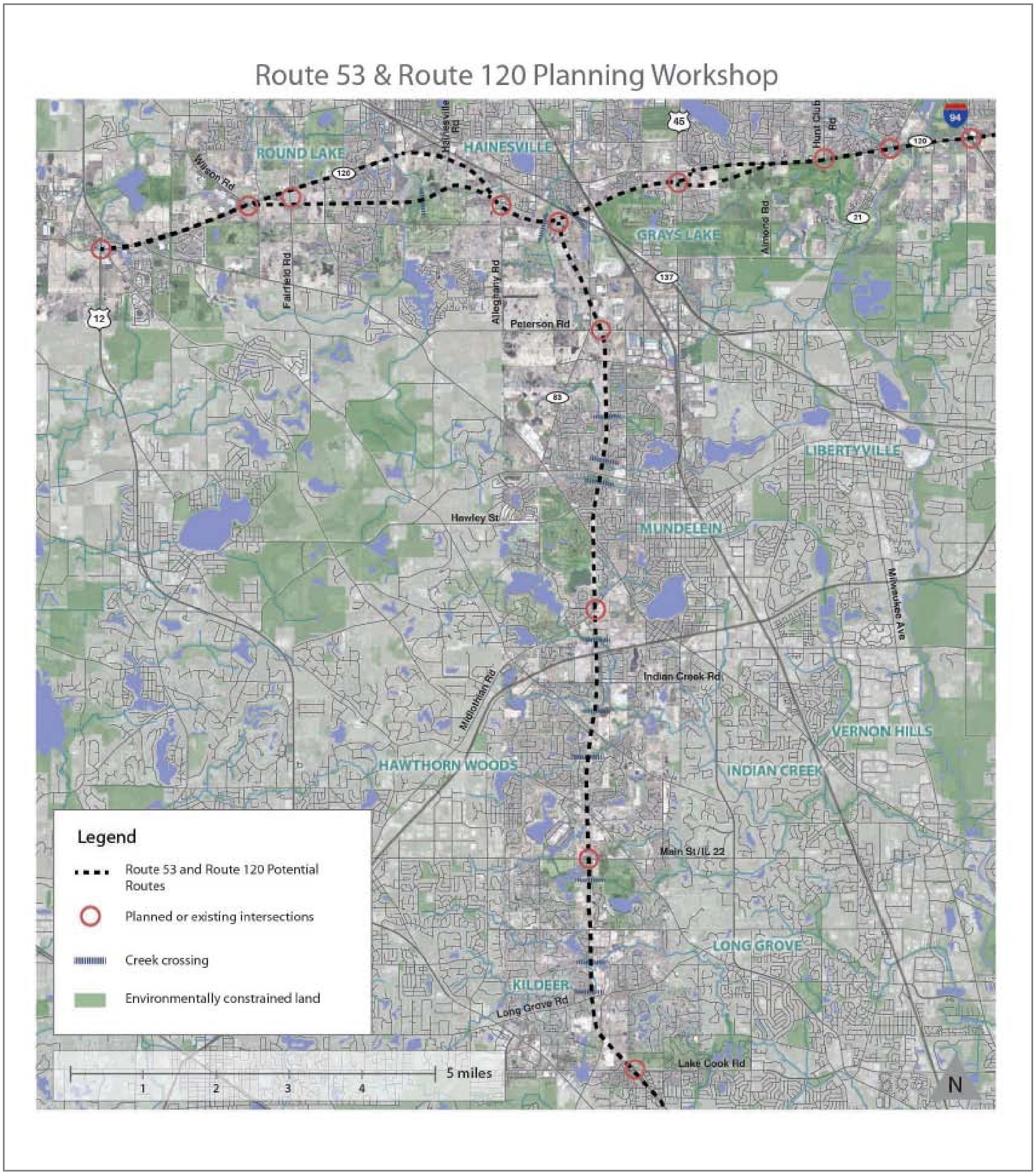
    Also **use this time to create a roadway cross-section**. Separate from the base map, this exercise allows the group to choose the specifics of how the entire road right-of-way could be designed, including elements such as travel lanes, shoulders, transit options, and other design considerations.

4. **[20 minutes] Choose environmental enhancements and add to the map.** Environmental enhancements represent best practices for ecologically sensitive roadway design, for six environmental components (water quality, habitat, noise, etc.). The group can choose to apply enhancements to the entire corridor, or in sections. The matrix of environmental enhancements provides an explanation of the best practices. Place the desired environment chips on the corridor.

5. **[20 minutes] Develop intersection policies and associated land uses.** There are multiple options available for intersection design and controls. These choices will strongly influence the development potential of adjacent land, as well as the urban form that is possible. For instance, expressway interchanges create auto-scaled places, whereas signalized intersections with pedestrian crossings can foster an urban, walkable environment. Choose intersection types and land uses and place on the corridor.

6. **[10 minutes] Review your work, determine themes, and name the map.** Reserve time at the end to ensure group consensus on the major items, before gluing down all chips. As the group fixes the chips to the map, this is a good time to reflect on themes and lessons learned from the exercise. What priorities does your map reflect? Did your group meet its goals? From this discussion, come up with a name for the map. Choose a presenter (not the facilitator) who will explain the map to the larger group.

BASE MAP


Route 53 & Route 120 Planning Workshop
ROUND LAKE
HAINESVILLE
GRAYS LAKE
LIBERTYVILLE
MUNDELEIN
VERNON HILLS
INDIAN CREEK
HAWTHORN WOODS
LONG GROVE
KILDEER
Wilson Rd
Fairfield Rd
Allegheny Rd
Peterson Rd
Hawley St
Indian Creek Rd
Midlothian Rd
Main St/IL 22
Long Grove Rd
Lake Cook Rd
Almond Rd
Milwaukee Ave
Legend
Route 53 and Route 120 Potential Routes
Planned or existing intersections
Creek crossing
Environmentally constrained land
1
2
3
4
5 miles
N

CHIP SET

The transportation, land use, and environment chips shown below will be cut out and arranged on the base map at your table to create your group's scenario.

TRANSPORTATION ICONS: ROAD DESIGN

Route 120 only
Add 2 lanes to existing, 35 MPH

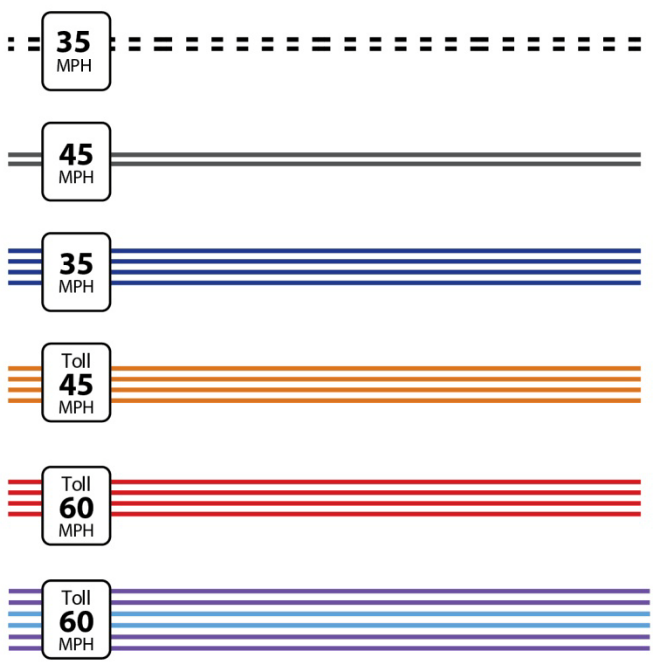
2 lane, limited access, 45 MPH

4 lane, arterial 35 MPH

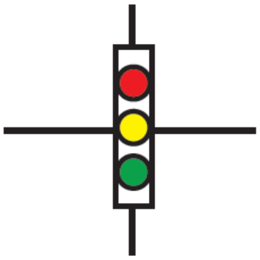
4 lane, limited access, 45 MPH

4 lane, limited access, 60 MPH

4 lane, limited access with 2 managed transit lanes, 60 MPH



TRANSPORTATION ICONS: INTERSECTIONS



Signalized Intersection

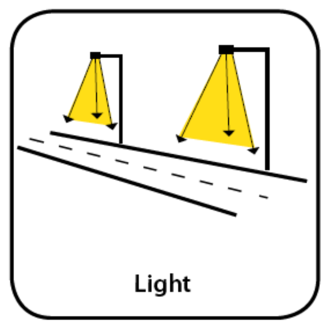
Roundabout

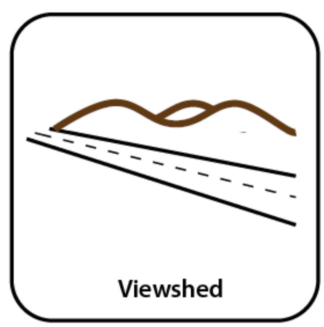
Grade-Separated Intersection

Stop Sign Intersection

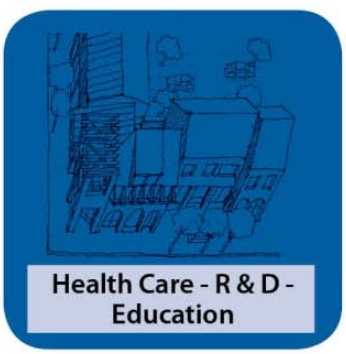
ENVIRONMENTAL ENHANCEMENT ICONS

See the Environmental Best Practices Summary for information.



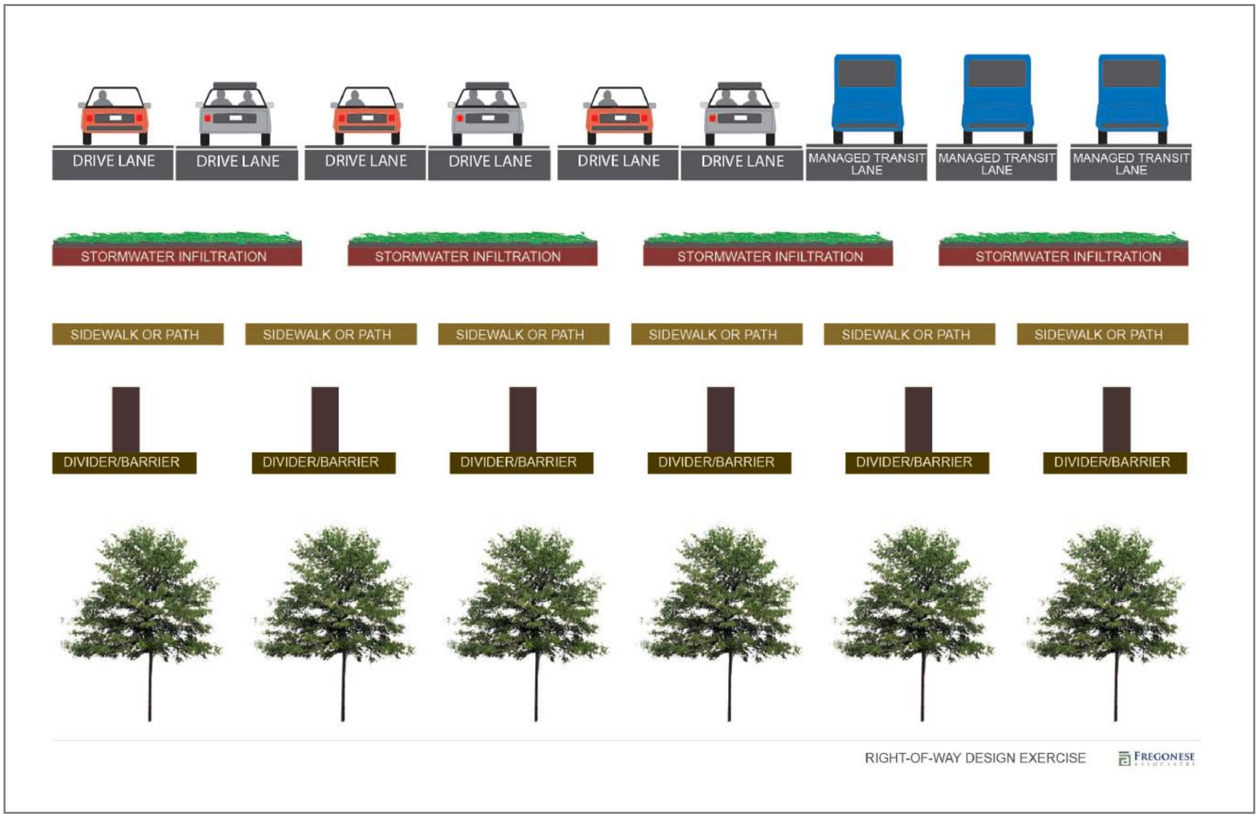


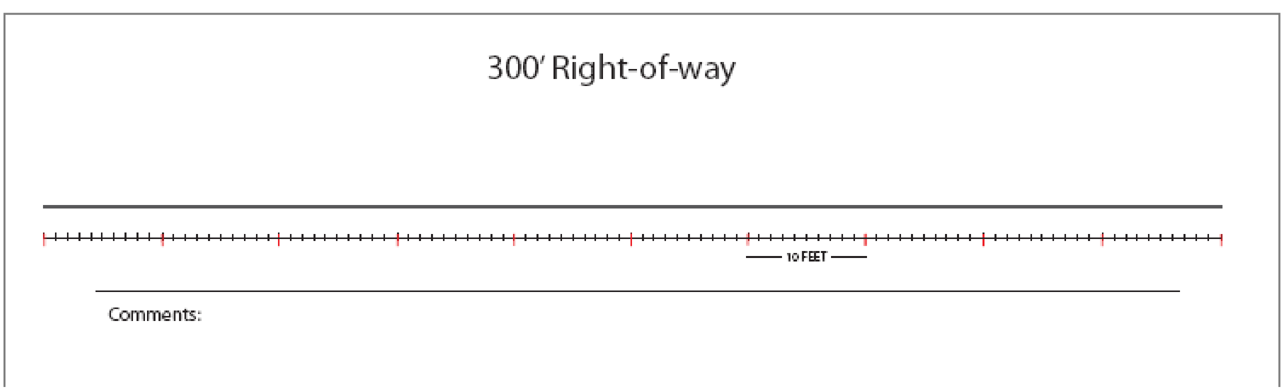
LAND USE ICONS



CROSS-SECTION EXERCISE

In this exercise, the chips below are cut out and arranged on the right of way to design the roadway cross-section. Note: The right of way segment shown here has been cropped to fit this page and is therefore not to scale. Printed materials for this exercise will be scaled appropriately.

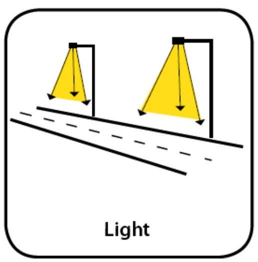


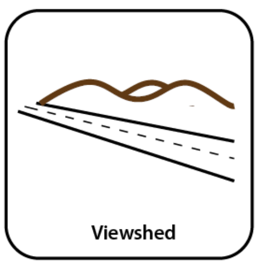


ENVIRONMENTAL BEST PRACTICES SUMMARY

This matrix explains the best practices represented by the environmental icons.

	STANDARD PRACTICE	BEST PRACTICE
WATER QUALITY		
Maintain and protect water quality  	• Install detention ponds. • Line stream channels with rock rip rap. • Use silt fences during construction.	• Reduce roadway surface area. • View as a system and design solutions that address the entire watershed. • Create stormwater treatment using native plants to capture and securely hold suspended solids and adsorbed contaminants. • Repair and restore existing destabilized stream channels • Filter water through anaerobic wetlands to de-nitrify and bio-metabolize large carbon chain molecules (oil, grease, etc), and control release. • Use alternative road surfacing to better control stormwater runoff and contamination mobility from the highway environment • Use micro-groove or equivalent surfacing to facilitate very efficient removal of water from road surface; capture contaminated runoff waters, use diffusion technologies and extract salt; use a no-salt policy.
WILDLIFE AND HABITAT CONNECTIVITY		
Avoid destruction of habitat for native plants and animals.  	• Avoid habitat for federally protected threatened and endangered species.	• Include under-crossings and overcrossings for wildlife to improve habitat connectivity. • Create a compensation land that links ROW restoration with public and private restoration in conservation lands to improve continuity of habitat across the landscape. • Establish robust native plant community plantings that are dense and stable and that inherently restrict invasive plant colonization and spread. • Provide early detection and rapid response for invasive species. • Use FAA equivalent standard wildlife fencing to eliminate access of medium and large mammals from ROW. • Use FAA and US air force landscape plant-use and land management standards of 6-18 vegetation height to reduce avian use of ROW vegetation.

NOISE		
Reduce the impacts of auto noise on adjacent uses.  	• Concrete or wood sound walls.	• Integrating noise barriers, diffusion, and cancellation strategies into vegetated buffers, layout of buildings, berms, vegetation, and alignment and restoration of habitat features. • Increase distance of future buildings from the roadway.
LIGHT		
Reduce negative effects of roadway lighting.  	• Standard spacing of standard overhead highway lights occurs along entire highway, at ramps and at intersections. • Down or directional shielding has been implemented on some projects but not typically on Highways.	• Create narrower roadways with curb and gutter and minimum or no clearance zones. • Reduce elevated lighting to only intersections and off ramps. • Use vegetation to alter view distances, resulting in reduced travel speeds. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Use LED and other lighting technologies that eliminate or reduce UV wavelengths that attract insects, bats, birds, and other wildlife. Consider lighting that is concentrated toward red or green spectral bands.

AIR QUALITY AND GREENHOUSE GAS EMISSIONS(GHG)		
Reduce Green House Gas emissions from construction, operations, maintenance and use. 	• Seldom considered; now being addressed in Federal Environmental Impact Statements (EIS) and some state appropriation considerations (see CA, OR, etc) for highway funding.	• Increase alternative transportation options. • Do a highway life cycle analysis as a part of the business plan for this highway and identify all strategies for eliminating and minimizing GHG emissions in all stages and operations of the highway • Compensate and offset material embodied GHG emissions and operational GHG emissions using ecological sequestration strategies in the vicinity of the corridor • Solar and wind power; utilize heat from urban heat island effect • Consider rechargeable lane technologies under development for electric vehicles
VIEWSHED		
Improve and protect driver viewshed and experience 	• Seldom considered. Safety is usually the only consideration on highways. Aesthetics and view shed experience is typically only considered on secondary roadways	• Alternative screening methods to shield neighborhoods and distractions while focusing drivers' attention for safety viewshed • Provide angled views and varying viewing screens and distances. • Avoid solid sound wall approach • Consider slight curvilinear road corridor that allows changing view • Consider visual elements: art, sculpture, creatively designed overpasses, etc.

Scenario Summary

Five scenarios have been developed to provide a starting point for discussions about the Route 53 and Route 120 corridors. The scenarios are not recommendations, but provide a number of approaches for comparison purposes. This summary provides a snapshot of the five scenarios, and more detailed descriptions are provided on the following pages.

NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
	Four lanes; 53 signalized arterial, not tolled; existing 120 alignment with two additional lanes and Grayslake bypass; 35 MPH	Four lanes; 53 tolled parkway; existing 120 alignment with two additional lanes and Grayslake bypass; 45 MPH / 35 MPH	Four lanes; 53 and 120 tolled parkway; 45 MPH	Four lanes; 53 and 120 tolled expressway; 60 MPH	Route 53 six lanes; Route 120 four lanes; both roads tolled expressways; includes accommodation for managed transit lanes; 60 MPH
1. Reduced Congestion in Lake County	**14%**	**15%**	**16%**	**23%**	**24%**
2. TIme Savings Waukegan to Schaumburg in 2040	**3 minutes**	**11 minutes**	**13 minutes**	**18 minutes**	**20 minutes** **28 min (on managed lanes)**
3. Potential Direct Environmental Impacts	**110 ac**	**215 ac**	**290 ac**	**435 ac**	**405 ac**
4. Potential Indirect Environmental Impacts	**26,000 ac**	**26,000 ac**	**31,000 ac**	**51,000 ac**	**51,000 ac**
5. Scenario Footprint	**48'**	**48'-92'**	**92'**	**139'**	**120'-139'**
6. Scenario Paved Area	**6m sq ft**	**8m sq ft**	**12m sq ft**	**13m sq ft**	**15m sq ft**
7. Construction Cost	**$900m to $1b**	**$1.4 to $1.5b**	**$1.7 to $1.9b**	**$2.0 to $2.2b**	**$2.1 to $2.3b**
8. Potential Toll Revenue	**$0**	**$30 to $50m**	**$55 to $85m**	**$70 to $100m**	**$80 to $120m**

Notes:

1. Percent drop in congested vehicle hours traveled in Lake County, compared to the 2040 no-build option.
2. Time saved on a typical trip from Waukegan to Schaumburg. Current travel time (2010) is approximately 74 min. Future travel time (2040) under the no-build option is approximately 99 min.
3. Projected acres of environmentally sensitive land that potentially could be impacted within the right of way.
4. Projected acres of environmentally sensitive land that potentially could be impacted within two miles of the right of way.
5. Approximate width of the scenario in feet (ranges are shown for scenarios that have different footprints for 53 and 120).
6. Approximate amount of pavement included in the scenario, including travel lanes and shoulders.
7. Estimated construction cost in 2020 dollars.
8. Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Scenario A DRAFT February 2, 2012

In **Scenario A** Route 53 is a four lane un-tolled arterial roadway. Travel speeds are kept low at 35 MPH, and travelers may access adjacent roadways at signalized intersections. This option includes a proposed bypass of Grayslake and joins with existing 120 to the east of Grayslake and to the west of Hainesville. This option is the most integrated with the existing land uses, is the lowest cost to construct, but provides the lowest amount of congestion relief and no potential for generating toll revenue.

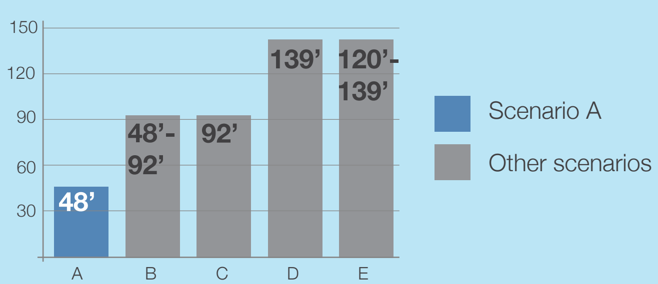
NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

Scenario A Highlights

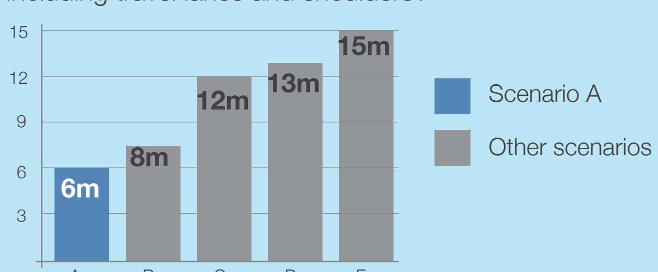
- Lowest environmental disturbance
- Lowest cost to construct
- Lowest amount of new paved roadway surface
- Lowest travel speed
- Lowest reduction in travel congestion
- Most roadway intersections
- Bypass of Grayslake
- Widens existing 120 E of Grayslake and W of Hainesville

Scenario A Indicators:

How large is the scenario footprint (width in feet)?

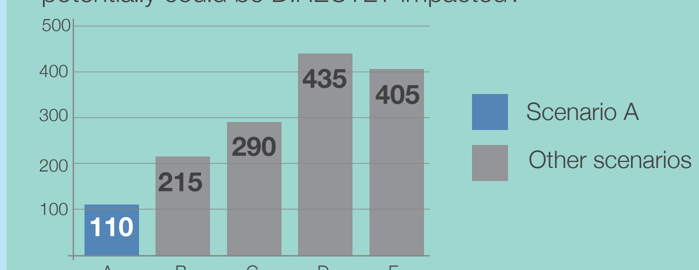


How much paved area (in million square feet) is created, including travel lanes and shoulders?

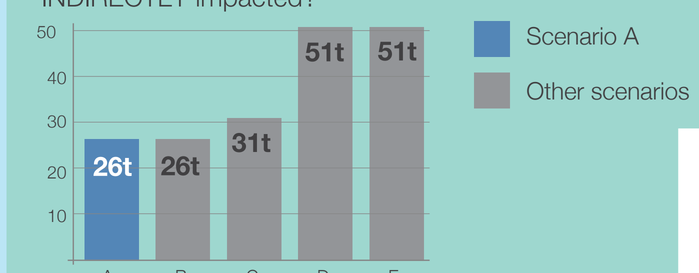


How much time (in minutes) could be saved on a typical trip from Waukegan to Schaumburg?

How much environmentally sensitive land (in acres) potentially could be DIRECTLY impacted?



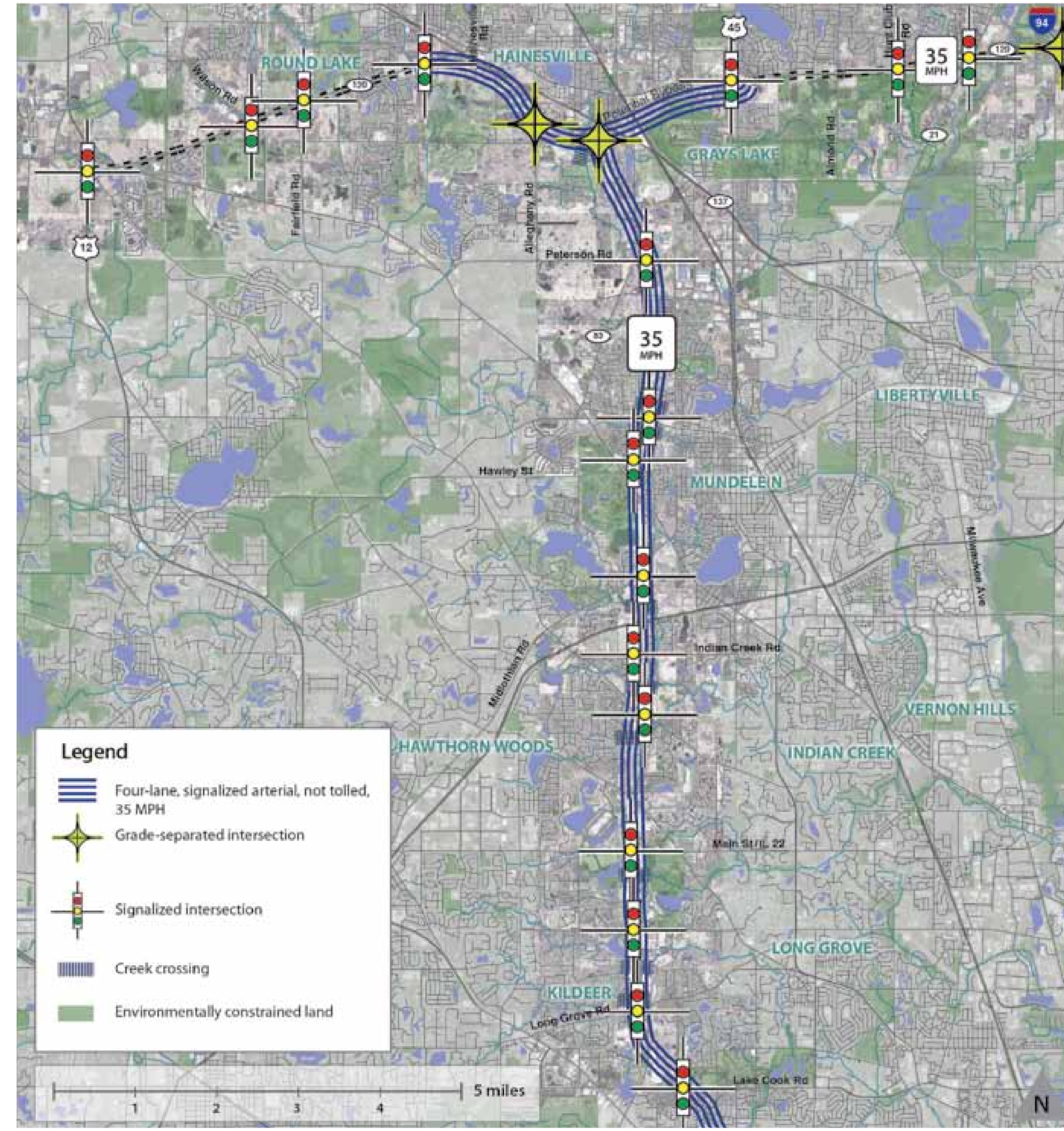
How much environmentally sensitive land (in thousand acres) potentially could be INDIRECTLY impacted?



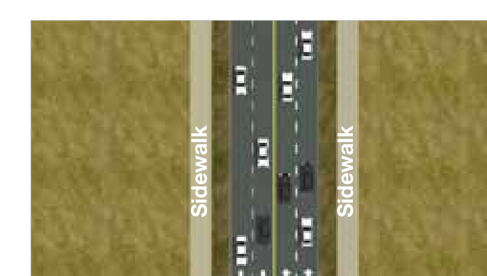
Reduced Congestion in Lake County (percent drop in congested vehicle hours traveled compared to no-build option)	Estimated cost to construct the roadway (in 2020 dollars)?	2025 Estimated Gross Total Annual Revenue (in millions)*
14%	**$900M - $1B**	**$0**

*Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Four lanes | 53 signalized arterial, not tolled | existing 120 alignment with two additional lanes and Grayslake bypass



Route 53 section



Route 53 plan view

Scenario B

DRAFT February 2, 2012

In **Scenario B**, Route 53 is a four lane tolled parkway. Grade-separated intersections allow for controlled access to adjacent roadways. Travel speeds are 45 MPH along all tolled segments of Routes 53 and 120. Un-tolled segments of Route 120 are expanded by two lanes, with signalized intersections and travel speeds of 35 MPH. This option includes a proposed bypass of Grayslake, which joins with existing Route 120 to the east of Grayslake and to the west of Hainesville.

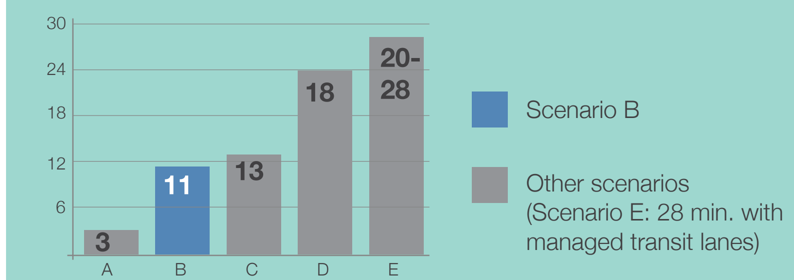
Scenario B Highlights

- Low potential environmental impacts
- Moderate amount of new paved roadway surface
- Travel speed of 45 MPH and 35 MPH
- Moderate reduction in travel congestion
- Grade-separated intersections along 53 and part of 120
- Bypass of Grayslake
- Widens existing 120 east of Grayslake and west of Hainesville

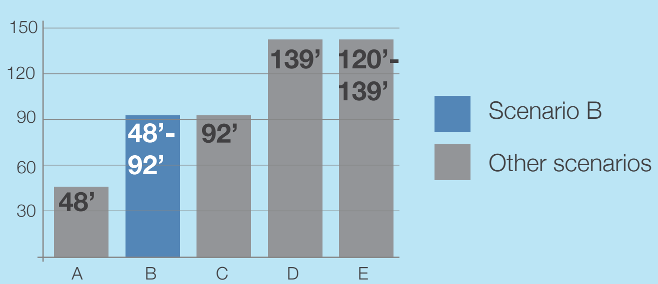
NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

Scenario B Indicators:

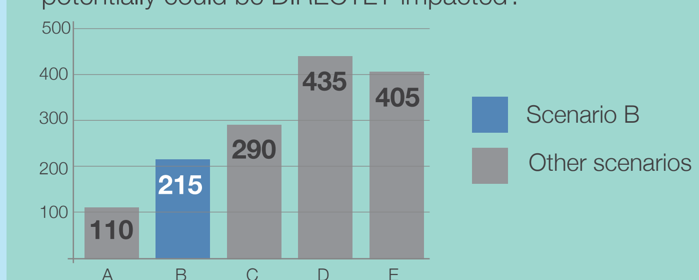
How much time (in minutes) could be saved on a typical trip from Waukegan to Schaumburg?



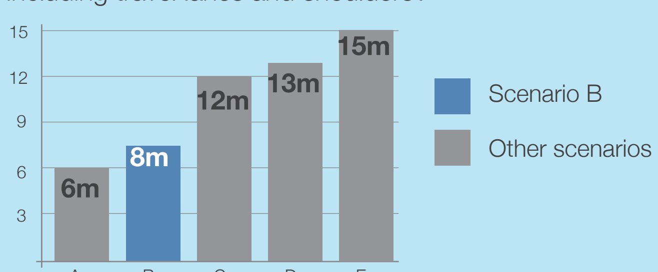
How large is the scenario footprint (width in feet)?



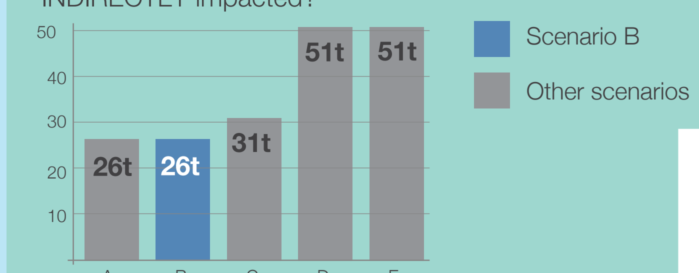
How much environmentally sensitive land (in acres) potentially could be DIRECTLY impacted?



How much paved area (in million square feet) is created, including travel lanes and shoulders?



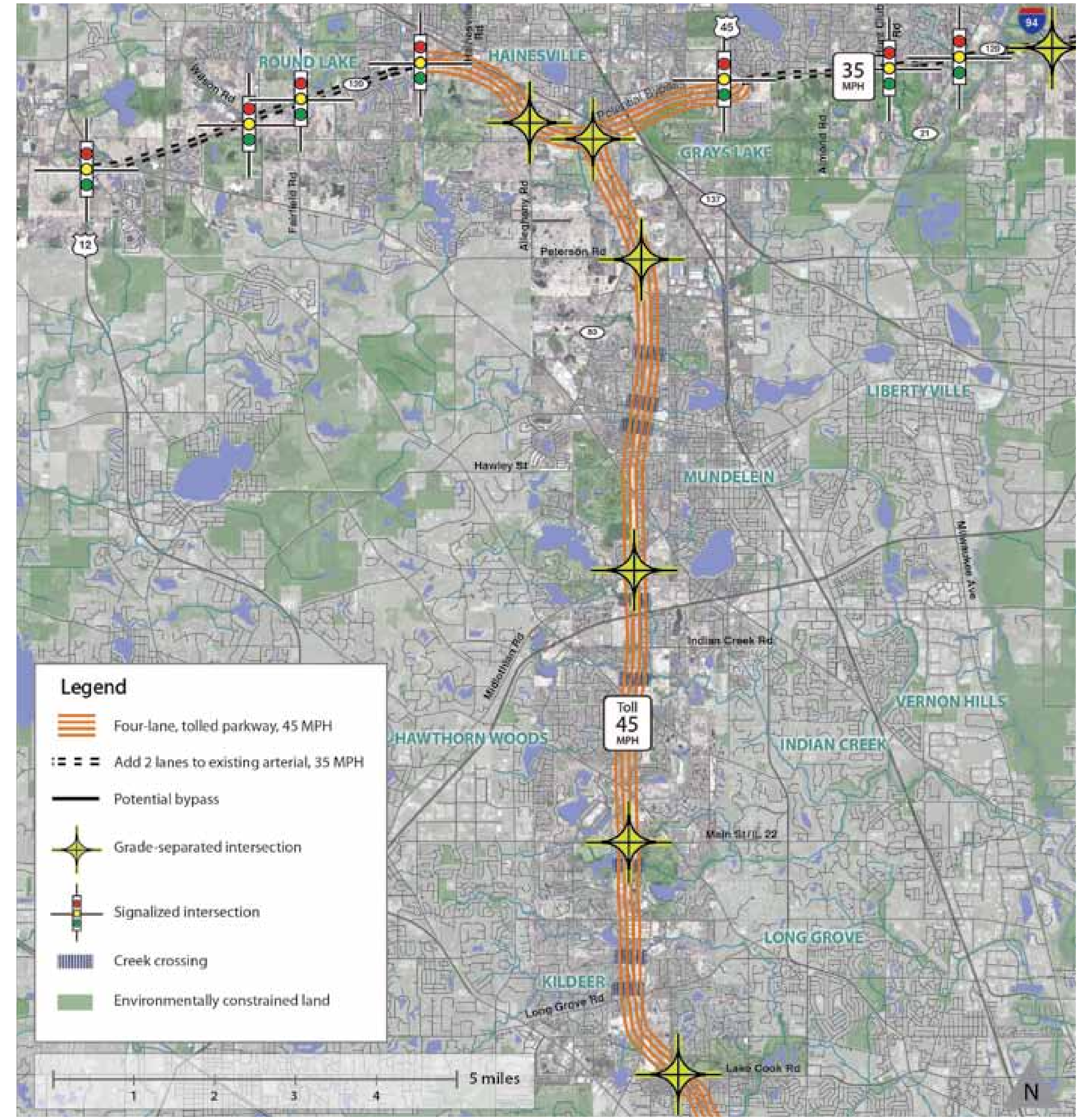
How much environmentally sensitive land (in thousand acres) potentially could be INDIRECTLY impacted?



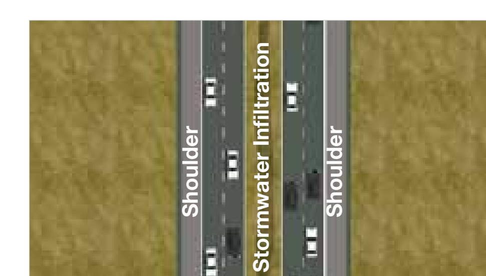
Reduced Congestion in Lake County (percent drop in congested vehicle hours traveled compared to no-build option)	Estimated cost to construct the roadway (in 2020 dollars)?	2025 Estimated Gross Total Annual Revenue (in millions)*
15%	**$1.4 - $1.5B**	**$30 - $50M**

*Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Four lanes | 53 tolled parkway | existing 120 alignment with two additional lanes and Grayslake bypass



Route 53 section



Route 53 plan view

Scenario C

DRAFT February 2, 2012

In **Scenario C**, Route 53 and Route 120 are four lane tolled parkways. Grade-separated intersections allow for controlled access to adjacent roadways. Travel speeds are 45 MPH along Routes 53 and 120. The scenario footprint and paved areas created are both slightly lower, compared to scenarios D and E. Potential environmental impacts and congestion relief are moderate.

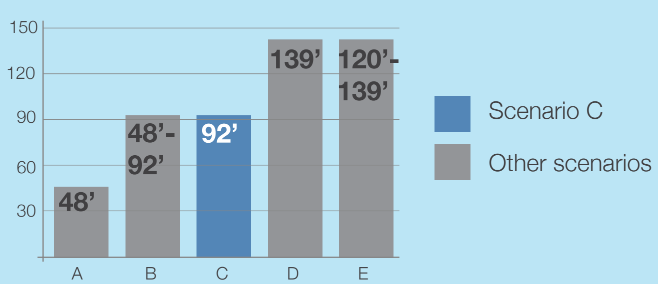
Scenario C Highlights

- Moderate potential environmental impacts
- Moderate-to-high new paved roadway surface
- Travel speed of 45 MPH
- Moderate reduction in travel congestion
- Grade separated intersections along the length of Routes 53 and 120
- Tolls collected on 53 and 120

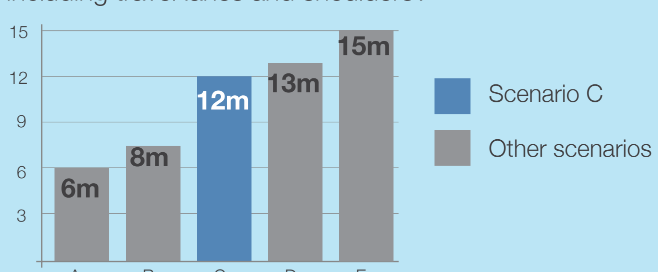
NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

Scenario C Indicators:

How large is the scenario footprint (width in feet)?

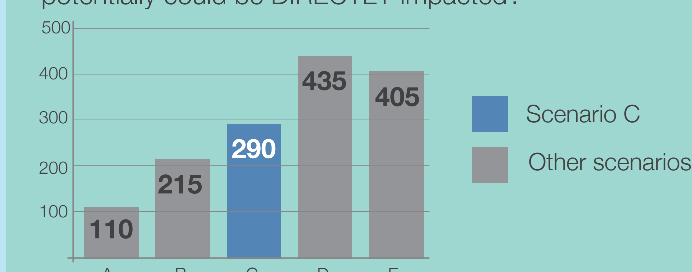


How much paved area (in million square feet) is created, including travel lanes and shoulders?

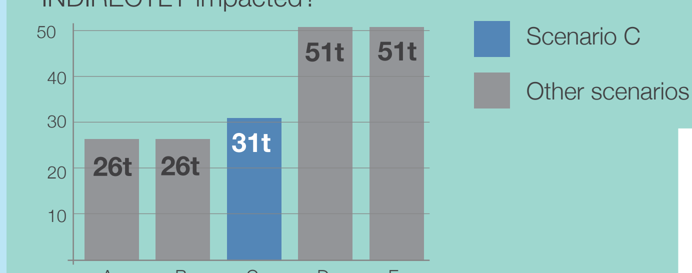


How much time (in minutes) could be saved on a typical trip from Waukegan to Schaumburg?

How much environmentally sensitive land (in acres) potentially could be DIRECTLY impacted?



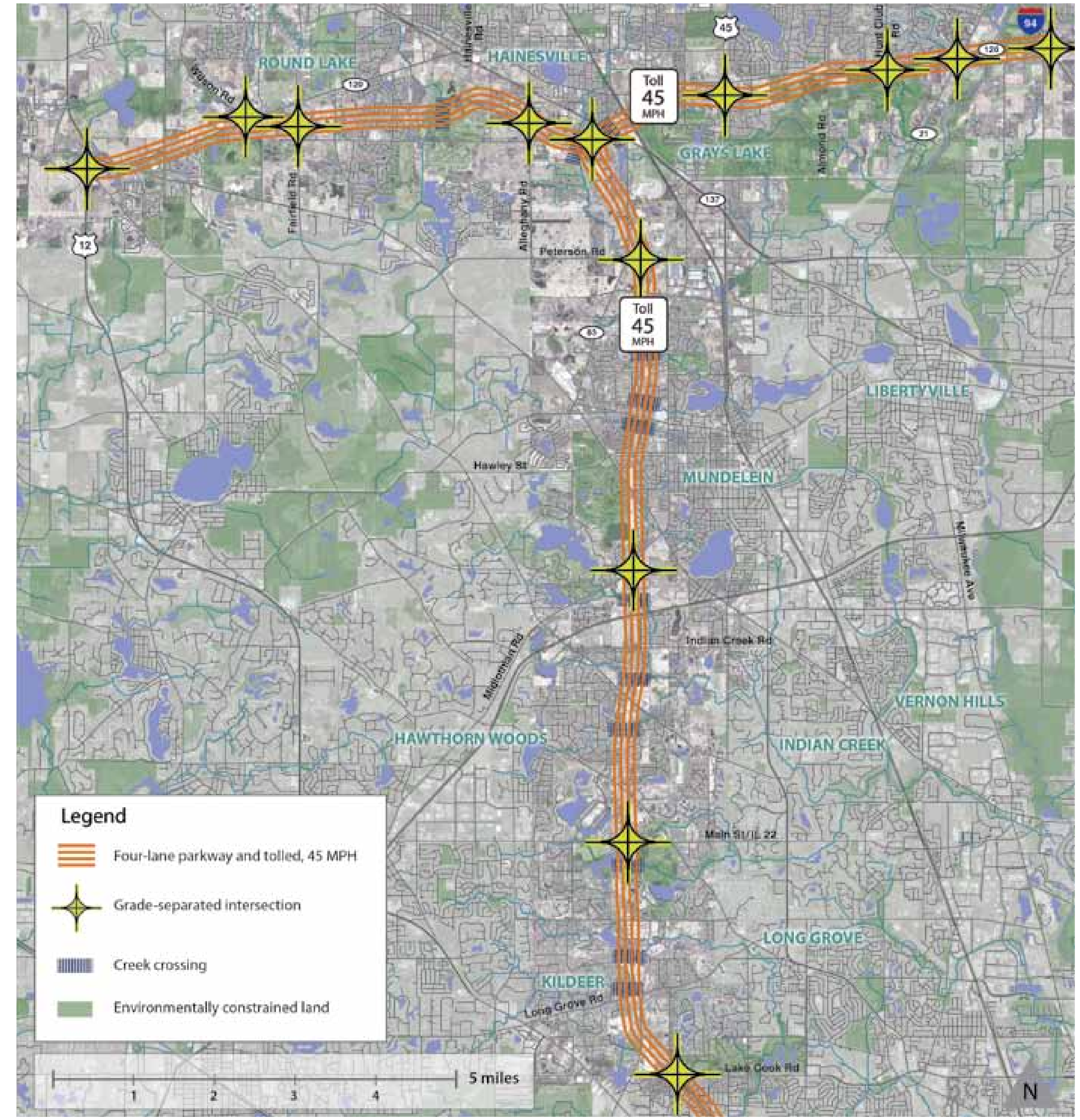
How much environmentally sensitive land (in thousand acres) potentially could be INDIRECTLY impacted?



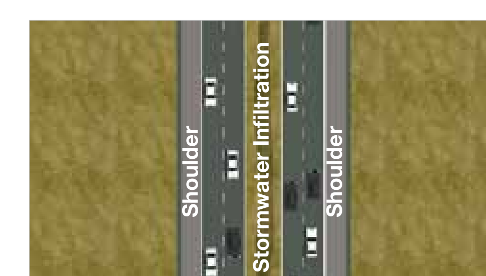
Reduced Congestion in Lake County (percent drop in congested vehicle hours traveled compared to no-build option)	Estimated cost to construct the roadway (in 2020 dollars)?	2025 Estimated Gross Total Annual Revenue (in millions)*
16%	**$1.7 - $1.9B**	**$55 - $85B**

*Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Four lanes | 53 and 120 tolled parkway



Route 53 section



Route 53 plan view

Scenario D DRAFT February 2, 2012

In **Scenario D**, Route 53 and Route 120 are four lane tolled expressways. Travel speeds are 60 MPH along Routes 53 and 120. Grade-separated intersections allow for controlled access to adjacent roadways. The scenario footprint, potential environmental impacts, and new paved area are virtually equivalent to scenario E.

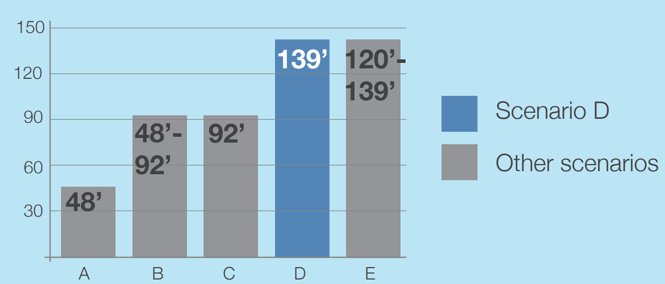
Scenario D Highlights

- High potential environmental impacts, similar to scenario E
- Moderate-to-high new paved roadway surface
- Travel speed of 60 MPH
- Moderate-to-high reduction in travel congestion
- Grade separated intersections along length 53 and 120
- Tolls collected on 53 and 120

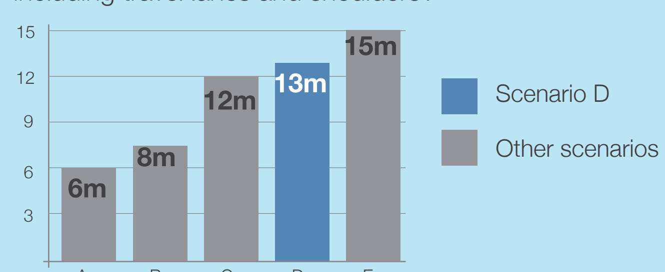
NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

Scenario D Indicators:

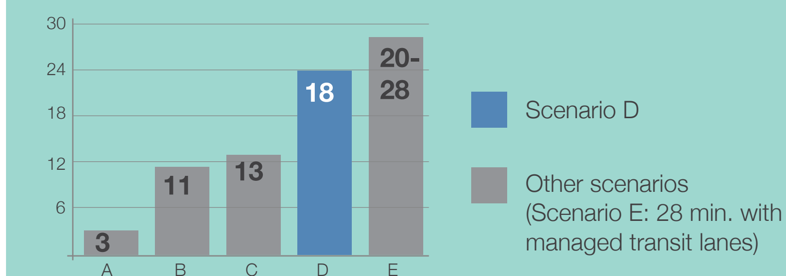
How large is the scenario footprint (width in feet)?



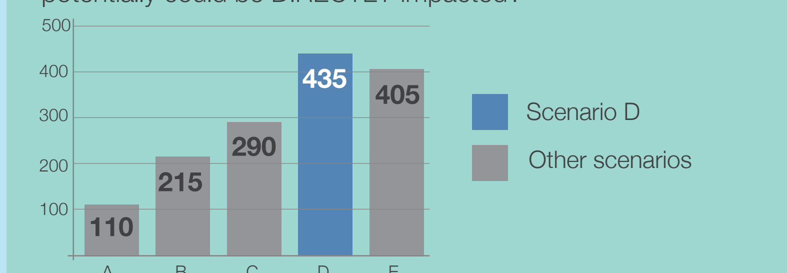
How much paved area (in million square feet) is created, including travel lanes and shoulders?



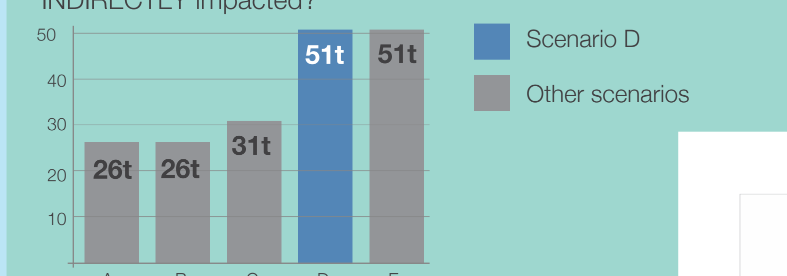
How much time (in minutes) could be saved on a typical trip from Waukegan to Schaumburg?



How much environmentally sensitive land (in acres) potentially could be DIRECTLY impacted?



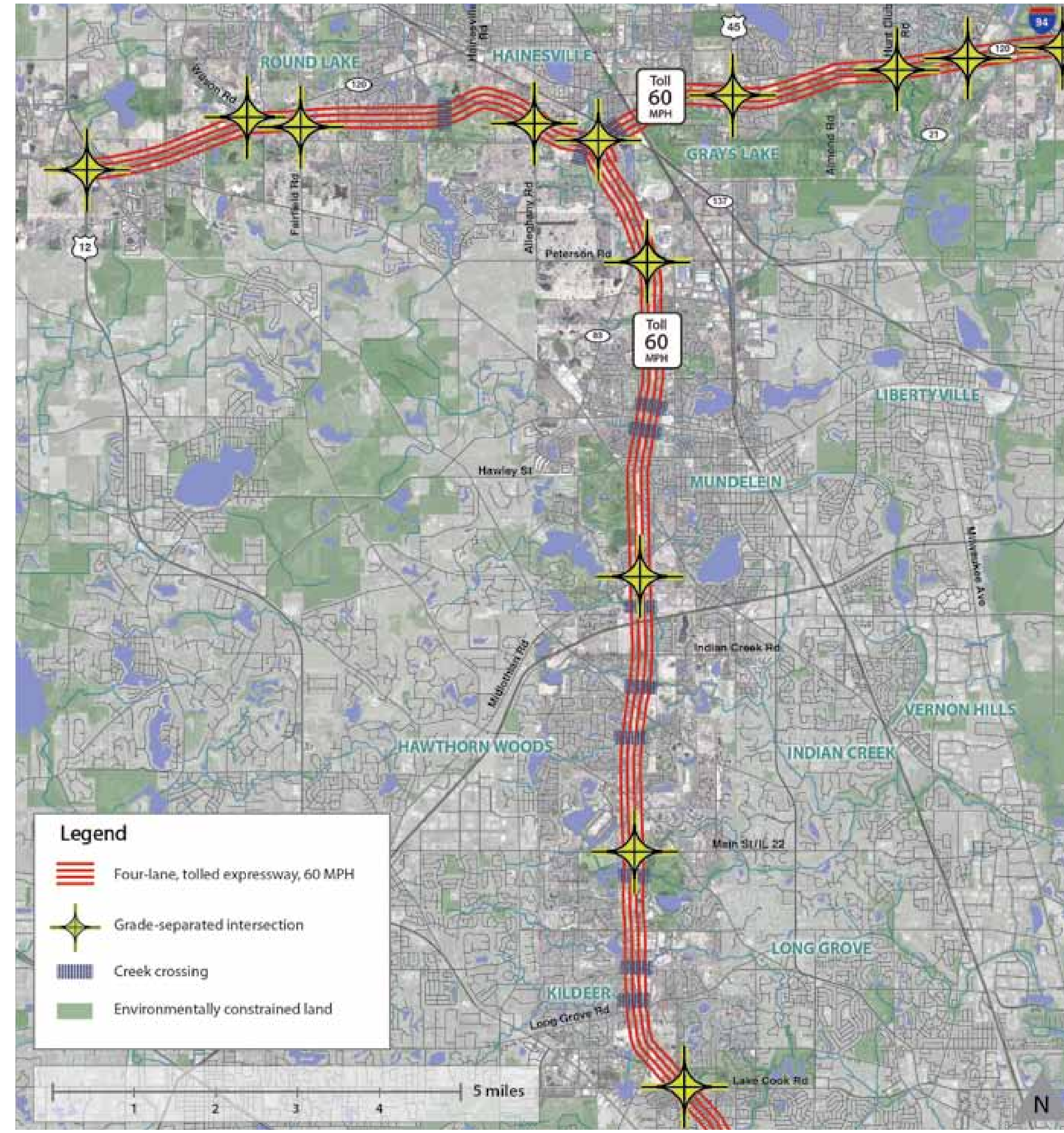
How much environmentally sensitive land (in thousand acres) potentially could be INDIRECTLY impacted?



Reduced Congestion in Lake County (percent drop in congested vehicle hours traveled compared to no-build option)	Estimated cost to construct the roadway (in 2020 dollars)?	2025 Estimated Gross Total Annual Revenue (in millions)*
23%	**$2.0 - $2.2B**	**$70 - $100M**

*Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Four lanes | 53 and 120 tolled expressway



Route 53 section

Route 53 plan view

Scenario E

DRAFT February 2, 2012

In **Scenario E** both roads are tolled expressways. Route 53 is six lanes - four general travel lanes and two managed transit lanes - which can be used for bus rapid transit during peak times. Travel speeds are 60 MPH on both roads and all intersections are grade separated. This scenario is the most expensive to construct, it provides the greatest congestion relief, and is the only option with managed transit lanes. The scenario footprint, potential environmental impacts, and new paved area are virtually equivalent to Scenario D.

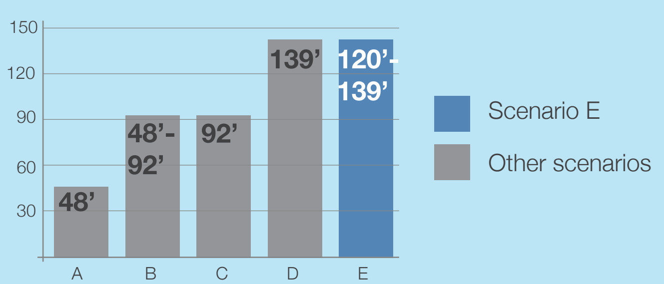
Scenario E Highlights

- High potential environmental impacts, similar to scenario D
- Maximum new paved roadway surface
- Travel speed of 60 MPH
- Highest reduction in travel congestion
- Grade separated intersections along length 53 and 120
- Tolls collected on 53 and 120

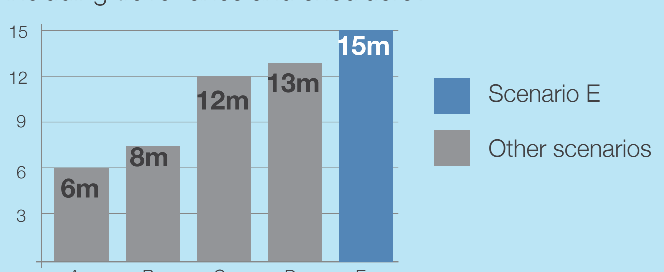
NOTE: All information included here is a preliminary draft and for scenario planning-level analysis only. Toll revenue estimates are gross and do not include financing costs, or operations and maintenance costs (which can vary depending on design features).

Scenario E Indicators:

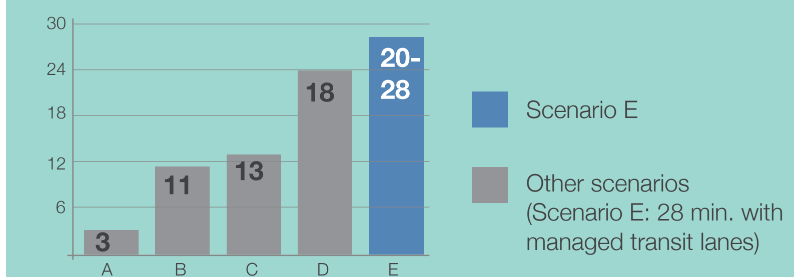
How large is the scenario footprint (width in feet)?



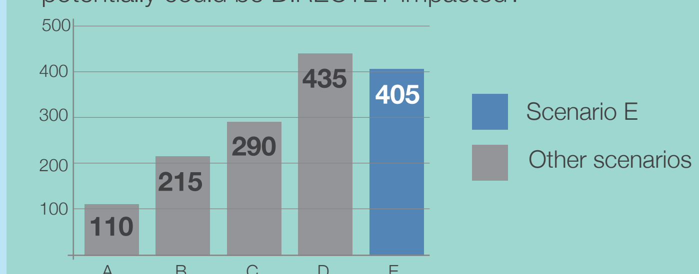
How much paved area (in million square feet) is created, including travel lanes and shoulders?



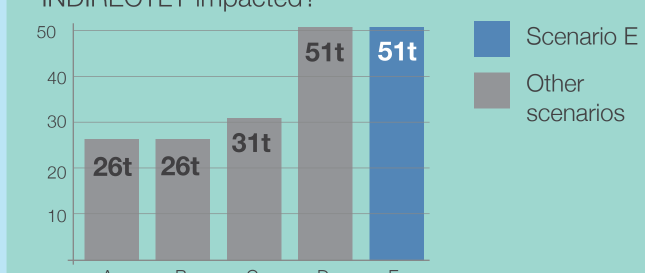
How much time (in minutes) could be saved on a typical trip from Waukegan to Schaumburg?



How much environmentally sensitive land (in acres) potentially could be DIRECTLY impacted?



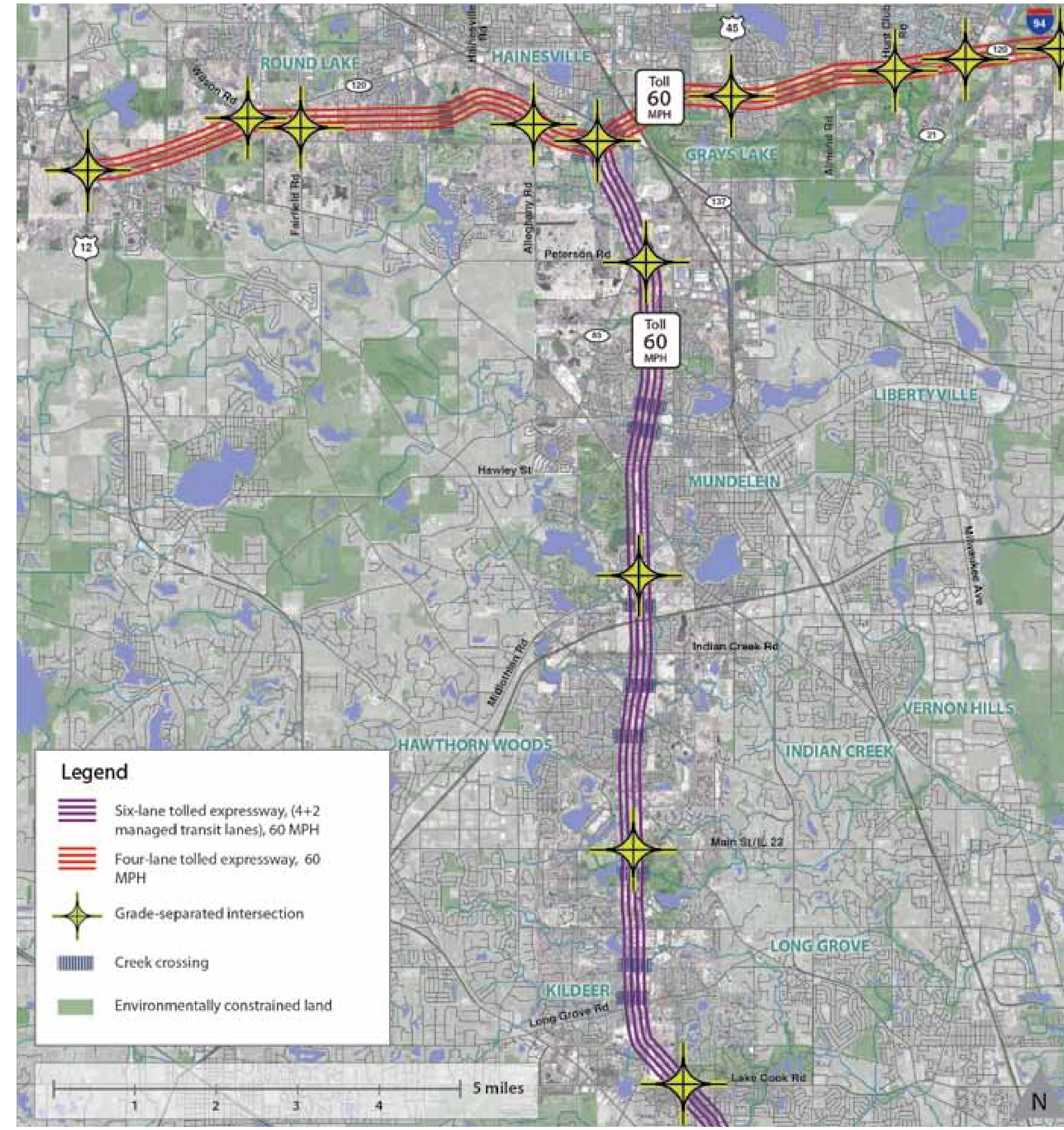
How much environmentally sensitive land (in thousand acres) potentially could be INDIRECTLY impacted?



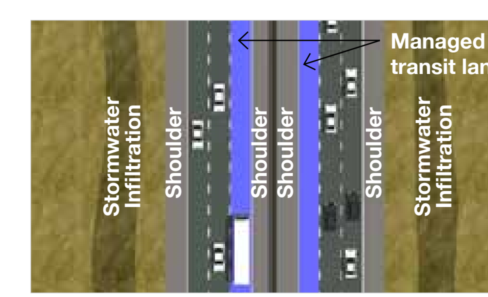
Reduced Congestion in Lake County (percent drop in congested vehicle hours traveled compared to no-build option)	Estimated cost to construct the roadway (in 2020 dollars)?	2025 Estimated Gross Total Annual Revenue (in millions)*
24%	**$2.1 - $2.3B**	**$80 - $120M**

*Estimated gross total annual revenue in 2025 (construction dollars are invested (2020) before revenue is realized (2025)).

Route 53 six lanes | Route 120 four lanes | both roads tolled expressways



Route 53 section



Route 53 plan view

APPENDIX

A. Environmental Enhancements Appendix

ENVIRONMENTAL ENHANCEMENTS APPENDIX

This matrix provides greater detail on industry standards and best practices in typical highway construction.

	STANDARD	BETTER	BEST PRACTICE
HYDROLOGY			
Create compensation landscapes to compensate for increased volumes of stormwater, direct ROW foot print impacts of road imperviousness, and loss of infiltration and replenishment of potable water supplies and baseflow to lakes, rivers, wetlands (etc) and to compensate for aerosol salt impacts that collapse soil structure and reduce imperviousness outside of the ROW	Detention ponds are installed to reduce the release rate, primarily focused on reducing downstream flooding	Naturally occurring depressional features and existing drained hydric soils are restored and connected in a stormwater treatment train to perform volume reduction, release rate, create and deliver biologically appropriate hydrographs, and water quality.	• View the ROW lands and reconnection of public and private restored conservation as a "system" and design hydrology for the highway within a restored system to "do no harm" to the system. • Restore soil carbon levels and capacity for water/contaminant cleansing and retention • Restore connections between public and private conservation lands • Restore public and private conservation lands to improve the "system" (see below).
Use alternative road surfacing to better control stormwater runoff and contamination mobility from the highway environment	Seldom considered	Reduce car tire interaction surface water on the pavement surface by prompt drainage to medians for pretreatment.	Use microgroove surfacing in the pavement to quickly remove surface water from interaction with tires, and direct microgrooves to median for pretreatment, storage of contaminated water.
Use post-construction soil management strategies to improve infiltration after contaminated water is pretreated	Seldom considered	• Road margin infiltration galleries • Pervious road surfaces • Road runoff detention with no surface outlets • Road runoff bioswales with no surface outlets	• Integrate cleansing, infiltration, into a compensation landscape.

	STANDARD	BETTER	BEST PRACTICE
		• Capture and use naturally-filtered runoff to irrigate adjacent farmlands Summer spray irrigation to evaporate	
Repair and restore existing destabilized stream channels	Rock rip rap is applied immediately up and downstream of new culverts, bridges, but no additional downstream treatments	Program for stabilizing with restoration techniques downstream stream reaches that will experience hydraulic geometry changes and channel/bed/bank instability	Formalize a long term stewardship program with secure funding to maintain and enhance stream environments downstream of highway.
Minimize or mitigate impacts to the water runoff volume and velocity and shear stress in downstream receiving water bodies	Volumes are typically not considered, velocity impacts to culverts/bridges is considered and immediately up and downstream to primarily to protect the infrastructure	Reduce volumes to pre-highway quantities, and reduce velocities to less then 4 ft per second and commensurate reduction of instream shear stresses.	Create release rates from Compensation landscapes that restore, enhance and preserve"nature's hydrograph" in all released water and receiving water bodies
Create water management reserves	Not considered	Restore all remaining depressions and hydric soils, and other uplands in the ROW and connect these to compensation restored landscapes beyond the ROW. Use landscape areas to compensate for groundwater infiltration losses from the roadway imperviousness	View the ROW lands and reconnection of public and private restored conservation as a "system" and design hydrology for the highway within a restored system to "do no harm" to the system.
WATER QUALITY			
Use alternative road surface finishes to remove or reduce ice risk	Seldom Considered	Use of crowned roadway to direct water and contaminants off roadway	Use micro-groove or equivalent surfacing to facilitate very efficient removal of water from road surface
Use alternative de-icing/anti-icing strategies to reduce salt impacts	Many equipment and operational variations on the same technology are used as standards for application around the USA. Anti-icing is being used more commonly to reduce salt quantities used per storm event.	Slow the average road speed down, and reduce surface acres of treated roadway and intersections to reduce overall salt use and to allow for lower volumes of contaminated runoff from highway environments. Create differential application rates with more focused intensified use of materials in intersections, off ramps, bridges, and not on straight aways	• Capture contaminated runoff waters, use RO and diffusion technologies and extract salt for beneficial reuse de-icing materials at locations of greatest use (e.g. bridges) • Evaluate Chinese road surface heating methods in roadway or key areas • Prioritize methods that minimize road deterioration to minimize road

	STANDARD	BETTER	BEST PRACTICE
			resurfacing
Use alternative de-icing/anti-icing materials	In some non-highway streets near environmentally sensitive lands and waterbodies, alternative deicing materials have been used. But, other then anti-icing, few other alternatives have been used as standard practice on highways	Use low salt policy---- and modified deicing and anti-icing mixes with 80% sand 20% salt; and use alternatives to NaCl, and CaCl2 such as corn and beet starch (good above 0 deg F; calcium magnesium acetate, and other formulations as is currently being done in many areas of USA.	Use a no-salt policy (at least no Sodium or Calcium Chloride) and evaluate the Chinese technology whereby carbon fibers installed into the road surface transfer geothermal and solar heat to deice the road surface.
Localize, capture and cleanse roadway runoff prior to release	Only considered to meet NPDS or other stormwater management requirements typically for total suspended solids in release waters. Does not address soluble contaminants and also with re-suspension from sediment traps/detention basins, contaminants adsorbed to fine particles are released from the systems; some contaminants released under ice cover when detention ponds become anerobic.	Create Stormwater treatment trains with upland grassed landscapes to capture and securely hold suspended solids and adsorbed contaminants. Then run water through anaerobic below and above ground wetlands to de-nitrify and bio-metabolize large carbon chain molecules (oil, grease, etc), then hold water for release.	• Do all in the Better column but hold water to remove soluable flow through contaminants such as salts using RO or Soil Colloid filters, Solar salt ponds for thermal capture and intersection de-icing • Restore and create High levels of organic matter in roadside soils to sequester aerosol mobilized heavy metals and other contaminants.
Protect and improve soil health in adjacent ROW to maximize runoff infiltration	Not considered	Pre-treat water as above, then direct clean water to deep chisel plowed soils in ROW to allow for capture, cleansing and infiltration	• Do all in the Better column but hold water to remove soluable flow through contaminants such as salts using RO or Soil Colloid filters, Solar salt ponds for thermal capture and intersection de-icing Restore and create High levels of organic matter using compost in roadside soils to sequester aerosol mobilized heavy metals and other contaminants.
WILDLIFE, HABITAT CONNECTIVITY, INVASIVES			
Causeways for road and causeways for greenway	Seldom considered	Integrate modular wildlife crossings and underpass crossings separate from stormwater drains and bridges that carry people and cars.	• Direct key wildlife species toward under-crossings and overcrossings through the use of integrated design of the habitats to be restored as a system within the ROW and the

	STANDARD	BETTER	BEST PRACTICE
			abutting compensation landscape beyond the ROW.
Avoid wildlife mortality from ingestion of roadway contaminants and vehicle collisions (avoid human injury and fatality)	Avoidance and minimization of the few regulated resources/habitats (e.g. wetland, floodplains, T and E species, etc) occurs. Some highways have moderately successful wildlife barrier fencing for larger mammals—eg. Deer.	• Avoid and Minimize disruption of all core and linkage habitats and key interior habitats, and tree rows, stream corridors, and drainageways which are concentrated corridor.	• Avoid habitats and provide restored "attractant habitats on each side of highway as a part of a compensation landscape to draw wildlife away from the highway ROW. • Use FAA equivalent standard wildlife fencing to eliminate access of medium and large mammals from ROW. • Use FAA and US air force landscape plant-use and land management standards of 6-18 vegetation height to reduce avian use of ROW vegetation.
Improve habitat connectivity	Seldom considered	Identify mobility corridors and protect them insitu by integration into the design and add wildlife underpasses and overpasses during design process to augment for unavoidable wildlife mobility impacts.	Create a compensation land that links ROW restoration with public and private restoration in conservation lands to improve continuity of habitat across the landscape.
Design and install native ecosystem in adjacent ROW to minimize invasive spread	Seldom considered	Establish robust native plant community plantings that are dense and stable and that inherently restrict invasive plant collinization and spread	• Manage habitats in ROW corridor for ecological health • Provide early detection and rapid response for invasive species
NOISE			
Noise barriers	Walls of wood, concrete panels, or textured surface poured in place concrete	• Living green technologies on structural barriers • A system of structural barriers and deflectors from horizon berming, to deciduous tree plantings along ROW margins, , Setback distances and horizon deflectors	• Integrating noise barriers, diffusion, and cancellation strategies into compensation landscape restoration plan, vegetated buffers, layout of buildings, berms, vegetation, and alignment and restoration of habitat features. • Making the barriers part of the habitat such as what the Tollway has done at The Grove National Historic Site, Glenview, IL

	STANDARD	BETTER	BEST PRACTICE
Noise diffusion and cancellation strategies	Seldom considered in midwest	• Noise source reduction strategies using surface pavement technologies that reduce road noise under dry and wet pavement conditions	• Integrating noise barriers, diffusion, and cancellation strategies into compensation landscape restoration plan, vegetated buffers, layout of buildings, berms, vegetation, and alignment and restoration of habitat features. • Making the barriers part of the habitat such as what the Tollway has done at The Grove National Historic Site, Glenview, IL
LIGHT			
Reduce lighting along highway	Standard spacing of Standard overhead highway lights occurs along entire highway, at ramps and at intersections	Discontinuous lighting along straight highway reaches and wayfinding lighting only at intersections and off ramps.	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in "dark zones".
Shield lighting impacts	Down or directional shielding has been implemented on some projects but not typically on Highways.	Focused downlighting lighting: downward facing, lane-oriented and, directional	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in "dark zones".
Embedded LED off ramp and directional lighting and lane placement and wayfinding lighting	Not considered on highway	Eliminate elevated surface lighting	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. (see Chinese example and 70% reduction in highway electricity use costs. • Eliminate high elevated lightening in "dark zones".

	STANDARD	BETTER	BEST PRACTICE
Driver-controlled intensity/ illumination zone	Not considered on highways	Eliminate elevated surface lighting	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in “dark zones”.
Dark zones for conservation	Seldom considered	Eliminate elevated surface lighting	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in “dark zones”.
Dark zones for neighborhoods	Seldom considered	Eliminate elevated surface lighting	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in “dark zones”.

	STANDARD	BETTER	BEST PRACTICE
Design lighting to minimize impacts to migrating birds/reduced insect attractant, bats, etc	Seldom considered	Shield, down direct, replace elevated surface lightening with low profile and surface embedded lighting.	• Reduce elevated lighting to only intersections and off ramps. • Use embedded driver intensity controlled lighting in all other highway locations and all dark zones. • Eliminate high elevated lightening in "dark zones". • Use Led and other lighting technologies that eliminate or reduce UV wavelengths that attract insects, bats, birds, and other wildlife. Consider lighting that is skewed toward red or green spectral bands.
VISUAL RESOURCES, VIEWSHEDS AND AESTHETICS, INCLUDING COUNTRY ROAD AND CONSERVATION ROAD IMPACTS			
Secondary impacts of highway to country road aesthetics and sensitive environmental corridors and lower service roadways.	Seldom considered		• Develop and adopt standards that prevent future improvements to country/conservation roads • Defend country/conservation roadways using legislative guarantees (e.g. Nature Preserve Dedication) and
Highway safety improvements by lowering traffic speed	Seldom considered over entire highway, typically only irregular terrain and ramping settings	Create traffic calming to discourage increased traffic speeds	• Create narrower roadways with curb and gutter and minimum or no clearance zones. • Change vertical and horizontal radius alignment of road • Create irregular vegetation landscape rooms with changing driver viewsheds and distances, through which the vehicles must travel to reduce travel speeds.
Driver viewshed and experience	Safety is usually the only consideration on highways. Aesthetics and view shed	Alternative screening methods to shield neighborhoods and distractions while	• Provide angled views and varying viewing screens and distances.

	STANDARD	BETTER	BEST PRACTICE
	experience is typically only considered on secondary roadways	focusing drivers' attention for safety viewshed	• Avoid solid sound wall approach • Consider slight curvilinear road corridor that allows changing view • Consider visual elements: art, sculpture, creatively designed overpasses, etc.
IMPACTS AND COSTS TO CONSERVATION LANDS			

External costs from Highway contamination short and long term to conservation lands	Seldom considered	• Create a defined highway environmental impact zone using the latest science to recognize that highway construction and operations have direct and indirect impacts to land and water resources (and people) that are not presently not required by Tollway or IDOT to be addressed through County, State or Federal regulations.
		• Create a funding program to repair, restore, maintain impacted environmental resources within the defined highway environmental impact zone.
			• Create regionally funded endowment using highway-generated revenues to cover stewardship costs
			• Create catastrophic fund for major impacts to conservation lands
			• Fund rapid response teams that can act across political boundaries
			  • Create a bonded (or coverage by another type of surety) to pay for the restoration, maintenance and management of impacts within and the beyond the highway ROW within the defined Impact zone for the life of the highway.
			  • Over the life of the highway, use Life Cycle and Natural resource Damage Assessment claim standard methods to standardize how restoration, management and maintenance dollars and on-going investments in the compensation landscapes are defined, acted upon and monitored for performance.
			•

AIR QUALITY AND GREENHOUSE GAS EMISSIONS(GHG)			
Eliminate and Minimize embodied GHG emissions from construction, materials, and operations and maintenance	Seldom considered; now being considered in Federal EIS and some state appropriation considerations (see CA,	Do a highway life cycle analysis as a part of the business plan for this highway and identify all strategies for eliminating and	• Develop a program to use low GHG emission construction, low embodied emissions materials, and

	STANDARD	BETTER	BEST PRACTICE
	OR, etc) for highway funding.	minimizing GHG emissions in all stages and operations of the highway	operations/maintenance programs that have reduced life-cycle GHG emissions • Use low electricity use road lighting (se LED lighting). • Use low/no salt deicing/anti-icing technologies and reduce highway maintenance truck vehicle hours of use annually • Explore use of Chinese carbon fiber
Mitigate embodied emissions and operational emissions	Seldom considered; now being considered in Federal EIS and some state appropriation considerations (see CA, OR, etc) for highway funding.	Do a highway life cycle analysis as a part of the business plan for this highway and identify all strategies for eliminating and minimizing GHG emissions in all stages and operations of the highway and evaluate alternative energy strategies that can be integrated with the highway design and compensation landscape to eliminate and minimize GHG emissions	Compensate and offset material embodied GHG emissions and operational GHG emissions using ecological sequestration strategies in the vicinity of the corridor
Explore opportunities for renewable energy along the corridor	Seldom considered; now being considered in Federal EIS and some state appropriation considerations (see CA, OR, etc) for highway funding.	Do a highway life cycle analysis as a part of the business plan for this highway and identify all strategies for eliminating and minimizing GHG emissions in all stages and operations of the highway and evaluate alternative energy strategies that can be integrated with the highway desing and compensation landscape to eliminate and minimize GHG emissions.	• Solar and wind power • Utilize heat from urban heat island effect • Grow biofuels along corridor • Consider rechargeable lane technologies under development for electric vehicles
ARCHAELOGICAL, HISTORIC AND CULTURAL RESOURCES			
Use findings from cultural/archaeological investigation when designing corridor alignment	Phase I surveys inform design and Phase II survey removes archeological resources from ROW as mitigation strategy	Protect and avoid such resources	• Combine important archeological areas with restoration or compensation areas as areas to avoid
Consider interpretive opportunities along corridor, integration with recreational trails, and adjacent natural resource areas	Seldom considered	Protect and avoid, and integrate such resources in the highway plan as a valuable asset	• Celebrate corridor history (Native American and recent immigrant/agricultural history) with interpretive signage and tours

	STANDARD	BETTER	BEST PRACTICE
			• Develop visual and audio interpretation of the corridor, available to recreational users and commuters via mobile technology (audio/visual in cars, QR codes, trail or rest stop signage, etc.)
Consider new stewardship culture in the region			• Tell the story of the 21st century highway through interpretive signs and interactive/mobile content