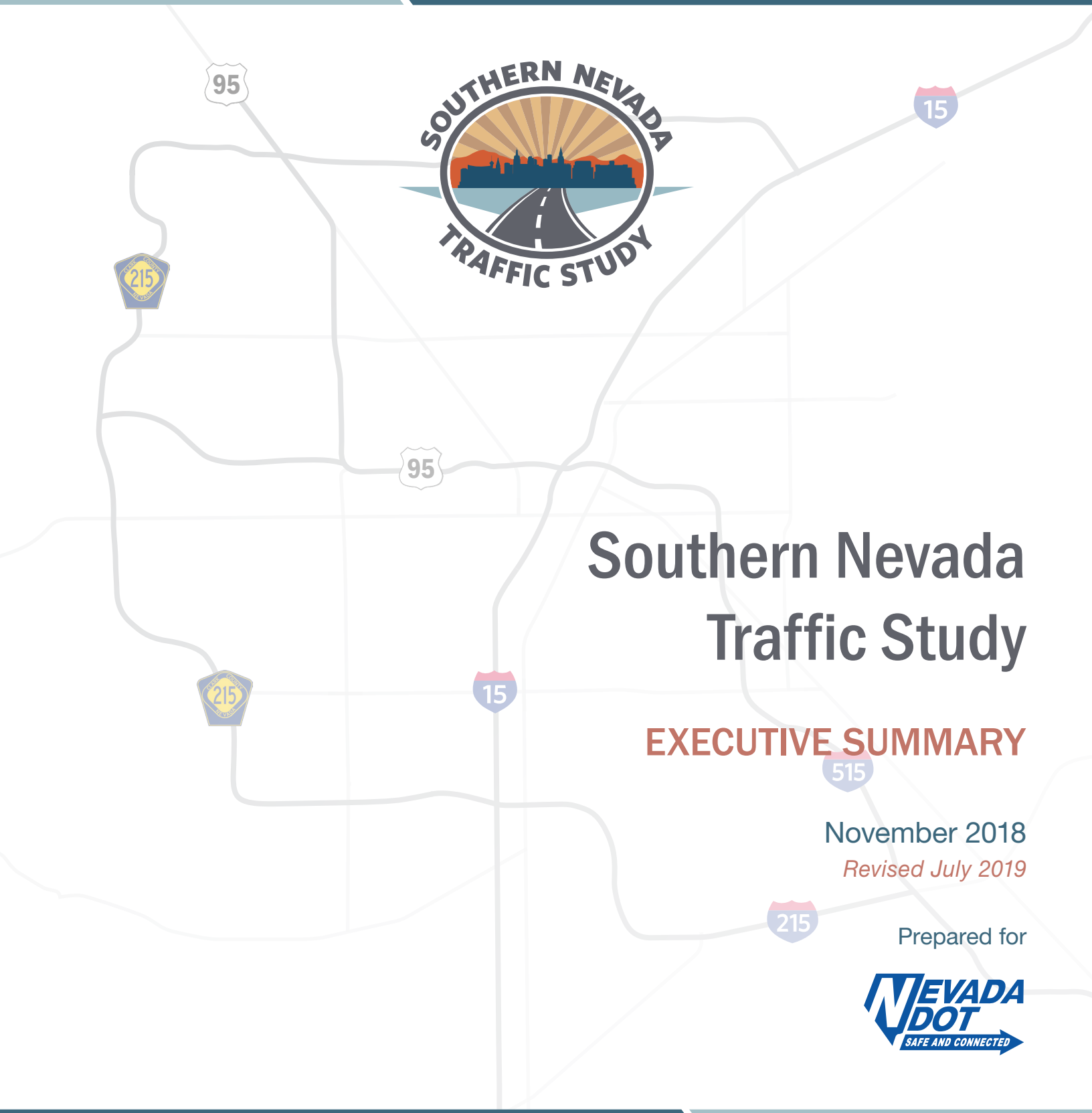


Southern Nevada Traffic Study

EXECUTIVE SUMMARY

November 2018

Revised July 2019

Prepared for

NEVADA DOT
SAFE AND CONNECTED

Prepared by HDR
in conjunction with
Jacobs and CA Group

Contents

continued

About the Study

The Nevada Department of Transportation (NDOT) conducted the first large-scale, system-wide traffic study of Southern Nevada freeways in the Las Vegas metropolitan area. The Southern Nevada Traffic Study (SNTS) included data collection, travel demand forecasting, traffic operations modeling, traffic analyses, alternatives development and evaluation, and benefit-cost analysis in coordination with ongoing projects and studies.

The study evaluated the needs of the region's freeway system, developed improvement strategies to meet short-term and long-term transportation needs, and maximize benefits of the Department's investments.

Goals and Objectives

- Develop forecast year 2040 traffic volumes for the study corridors
- Identify projects that relieve future mainline traffic congestion
- Apply benefit-cost analysis (BCA) to corridor alternatives
- Create preliminary layouts and cost estimates for future projects

STUDY APPROACH

1. Identify existing and future congestion points along the freeway corridors
2. Provide and evaluate design alternatives and develop solutions to alleviate congestion bottlenecks
3. Perform benefit-cost analysis on alternatives to quantify return on investment
4. Create preliminary roadway plans and cost estimates to facilitate programming of future projects

PROJECT NEED

Population in the valley is growing rapidly. By 2040, over 2.8 million people will live in the Las Vegas region – an increase of over 34% from 2015. With this growth will come an increase in traffic on freeways and interstates. The purpose of this study is to identify freeway needs, decrease congestion, enhance safety, and ultimately improve mobility and quality of life.

SNTS accomplished several planning needs:

- Refreshed findings and traffic volumes from several separate and outdated studies that were conducted between 2003 and 2009
- Provided a consistent and system-wide set of traffic counts of freeway and ramp traffic patterns – over 1,300 locations
- Updated traffic volume forecasts to 2040 to:
  - » *Be in compliance with the air quality conformity approvals*
  - » *Design and construct projects based on 20-year projections*

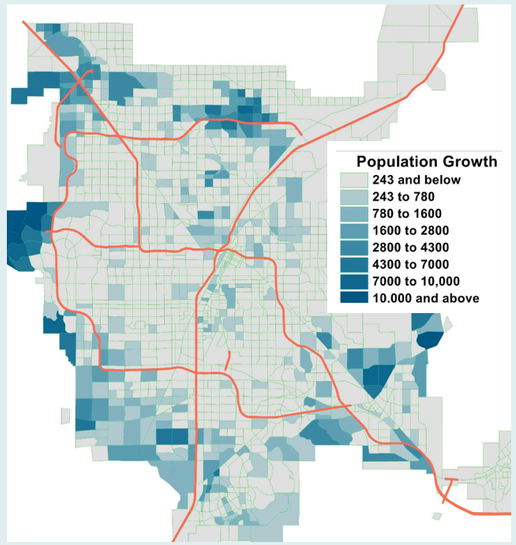


Fig 1 Areas of population growth in 2040

The corridors for alternative development comprised:

I-15 from Russell Road to Sloan Rd

Summerlin Parkway from CC 215 to US 95

CC 215 from Russell Road to the I-15/ I-215 System Interchange

I-215 from Windmill Ln to the I-515/ I-215 System Interchange

I-15/US 95/I-515 System Interchange

Planning and Environmental Linkage Process (PEL) Corridors

I-515 from Charleston Ave to I-215/I-515 System Interchange

I-15/I-215 System Interchange

I-215/I-515 System Interchange

Fig 2 Study area map

STRATEGY

SNTS studied freeway corridors with different levels of detail depending upon corridor status. Other corridors, shown in Figure 2, have been studied recently or have fewer anticipated future needs, and were not directly analyzed as part of the SNTS project.

MICRO-SCALE ANALYSIS

Corridors for Development of Project Alternative Improvements

SNTS developed and evaluated alternatives using microsimulation traffic operational analysis modeling. This included completion of preliminary conceptual designs for alternative project improvements. SNTS conducted the PEL process for a subset of these corridors.

MESO-SCALE ANALYSIS

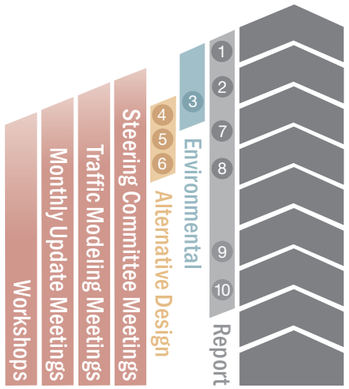
Corridors for Future Condition Assessment

SNTS performed meso-scale analysis on the remaining corridors. The study identified these corridors as needing an assessment of the existing and future traffic conditions, however, congestion mitigation alternatives were not developed.

PEL PROCESS

- Identifies and considers environmental constraints early in the planning process
- Informs alternative evaluation
- Make decisions that will be useful later in National Environmental Policy Act (NEPA) process
- Consistent with federal transportation legislation and guidance

Project Schedule



Fall 2018 • Final Report • Environmental
Summer 2018 • Benefit-Cost Analysis • Alternative Design • Environmental
Spring 2018 • Future Year Traffic Operational Analysis • Alternative Design
Winter 2018 • Existing Traffic Operational Analysis
Fall 2017 • Microsimulation Model Calibration
Summer 2017 • Updated Travel Demand Forecasts with 2040 RTC Model
Spring 2017 • Data Collection Travel Demand Forecasting (2035)
Winter 2017 • Travel Demand Model Preparation
Fall 2016 • Study Initiation

Study Products

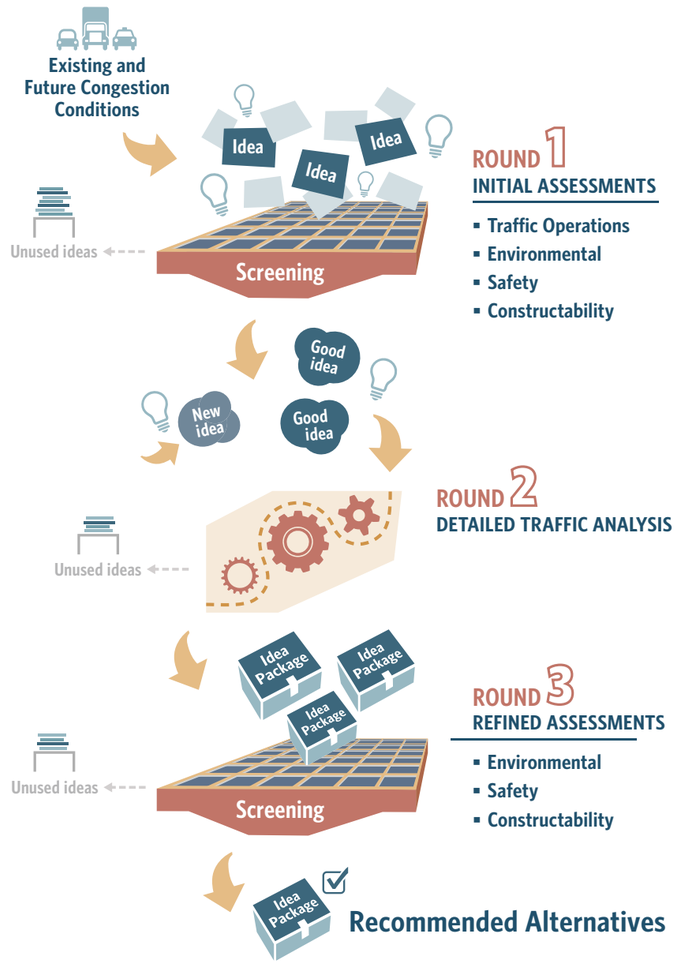
1. Existing traffic volumes
2. Methods and Assumptions report
3. Existing conditions traffic operational report
4. Future traffic forecasts
5. Design layouts
6. Cost estimates
7. Benefit-cost analysis
8. PEL Corridors Purpose & Need statement and final report
9. Future conditions traffic operational report
10. Final SNTS report

Partners

A SNTS Steering Committee provided guidance and oversight throughout the course of the SNTS. Representatives from Federal Highway Administration, Regional Transportation Committee of Southern Nevada, Clark County, City of Henderson, City of Las Vegas, and City of North Las Vegas participated in the Steering Committee, as well as personnel from NDOT Traffic Operations, NDOT Traffic Information, and NDOT Project Management. Several Steering Committee meetings consisted of half-day workshops to foster in-depth technical discussions.

Additional public engagement conducted for the PEL corridors included outreach through a SNTS website and participation in a public meeting.

Alternative Development Process



Once the project team identified future traffic congestion issues, they brainstormed potential alternative solutions for each of the corridors.

Round 1

They initially screened solutions using a qualitative ranking for each of these categories:

Traffic Operations
- » *Mainline Operations*
- » *Local Operations*

Environmental Impacts

Safety

Constructability
- » *Maintainability*
- » *Construction Impacts*

Based on the initial screening, they advanced alternatives that scored favorably for further analysis.

Round 2

SNTS completed a second round of quantitative screening and analyzed the safety aspects of the alternatives. This process produced a combination of individual ideas that were bundled together to form preferred alternatives for each corridor.

CORRIDORS FOR FUTURE ASSESSMENT

Look for the yellow highlighted areas in Figure 2

The study identified several corridors as needing an assessment of the existing and future traffic conditions, however, congestion mitigation alternatives were not developed. These corridors could be developed further in a future assessment.

- US 95 from CC 215 to the Spaghetti Bowl
- CC 215 from US 95 to Russell Road
- I-215 from I-15/I-215 System Interchange to Windmill Lane
- I-15 from South of Spaghetti Bowl entrance ramps to Russell Road

Modeling

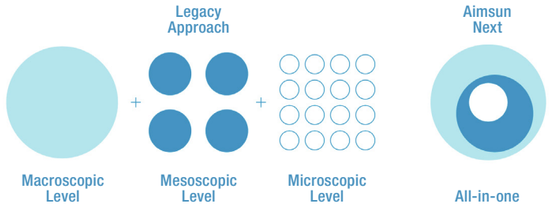
TRAVEL DEMAND MODELING

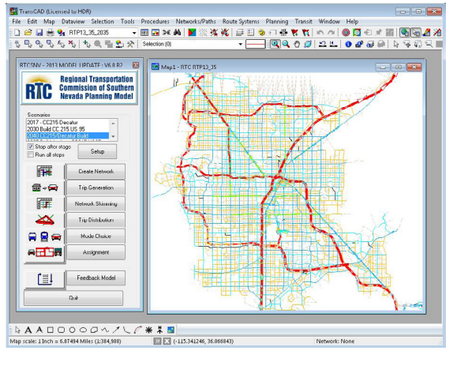
The SNTS team used the RTCSNV TransCAD Travel Demand Model (TDM) to project corridor traffic demand for the year 2040. The macro-scale model generates future trips and calculates trip origins and destinations based on projections of population and employment. The model network reflects the long range transportation plan, Access 2040 Regional Transportation Plan of RTC. The model output origin and destination trip tables provided input to the micro-scale model.

TRAFFIC OPERATIONS MODELING

Traffic operations analysis micro-scale modeling was performed with Aimsun Next, which combines the ability to perform travel demand macroscopic functions with meso- and microsimulation capabilities. The SNTS team created the macro-scale model by importing the TransCAD travel demand network and replicating the assignment in Aimsun Next. This macro model was then used to build sub-area networks for more detailed modeling at meso- and microscopic simulation levels, all housed in the same file. The team calibrated each sub-area corridor level network for existing conditions to match observed field conditions for various Measures of Effectiveness (MOE). The SNTS team then updated the sub-area networks to future 2040 conditions. Corridor improvement alternatives were created, tested, and evaluated under the future conditions scenario. The traffic results from these corridor models provided user benefits for the Benefit-Cost Analysis (BCA).

The SNTS project is unique in nature for NDOT as it is the first regional traffic analysis project that developed and compared alternatives among multiple corridors in the Las Vegas Valley, rather than along one single corridor. This created a need to evaluate available software analysis platforms in conjunction with project goals and objectives.





Aimsun Next was selected for several reasons:

- The software is a single platform for macro-, meso-, and microscopic modeling, resulting in a single integrated large network for all 3 levels.
- The model was geocoded regardless of the level of analysis being undertaken. This allowed for updates utilizing outside information sources, including GIS information.
- Sub-area modeling capability allowed the ability to to choose areas to increase detail and reporting. The software also allowed for detailed volume development in specific areas, based on the TransCAD TDM.
- Aimsun supports hybrid modeling, giving the team the ability to understand an alternative's direct impact to the study area corridor as well as the ability to assess meso-level impacts on adjacent corridors within the larger project area.

Benefit-Cost Analysis

After the project team identified the preferred corridor alternatives, a benefit-cost analysis (BCA) was conducted for each alternative and component idea.

WHAT IS BCA?

- Systematic approach to comparing the benefits and costs of alternatives
- Helps select optimum alternative while considering multiple benefits

WHAT ARE GOALS OF BCA?

- Determines soundness of investment decisions
- Provides basis for comparison of alternatives/projects

WHY BCA?

- Puts multiple Measures of Effectiveness (MOE) into a summary measure
- Helps validate the micro-simulation models
- Compares ideas and alternatives along corridors and across corridors

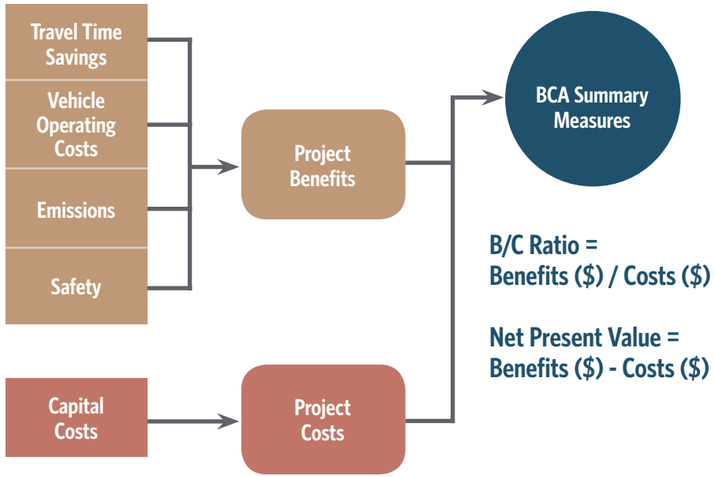


Fig 3 Benefit-cost analysis summary measures

BCA ASSUMPTIONS

The BCA used standard values and parameters adopted by NDOT and the Steering Committee. Benefits were assessed over a 20-year period. To ensure a fair comparison, each project idea was assumed to be constructed over a 2-year period from 2019 to 2020, while the project generated benefits from 2021 to 2040. The project team discounted these future benefits into present values using a 3% discount rate, and a more conservative 7% discount rate.

Cost Estimate Methodology

SNTS developed preliminary conceptual costs for the preferred alternatives along each corridor. The costs reflect conceptual layouts at the 10% level of design and were input in the benefit-cost analysis.

The methodology process included the following steps:

- Evaluated geometric options for corridor alternatives using established design criteria
- Prepared 10% level design drawings to determine right-of-way limits and feasibility of the preferred alternatives
- Entered geometric information for the alternatives into the NDOT Cost Estimate Wizard to calculate costs (assuming typical factors)
- Assumed an overall contingency of 25% due to preliminary 10% level of design

DESIGN GUIDELINE	CRITERIA BASIS	DESIGN CRITERIA SNTS			
		I-515/I-15/CC 215/ Summerlin Parkway	I-515/I-15/I-215/ SP Ramps	I-15 NB CD/ I-15 SB CD	All Local Streets
Functional Classification		Freeway	Freeway	C-D	U-Arterial
Ownership		NDOT	NDOT	NDOT	CLV/CCPW
Access		Full	Full	Full	Full
Design Speed mph	NDOT Design Guide	75	55	65	50
Posted Speed mph	10 MPH below Design Speed	65	45	55	45
Design Vehicle	AASHTO 2011 Table 2-1b	WB-67	WB-62	WB-50	WB-50
GEOMETRY					
Horizontal					
Minimum Horizontal Radius Curve (ft)	AASHTO 2011, Table 3-9 (US Customary) (Emax 6% full super)	Match Existing	1060	1485	833
Minimum Length of Curve (ft)	NDOT Section 2.2 15X Design Speed	Match Existing	1650	975	1500
Maximum Superelevation - Emax (%)	NDOT Table 1.2 and Section 2.13	Match Existing	6%	8%	6%
Design Superelevation Rate (Dependent on Curve Radius)	AASHTO 2011, Tables 3- and 3-13b	Match Existing	6%	Varies	2% NC
**All other criteria are dependent upon Design Speed and the above criteria*					

Fig 4 SNTS standard design criteria

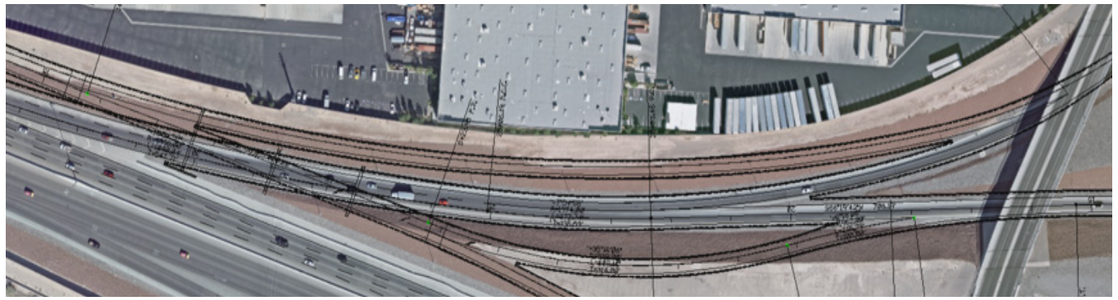


Fig 5 Example conceptual layout from I-15/I-215/CC 215 System Interchange

Cost Estimate Assumptions

- Cost estimates in **current year dollars**
- For roadways with potential outside barrier, **a closed drainage system**
- **Concrete pavement type** for all interstate segments, **plantmix pavement** for Summerlin Parkway
- Average **14-foot heights for retaining walls** for bridge approaches

ADDITIONAL COST ROLL-UP

- 15% of overall construction items are additional items
- 7% mobilization, 12% time related overhead
- 10% traffic control
- 3% landscape and architecture
- 1% legal and admin costs
- 3% environmental
- 3% hydraulic/stormwater

» **25% overall contingency** *(included at the end)*

- 14% total preliminary and final engineering
- 5%, 10%, and 15% construction engineering, based on cost

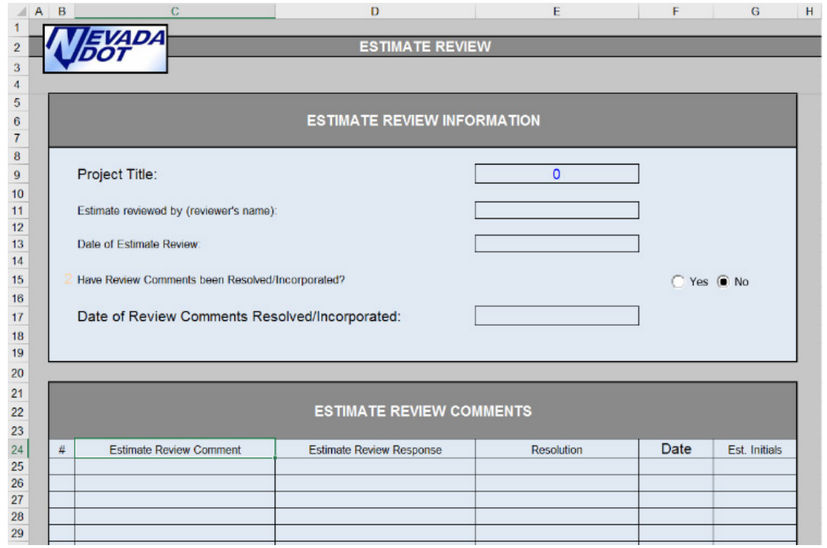


Fig 6 NDOT Cost Estimate Wizard

Data Collection

One of the unique aspects of SNTS is the scale of the overall study. Given that one of the foremost project goals was to develop a comprehensive traffic model for most of the freeway systems in the Las Vegas Valley, the data collection effort on SNTS was monumental. The data was geocoded, allowing ease of use and accuracy.

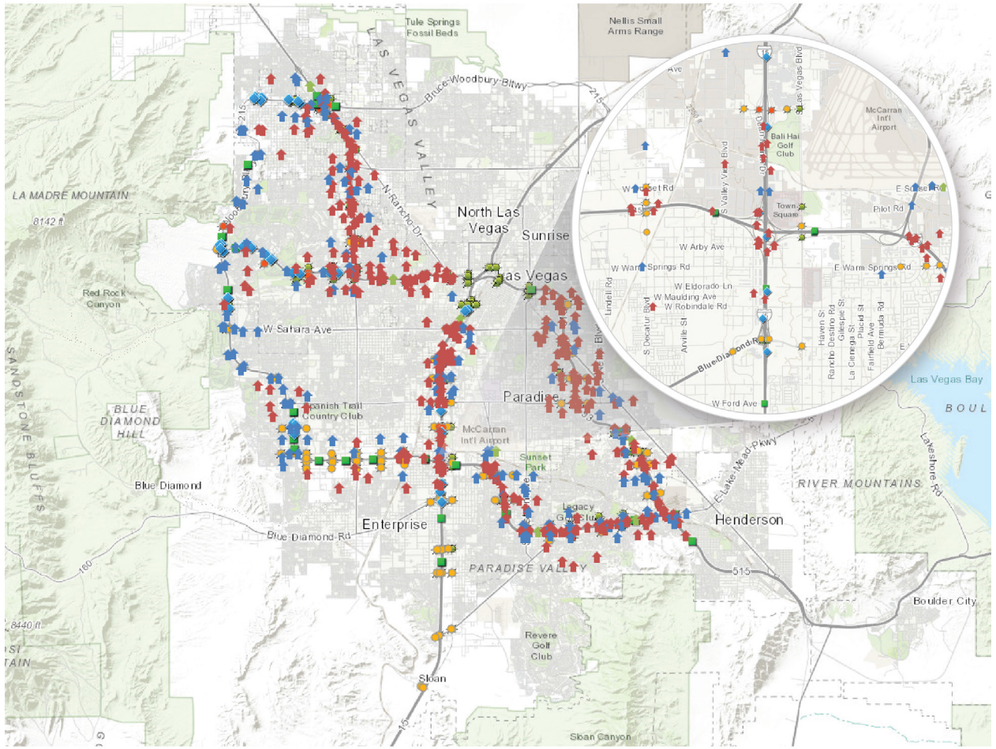


Fig 7 ArcGIS online map for SNTS project related data from a variety of resources

DATA COLLECTION STATISTICS AND BENEFITS

SNTS assembled and collected data on traffic volume, speeds, travel time, and crash data in order to build a comprehensive databank.

Sources included:

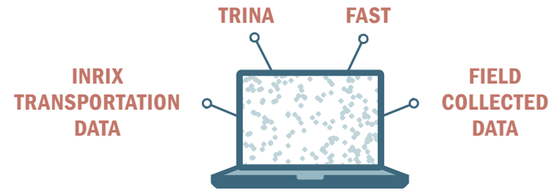
- NDOT's Traffic Records Information Access (TRINA)
- RTC's Freeway and Arterial System of Transportation (FAST)
- INRIX transportation data
- Field collected data

SNTS developed a GIS-based traffic databank, used to establish existing conditions and for calibration of the traffic model.

Types of data included:

Daily and hourly traffic volumes	Turn movement counts
Ramp counts	Travel speeds
Travel times	Traffic signal timing
Crash data	City of Las Vegas provided over 700 counts

1,300+
DATA POINTS ANALYZED



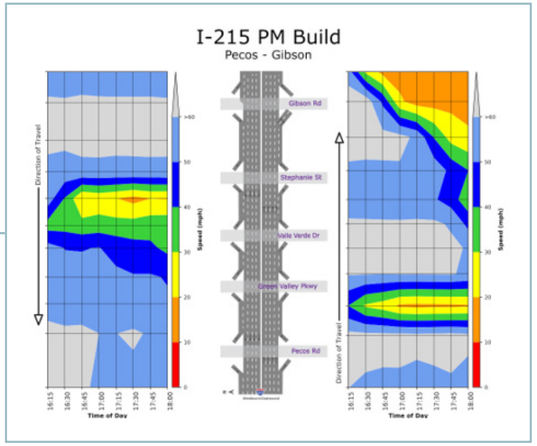


Fig 8 Congestion heat map showing peak period travel speeds calibrated to field collected data

Recommended Alternatives

The results of the analysis are presented for each corridor. The build condition for each corridor in general includes an additional lane in each direction. The corridor alternatives are in addition to this capacity improvement. The alternatives summary of results in the following pages show the results for corridor alternatives as well as the build results.

Proposed alternatives feature combinations of the following improvements:

- Braided ramps are grade-separated ramps that preclude traffic merging conflicts
- Ramp augmentations include lane widening, dual and/or extended turn lanes, and other improvements
- Direct connect ramps are dedicated ramps for HOV lanes, connecting HOV lanes through a system interchange
- Collector Distributor (CD) roads are extra lanes between the freeway mainline and the arterial system
- Auxiliary lanes provide additional capacity

Look for these symbols in the following pages to identify features of the proposed alternatives.

Some individual improvement alternatives are included in the overall corridor preferred alternative, even though individually they produce a low or negative benefit-cost ratio. These elements are considered necessary, and contribute positively to the overall corridor benefits of the preferred alternative.

ALTERNATIVE SUMMARY RESULTS

Alternative Result

Build Result

Benefit-Cost Ratio
X.X
X.X

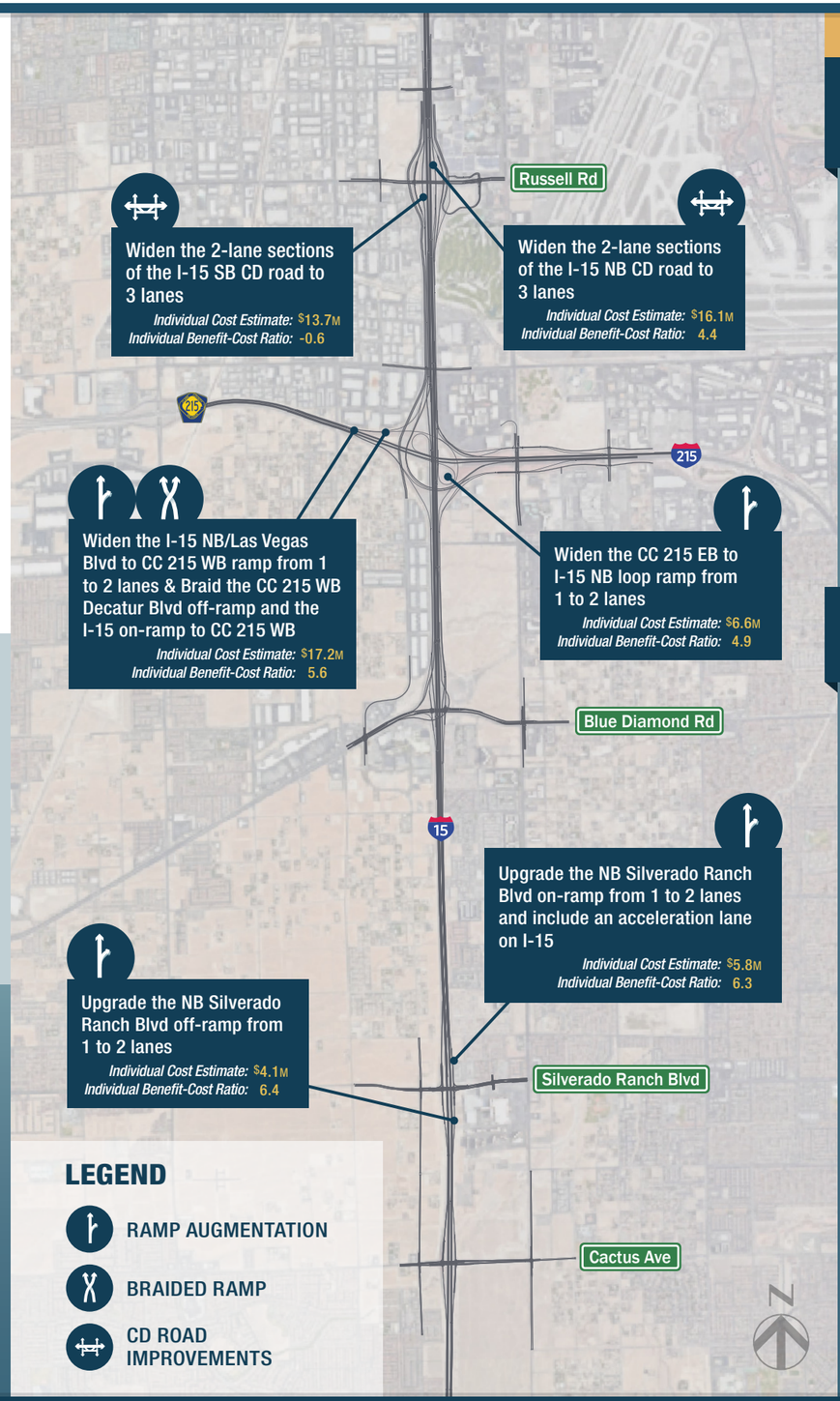
The benefit-cost ratio compares the total benefits to the capital costs of the alternative discounted at a 7% rate.

Net Present Value
$XX.XM
$XX.XM

The net present value shows the total discounted benefits net of capital costs for the alternative in 2018 dollars.

Overall Cost
$XX.XM
$XX.XM

The overall cost is the SNTS cost estimated at the 10% level of design in 2018 dollars.



CORRIDOR ALTERNATIVE

I-15

Russell Rd to Sloan Rd

Includes additional lane of capacity in each direction for Build condition

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio
2.7
0.7

Net Present Value
$98.1M
-$94.0M

Overall Cost
$63.6M
$353.9M

CORRIDOR ALTERNATIVE

SUMMERLIN PARKWAY

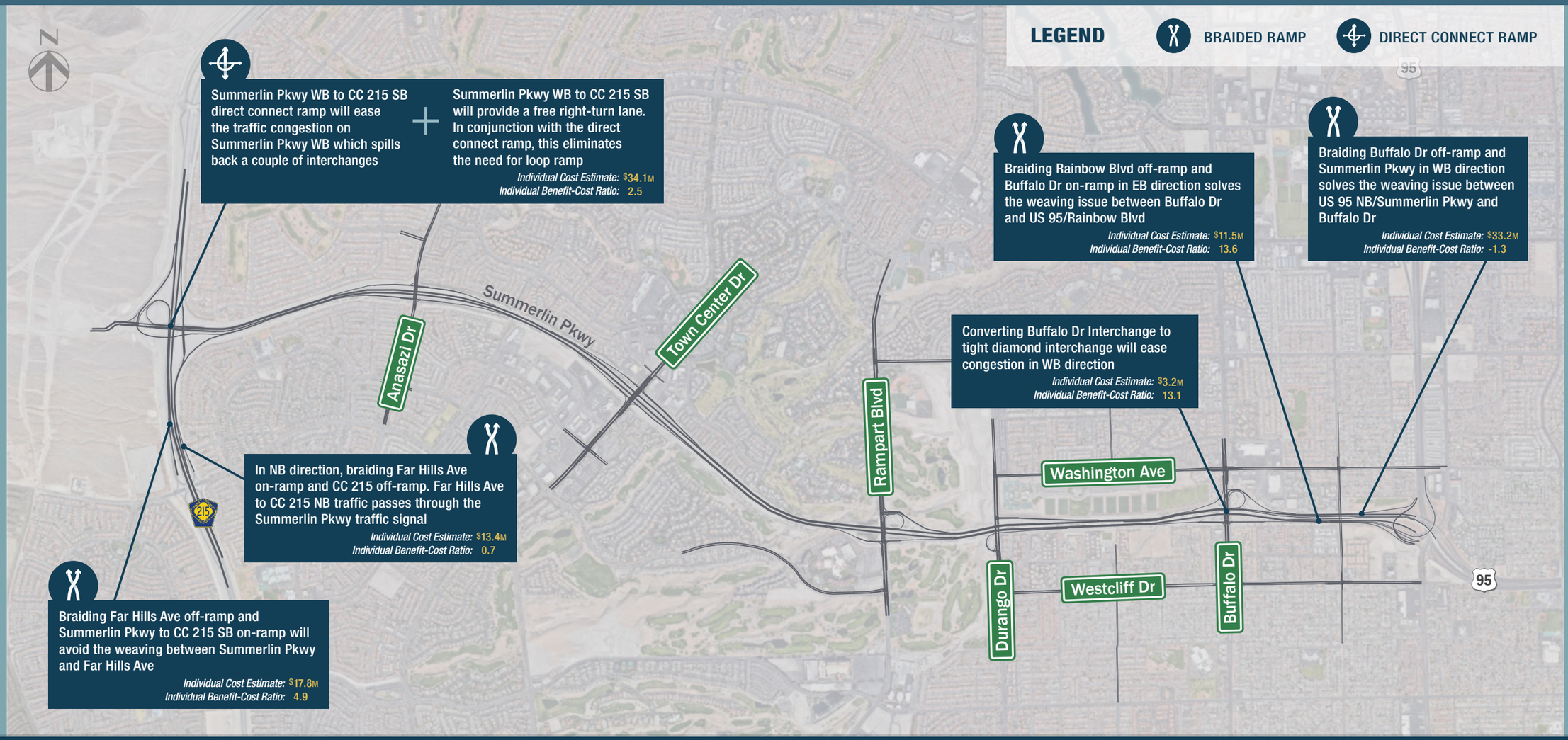
CC 215 to US 95

Includes additional lane of capacity in each direction for Build condition

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
2.6	$160.1M	$113.2M
1.3	$14.0M	$62.9M



LEGEND BRAIDED RAMP DIRECT CONNECT RAMP

Summerlin Pkwy WB to CC 215 SB direct connect ramp will ease the traffic congestion on Summerlin Pkwy WB which spills back a couple of interchanges

+

Summerlin Pkwy WB to CC 215 SB will provide a free right-turn lane. In conjunction with the direct connect ramp, this eliminates the need for loop ramp

Individual Cost Estimate: $34.1M
Individual Benefit-Cost Ratio: 2.5

Braiding Rainbow Blvd off-ramp and Buffalo Dr on-ramp in EB direction solves the weaving issue between Buffalo Dr and US 95/Rainbow Blvd

Individual Cost Estimate: $11.5M
Individual Benefit-Cost Ratio: 13.6

Braiding Buffalo Dr off-ramp and Summerlin Pkwy in WB direction solves the weaving issue between US 95 NB/Summerlin Pkwy and Buffalo Dr

Individual Cost Estimate: $33.2M
Individual Benefit-Cost Ratio: -1.3

Converting Buffalo Dr Interchange to tight diamond interchange will ease congestion in WB direction

Individual Cost Estimate: $3.2M
Individual Benefit-Cost Ratio: 13.1

In NB direction, braiding Far Hills Ave on-ramp and CC 215 off-ramp. Far Hills Ave to CC 215 NB traffic passes through the Summerlin Pkwy traffic signal

Individual Cost Estimate: $13.4M
Individual Benefit-Cost Ratio: 0.7

Braiding Far Hills Ave off-ramp and Summerlin Pkwy to CC 215 SB on-ramp will avoid the weaving between Summerlin Pkwy and Far Hills Ave

Individual Cost Estimate: $17.8M
Individual Benefit-Cost Ratio: 4.9

CORRIDOR ALTERNATIVE

CC 215

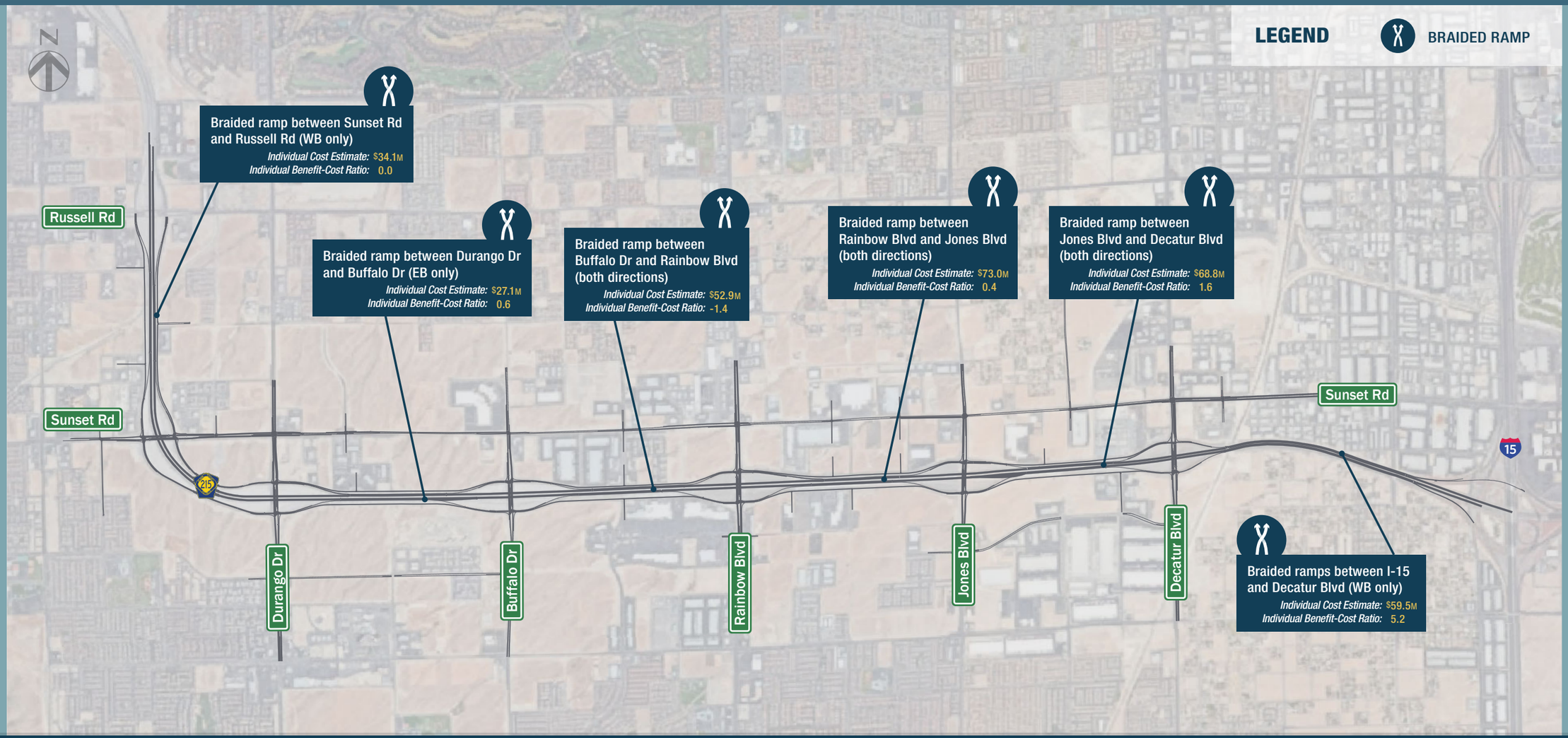
Russell Rd to the I-15/ I-215 System Interchange

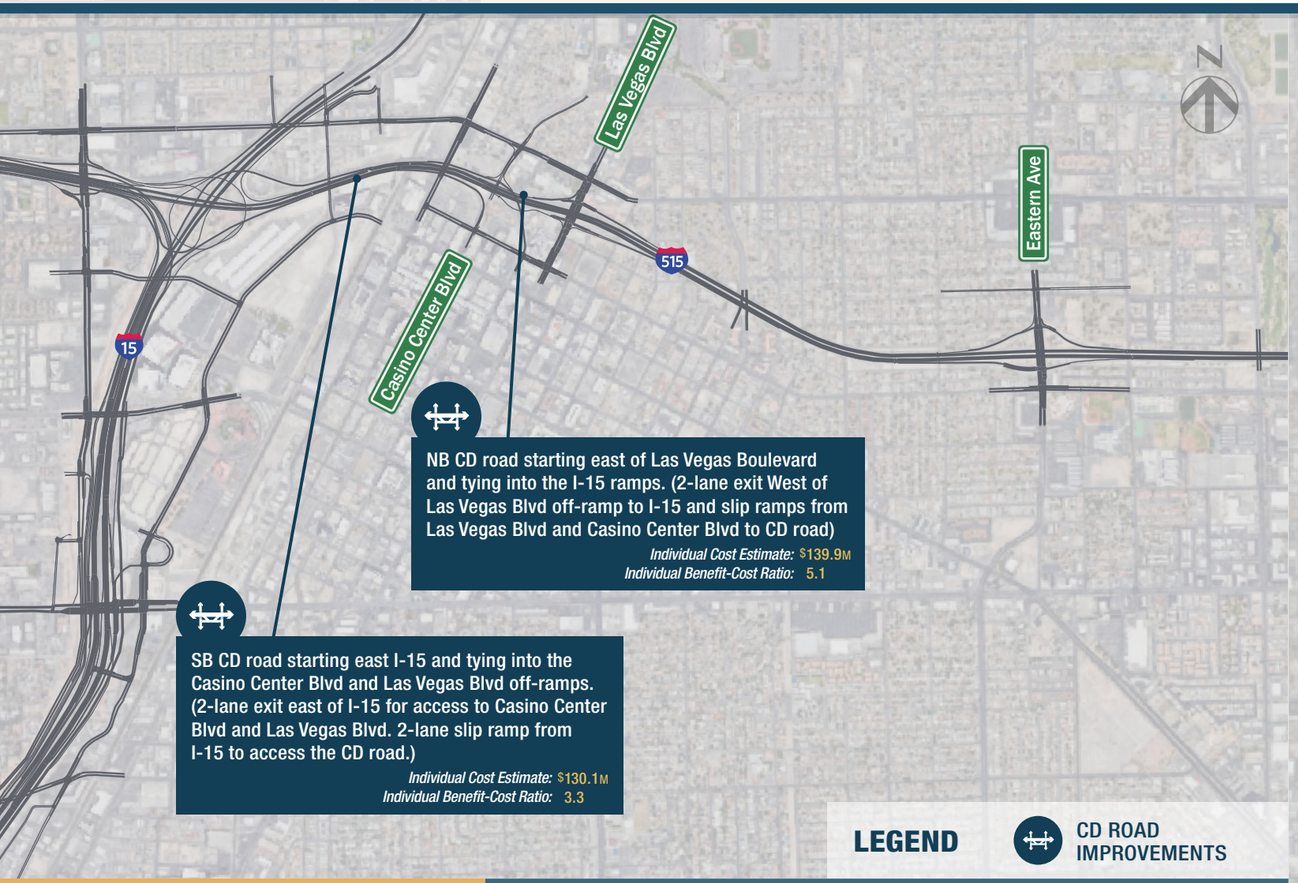
Includes additional lane of capacity in each direction for Build condition

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
1.7	$193.1M	$315.4M
18.2	$204.6M	$13.5M





CORRIDOR ALTERNATIVE

Includes additional lane of capacity in each direction for Build condition

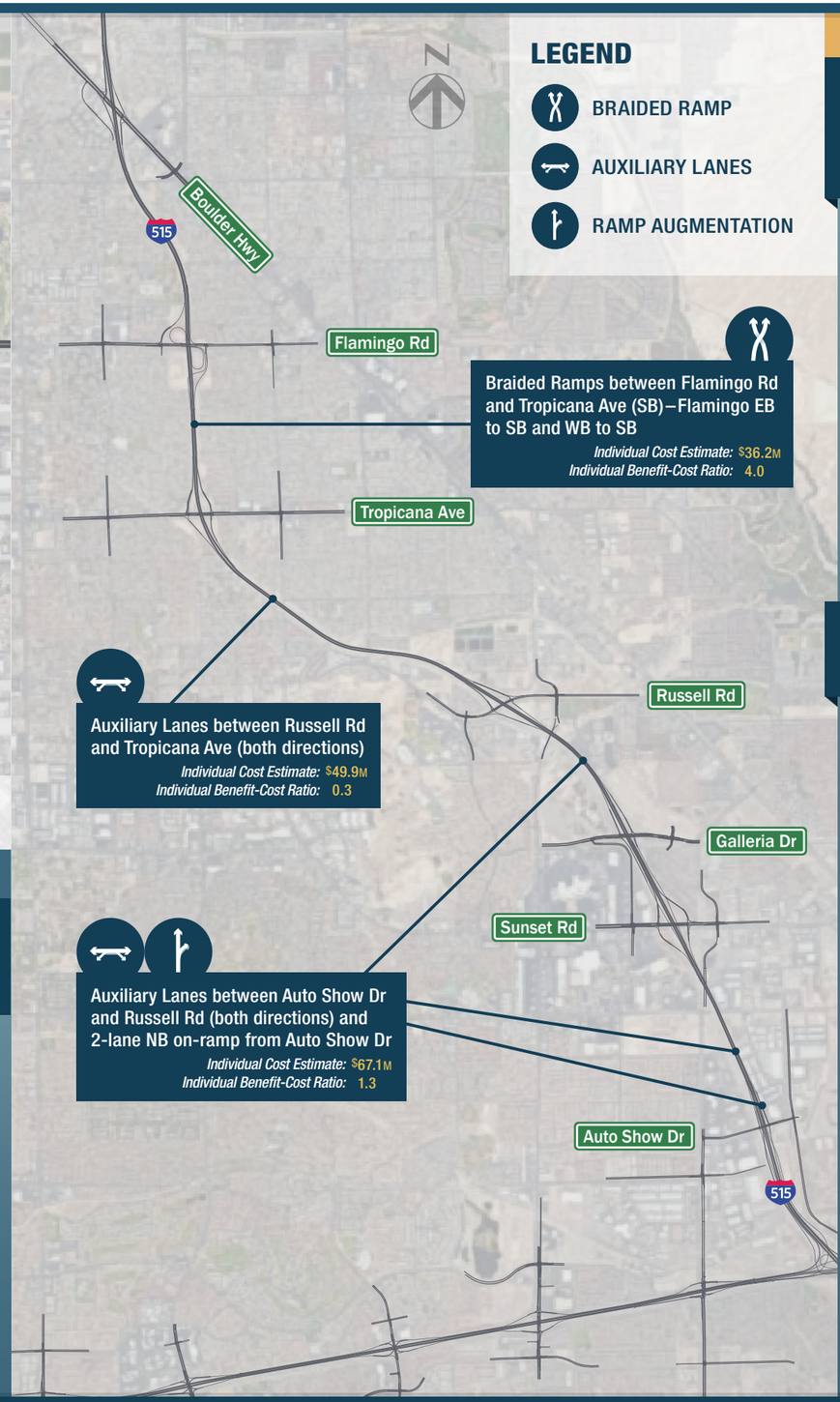
I-515 North

US 95/I-515 to Charleston Blvd

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
4.8	$923.9M	$269.9M
0.3	-$531.5M	$853.4M



CORRIDOR ALTERNATIVE

I-515 South

Charleston Blvd to the I-215/ I-515 System Interchange

Includes additional lane of capacity in each direction for Build condition

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
UP TO 1.2*	UP TO $32.4M*	$153.2M
1.6	$116.5M	$215.3M

** Depends on alternative chosen for system interchange*

ALTERNATIVE 1

I-215/I-515
System Interchange

ALTERNATIVE 1 SUMMARY RESULTS

● ALTERNATIVE RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
0.4*	-$86.1M	$151.3M

** The system interchange alternatives are a necessary step to making improvements on I-515 South and I-215. The benefits of these alternatives with the improvements on I-515 South and I-215 are ≈1.0.*

ALTERNATIVE 2

I-215/I-515
System Interchange

ALTERNATIVE 2 SUMMARY RESULTS

● ALTERNATIVE RESULT

Benefit-Cost Ratio	Net Present Value	Net Present Value
0.5*	-$71.3M	$171.0M

** The system interchange alternatives are a necessary step to making improvements on I-515 South and I-215. The benefits of these alternatives with the improvements on I-515 South and I-215 are ≈1.0.*

CORRIDOR ALTERNATIVE

I-215

Windmill Ln to the I-515/ I-215 System Interchange

Includes additional lane of capacity in each direction for Build condition

ALTERNATIVE SUMMARY RESULTS

● ALTERNATIVE RESULT ● BUILD RESULT

Benefit-Cost Ratio	Net Present Value	Overall Cost
UP TO 1.0*	UP TO -$1.1M	$132.8M
3.9	$151.6M	$57.7M

** Depends on alternative chosen for system interchange*

Benefit-Cost Results Summary

The table below summarizes benefit-cost results for all corridors in terms of the benefit-cost ratio and the overall cost. For each corridor, the benefit-cost results are shown for the corridor alternative and the individual ideas that make up that alternative compared to the build scenario.

CORRIDOR IDEAS	B/C RATIO	OVERALL COST
I-15 (Russell Rd to Sloan Rd)	**2.7**	**$63.6M**
» Widen the 2-lane sections of the I-15 SB CD road to 3 lanes	-0.6	$13.7M
» Widen the I-15 NB/Las Vegas Blvd to CC 215 WB ramp from 1 to 2 lanes and braid the CC 215 WB Decatur Blvd off-ramp and the I-15 on-ramp to CC 215 WB	5.6	$17.2M
» Upgrade the NB Silverado Ranch Blvd off-ramp from 1 to 2 lanes	6.4	$4.1M
» Widen the 2-lane sections of the I-15 NB CD road to 3 lanes	4.4	$16.1M
» Widen the CC 215 EB to I-15 NB loop ramp from 1 to 2 lanes	4.9	$6.6M
» Upgrade the NB Silverado Ranch Blvd on-ramp from 1 to 2 lanes and include an acceleration lane on I-15	6.3	$5.8M
Summerlin Parkway (CC 215 to US 95)	**2.6**	**$113.2M**
» Summerlin Pkwy WB to CC 215 SB direct connector + Summerlin Pkwy WB to CC 215 SB free right-turn lane	2.5	$34.1M
» In the NB direction, braided Far Hills Ave on-ramp and CC 215 off-ramp and Far Hills Ave to CC 215 NB traffic passing through the Summerlin Pkwy traffic signal	0.7	$13.4M
» Braided Far Hills Ave off-ramp and Summerlin Pkwy to CC 215 SB on-ramp	4.9	$17.8M
» Braided Rainbow Blvd off-ramp and Buffalo Dr on-ramp in EB direction	13.6	$11.5M
» Convert Buffalo Dr Interchange to tight diamond interchange	13.1	$3.2M
» Braided Buffalo Dr off-ramp and Summerlin Pkwy in WB direction	-1.3	$33.2M
CC 215 (Russell Rd to I-15/I-215 System Interchange)	**1.7**	**$315.4M**
» Braided ramp between Sunset Rd and Russell Rd (WB only)	0.0	$34.1M
» Braided ramp between Durango Dr and Buffalo Dr (EB only)	0.6	$27.1M
» Braided ramp between Buffalo Dr and Rainbow Blvd (both directions)	-1.4	$52.9M
» Braided ramp between Rainbow Blvd and Jones Blvd (both directions)	0.4	$73.0M
» Braided ramp between Jones Blvd and Decatur Blvd (both directions)	1.6	$68.8M
» Braided ramps between I-15 and Decatur Blvd (WB only)	5.2	$59.5M

CORRIDOR IDEAS	B/C RATIO	OVERALL COST
I-515 North (US 95/I-515 to Charleston Blvd)	**4.8**	**$269.9M**
» SB CD road starting east I-15 and tying into the Casino Center Blvd and Las Vegas Blvd off-ramps. (2-lane exit east of I-15 for access to Casino Center Blvd and Las Vegas Boulevard. 2-lane slip ramp from I-15 to access the CD road)	3.3	$130.1M
» NB CD road starting east of Las Vegas Blvd and tying into the I-15 ramps. (2-lane exit West of Las Vegas Blvd off-ramp to I-15 & slip ramps from Las Vegas Blvd and Casino Ctr Blvd to CD Rd)	5.1	$139.9M
I-515 South (Charleston Blvd to the I-215/I-515 System Interchange)	**UP TO 1.2***	**$153.2M**
» Braided Ramps between Flamingo Rd and Tropicana Ave (SB)–Flamingo EB to SB and WB to SB	4.0	$36.2M
» Auxiliary Lanes between Russell Rd and Tropicana Ave (both directions)	0.3	$49.9M
» Auxiliary Lanes between Auto Show Dr and Russell Rd (both directions) and 2-lane NB on-ramp from Auto Show Dr	1.3	$67.1M
* Depends on alternative chosen for system interchange		
I-215/I-515 System Interchange	**SEE BELOW**	
» Alternative 1 (braided ramps, add lane to ramp, modified ramp connection)	0.4*	$151.3M
» Alternative 2 (2-lane system-to-system ramps, modified rotary local movement system)	0.5*	$171.0M
* The system interchange alternatives are a necessary step to making improvements on I-515 South and I-215. The benefits of these alternatives with the improvements on I-515 South and I-215 are ≈1.0.		
I-215 (Windmill Ln to the I-515/I-215 System Interchange)	**UP TO 1.0***	**$132.8M**
» Auxiliary Lanes between Windmill Ln and Eastern Ave (both directions)	-1.7	$24.0M
» 2-lane off-ramps to Eastern Ave (EB) and 2-lane WB off-ramp to Pecos Rd (part of the Braided Ramp)	52.9	$1.2M
» Auxiliary Lanes between Eastern Ave and Pecos Rd (both directions)	6.5	$9.9M
» Braided Ramps between Pecos Rd and Green Valley Pkwy (both directions) and Braided Ramps between Valle Verde Dr and Stephanie St (both directions)	0.0	$97.7M
* Depends on alternative chosen for system interchange		

Planning and Environmental Linkage (PEL)

The Planning and Environmental Linkage (PEL) process identifies and considers environmental constraints early in the planning process. The process also involves soliciting input and feedback from public and agency stakeholders. Decisions that are made during the PEL process are useful during subsequent National Environmental Policy Act (NEPA) studies. The PEL process was conducted for the following three areas being studied as part of the larger Traffic Study, as depicted on the map on page 3:

- I-515 from Charleston Boulevard to I-215
- I-215/I-515 System Interchange
- I-15/I-215 System Interchange

PURPOSE AND NEED

A Purpose and Need statement is used in PEL and NEPA studies to articulate and focus on specific problems to address. The Purpose and Need is used to develop and evaluate alternatives.

The Purpose and Need of the PEL corridor study areas is to:

- Decrease traffic congestion
- Address safety

AGENCY COORDINATION AND STAKEHOLDER INVOLVEMENT

- NDOT informed the local, state, and federal agencies of the study and requested their scoping comments regarding any issues or concerns that they felt should be considered in the study.
- SNTS conducted regular Steering Committee meetings with representatives from counties and municipalities, and regional transportation agencies.
- SNTS staffed an information booth in conjunction with a public meeting held for the I-515 Restripe SlipRamp project. The team provided open house attendees with information about the study, the Purpose and Need, and the PEL area alternatives.
- SNTS created a study website that could be accessed by anyone in the study area at any time.

ENVIRONMENTAL CONDITIONS

The study team collected and mapped data for select environmental resources, using readily available mapping resources. The resources that were mapped included those that could influence or affect the evaluation of alternatives, based on their likely presence in the PEL study areas.

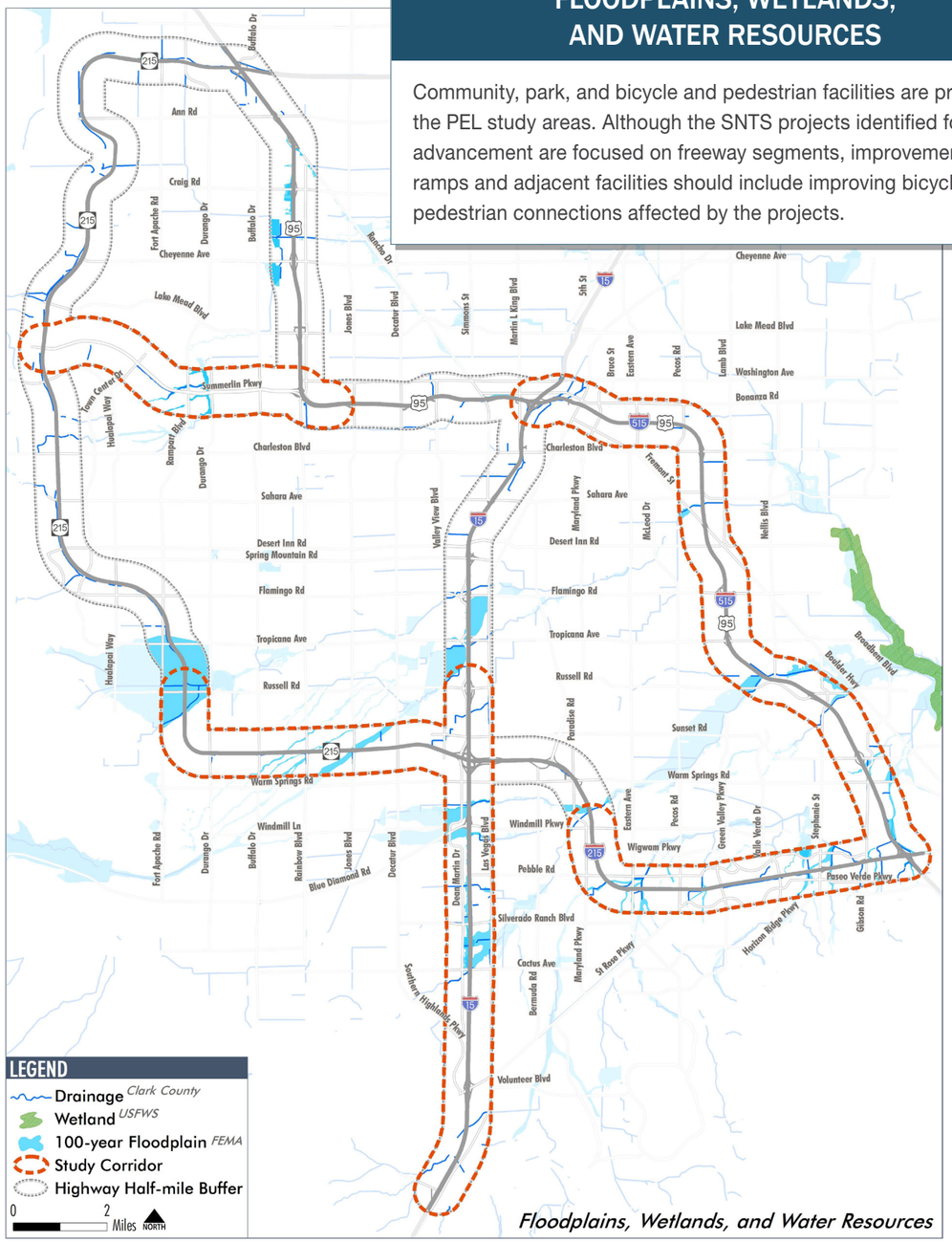
Potential effects to these resources could also affect the level of future NEPA documentation required. Maps of key resources for the SNTS corridors are presented in the following pages.

SNTS PEL APPROACH

The PEL process provides flexibility in linking the transportation planning and environmental decision-making. The approach used for the SNTS PEL involved:

FLOODPLAINS, WETLANDS, AND WATER RESOURCES

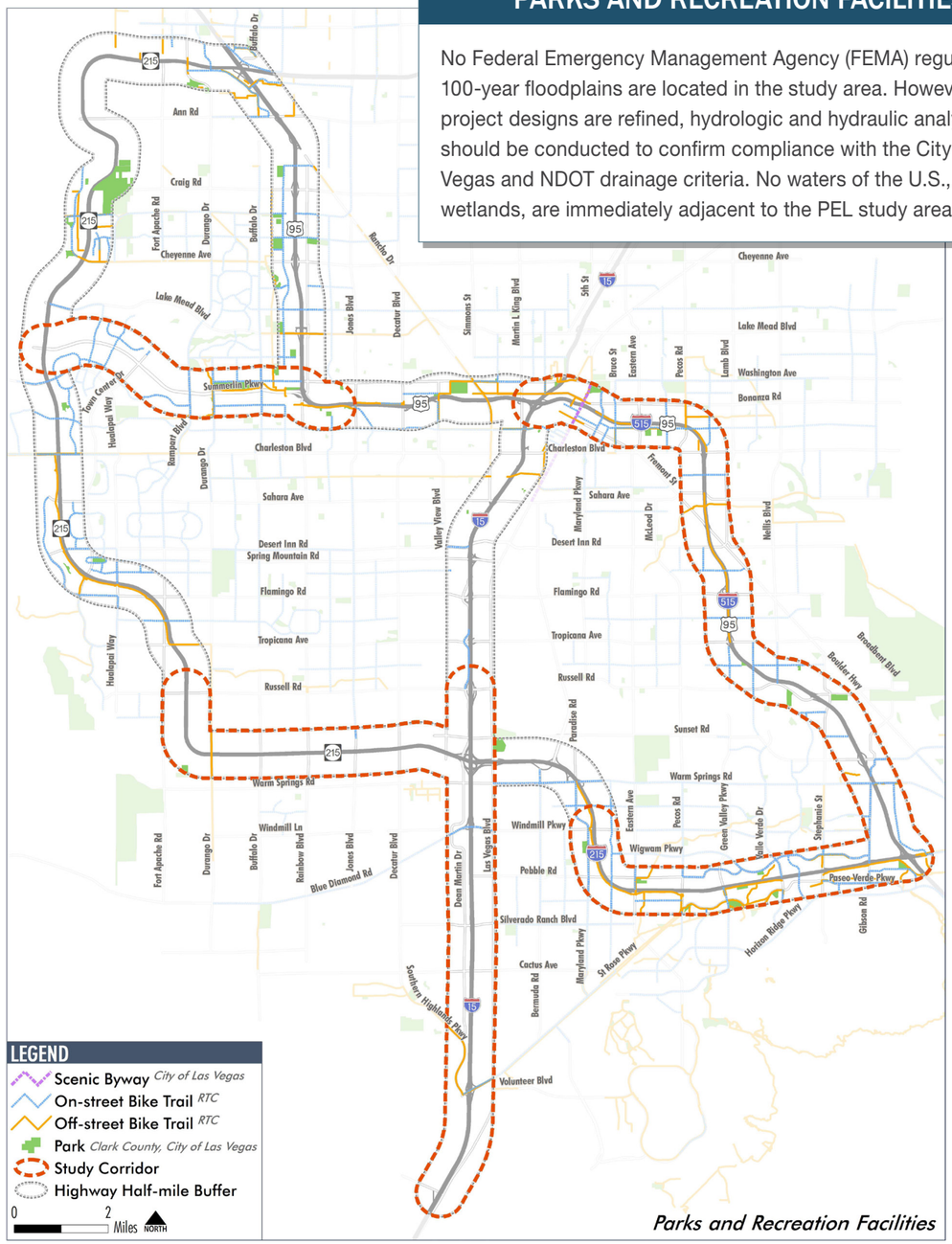
Community, park, and bicycle and pedestrian facilities are present in the PEL study areas. Although the SNTS projects identified for further advancement are focused on freeway segments, improvements to ramps and adjacent facilities should include improving bicycle and pedestrian connections affected by the projects.



Floodplains, Wetlands, and Water Resources

PARKS AND RECREATION FACILITIES

No Federal Emergency Management Agency (FEMA) regulated, 100-year floodplains are located in the study area. However, as project designs are refined, hydrologic and hydraulic analyses should be conducted to confirm compliance with the City of Las Vegas and NDOT drainage criteria. No waters of the U.S., including wetlands, are immediately adjacent to the PEL study areas.



Parks and Recreation Facilities

MINORITY POPULATION

Higher than county averages of minority populations exist within the PEL study areas. Each project must be assessed to determine if it will result in disproportionate effects to this group. For any adverse effects, NDOT should evaluate measures to avoid and minimize impacts to disadvantaged communities. If impacts cannot be avoided, NDOT should work with the affected community to develop mitigation measures to offset the impacts.

LEGEND

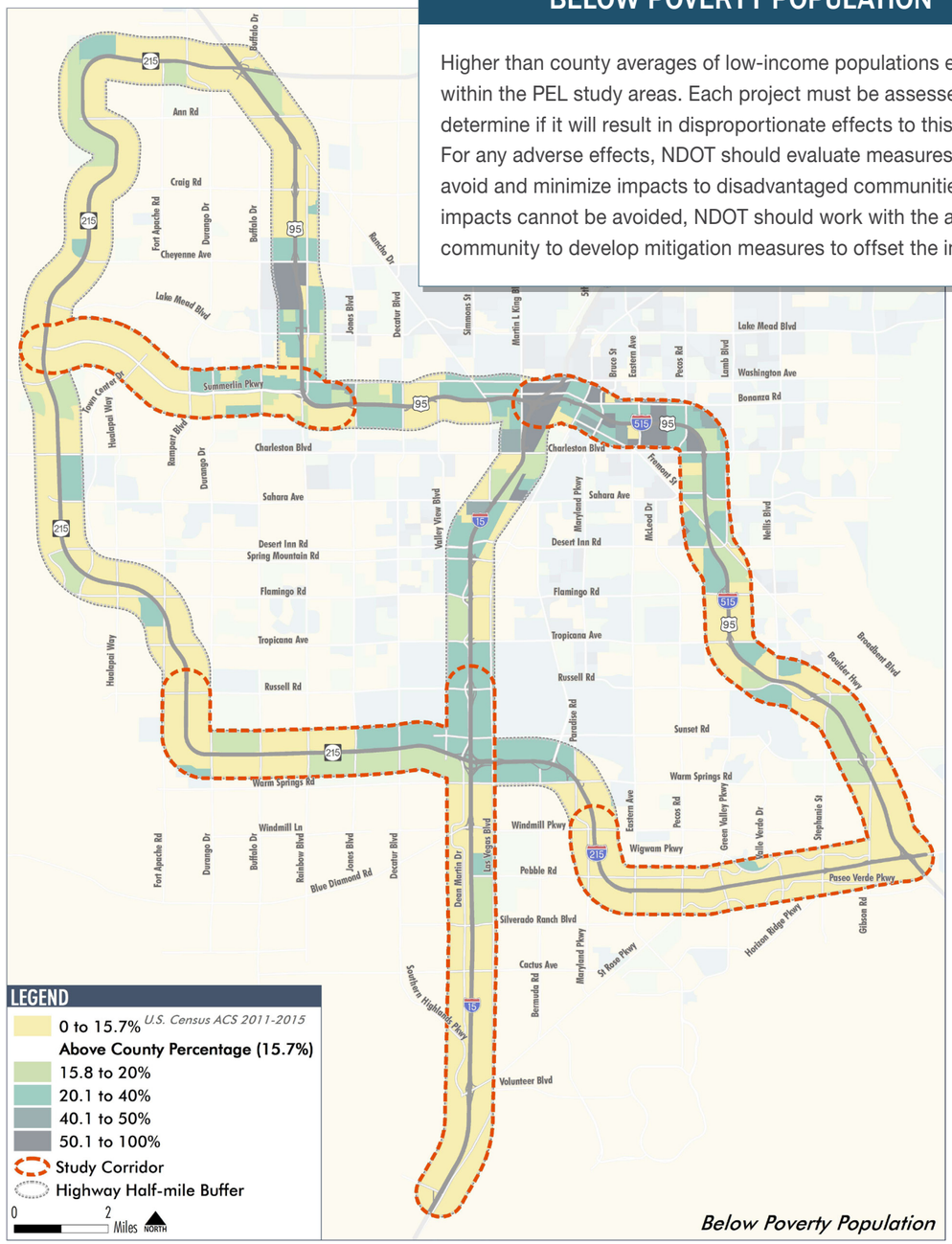
- 0 to 30% *U.S. Census ACS 2011-2015*
- **Above County Percentage (30%)**
- 30.1 to 50%
- 50.1 to 70%
- 70.1 to 90%
- 90.1 to 100%
- Study Corridor
- Highway Half-mile Buffer

0 2 Miles NORTH

Minority Population

BELOW POVERTY POPULATION

Higher than county averages of low-income populations exist within the PEL study areas. Each project must be assessed to determine if it will result in disproportionate effects to this group. For any adverse effects, NDOT should evaluate measures to avoid and minimize impacts to disadvantaged communities. If impacts cannot be avoided, NDOT should work with the affected community to develop mitigation measures to offset the impacts.



LEGEND

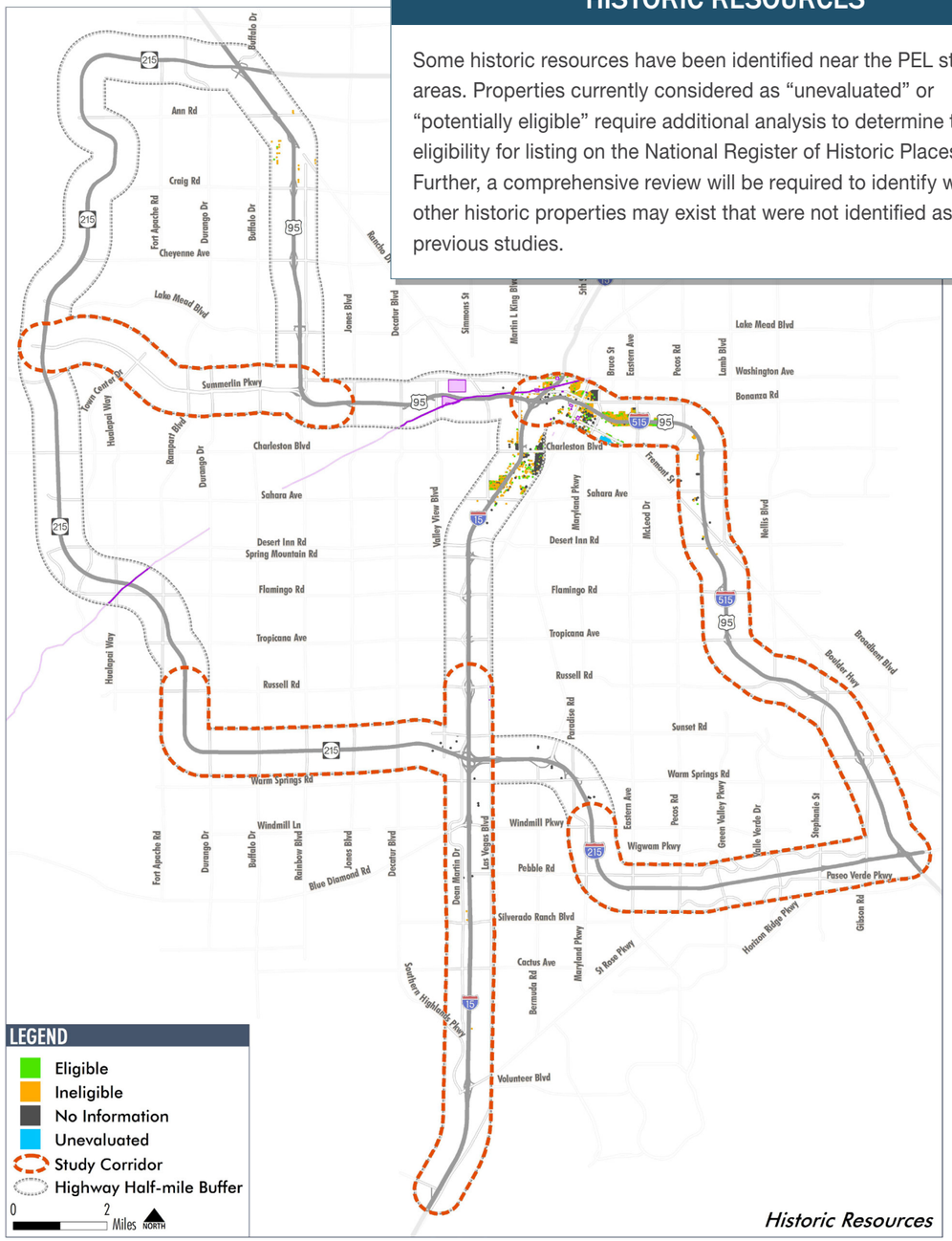
- 0 to 15.7% *U.S. Census ACS 2011-2015*
- **Above County Percentage (15.7%)**
- 15.8 to 20%
- 20.1 to 40%
- 40.1 to 50%
- 50.1 to 100%
- Study Corridor
- Highway Half-mile Buffer

0 2 Miles NORTH

Below Poverty Population

HISTORIC RESOURCES

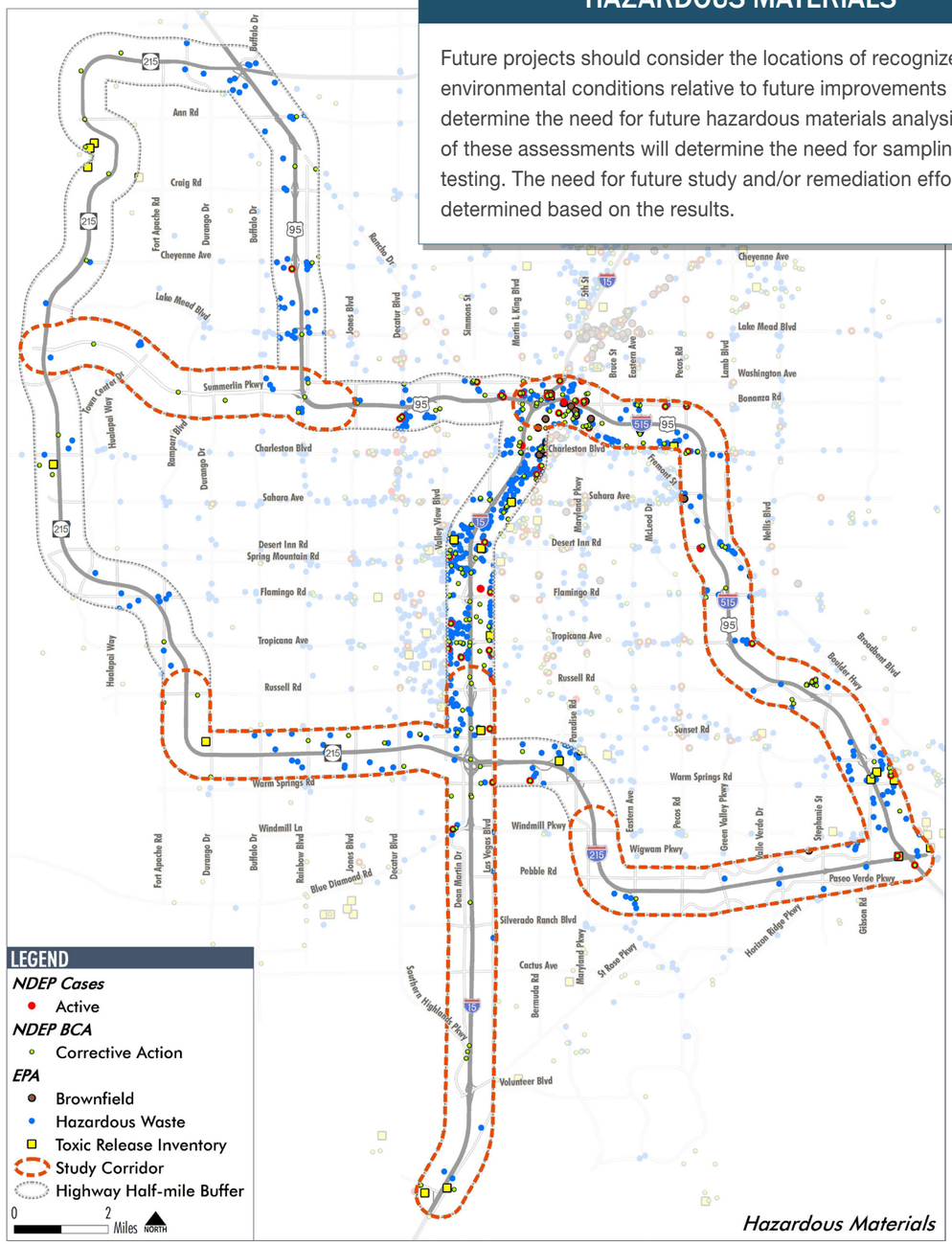
Some historic resources have been identified near the PEL study areas. Properties currently considered as “unevaluated” or “potentially eligible” require additional analysis to determine their eligibility for listing on the National Register of Historic Places (NRHP). Further, a comprehensive review will be required to identify whether other historic properties may exist that were not identified as part of previous studies.



Historic Resources

HAZARDOUS MATERIALS

Future projects should consider the locations of recognized environmental conditions relative to future improvements to determine the need for future hazardous materials analysis. Results of these assessments will determine the need for sampling and testing. The need for future study and/or remediation efforts will be determined based on the results.



Hazardous Materials

NEVADA DOT
SAFE AND CONNECTED