Memo

Stantec

To:	Garth Oksol	From:	Joseph A. Mactutis
	RTC		Stantec - Reno
File:	180101098	Date:	November 7, 2008

Reference: Plan Line Study for the SE Connector
Design Criteria

TASK 2.1.D.1 DESIGN CRITERIA

Stantec Consulting was retained by the RTC to perform a plan line study of the Southeast Connector extending from the intersection of South Meadows Parkway and Veterans Parkway to the intersection of Greg Street and Sparks Boulevard. This plan line study is limited to the previously established Valley Corridor.

This project memorandum addresses Task 2.1.D.1 Design Criteria, of the subject project. Stantec has reviewed the latest versions of the applicable design manuals and standards and the following summarizes this effort.

References

The following references provided the basis for establishing the design criteria:

- A Policy on Geometric Design of Highways and Streets, 2004, AASHTO
- Highway Capacity Manual, 2000, TRB
- 2030 Regional Transportation Plan (RTP), RTC, August 17, 2001
- Roadside Design Guide, AASHTO, 2006
- Manual of Uniform Traffic Control Devices, FHWA, 2003
- Public Works Design Manual, City of Sparks, Department of Public Works
- Public Works Design Manual, City of Reno, Department of Public Works
- Public Works Design Manual, Washoe County, Department of Public Works
- Intersection Channelization Design Guide, National Cooperative Highway Research Program Report (NCHRPR) 279, 1985
- Access Management Manual, Transportation Research Board, 2003
- Guidelines for Urban Major Street Design, Institute of Transportation Engineers, 1984
- Washoe County Hydrologic Criteria and Drainage Design Manual
- City of Sparks Hydrologic Criteria and Drainage Design Manual

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Functional Classification

The functional classification for the SE Connector is High Access Control-Arterial. As per the 2030 Regional Transportation Plan, design parameters associated with high access control arterials are:

- Posted Speeds - 45-55 mph
- Signals per mile – 2 or less
- Median Type – Raised with channelized turn pockets
- Left from Major Street? (Spacing from Signal) – Yes (750' minimum)
- Left from Minor Street or Driveway? – Only at signalized locations
- Right Decel Lanes at Driveways? – Yes if more than 30 inbound right-turn movements during peak hour.
- Driveway Spacing – 250' minimum spacing from signalized intersection, 500' minimum spacing from other driveways.

Level of Service (LOS)

Consistent with the RTC Board Decision of December 20, 2007 effectively making Level of Service (LOS) E the new Policy LOS for roadways with annual average daily traffic volumes (AADT's) of 27,000 or greater, the Policy LOS for the SouthEast Connector is LOS E. As per discussions with RTC staff, the limiting parameters (i.e. control delay) as put forth by the Highway Capacity Manual (TRB) shall be limited to the lower quartile of the specified range for LOS E (e.g. the range of delay for LOS E is >55-80 sec, the lower quartile would be 55-61.25 sec).

Stantec recommends that the Policy LOS as it relates to intersections be clarified to identify reasonable improvements that would, where possible, provide the Policy LOS of "E" for (in order of priority) for:

- major movements
- approaches
- the intersection as a whole

Design Speed

The design speed for the SE Connector is 55 mph. This is based on an assumed posted speed limit of 45 mph. This is consistent with Chapter 1, Section 4.4 of the City of Reno Public Works Design Manual.

Intersections

- Minimum signal spacing shall be at 0.5 miles

- Intersection angles shall be limited to 75 to 90 degrees
- The design vehicle shall be a WB-67
- Auxiliary lanes and storage lengths shall be consistent with the traffic study.

Horizontal Alignment

The horizontal geometry shall be governed by the AASHTO Policy on Geometric Design of Highways and Streets consistent with a design speed of 55 mph.

- Maximum Superelevation – Consistent with the City of Reno requirements, the maximum superelevation shall be 4%.

- Minimum Horizontal Curve Radius – Minimum horizontal curve radii for normal crown, 2%, and 4% super-elevation with a design speed of 55 mph are provided below.

Minimum Centerline Radius	Super Elevation
1835 feet	-2% (normal crown)
1345 feet	+2%
1190 feet	+4%

- Minimum Stopping Sight Distance – As per the AASHTO Policy on Geometric Design of Highways and Streets, the minimum stopping sight distance shall be 495 ft.

Vertical Alignment

The vertical geometry shall be governed by the AASHTO Policy on Geometric Design of Highways and Streets consistent with a design speed of 55 mph.

- Minimum Vertical Curve K-factor (Sag) - 114
- Minimum Vertical Curve K-factor (Crest) - 115
- Maximum Gradient (%) – The AASHTO recommended maximum grade for "level" terrain is 5%.
- Minimum Gradient (%) – Where the roadway does not have curb and gutter a longitudinal slope of 0% is permitted. Where the roadway has curb and gutter, the minimum longitudinal slope shall be 0.6% (City of Reno Standard).
- Flood Elevation – Roadway elevation shall be set such that the roadway surface elevation of at least one through lane in each direction shall be above the 117 year flood elevation.

- Bridge Elevation – Four feet above the 117 year flood elevation. The City of Sparks and Washoe County Drainage Design Manuals specify that the bottom of bridge elevation should be 2 feet above the 100 flood elevation. Recent discussion with the City of Reno staff indicates that the Virginia Street Bridge Replacement is utilizing 3 feet as the design criteria. Correspondence with Washoe County staff indicates that the current Army Corp of Engineers recommendations for the flood control project is for bridge structures to be set such that the bottom of the bridge structure is a minimum of four feet above the 117 year flood elevation.
- Split Alignments – Split alignments shall be permitted where it may result in decreased earthwork quantities and/or improved design. This may require medians wider than 14 feet.

Cross-section

The typical lane configurations for the SE Connector roadway shall include:

- 4' minimum median width (as measured from front face of curb). Current guidance in the AASHTO Policy on Geometric Design of Highways and Streets limits the median width to a minimum of 4 feet for arterial roadways with design speeds of 55 mph. As per RTC staff, the use of an arresting barrier within the median will be utilized where safety considerations warrant.
- 12' lanes. The current RTC requirement allows for 11 foot lanes, however current guidance in the AASHTO Policy on Geometric Design of Highways and Streets recommends 12 foot lanes for arterials where right-of-way is not constrained.
- 8' shoulder/bike lane (with or without curb and gutter). The current RTC requirement allows for 6.5' shoulder/bike lanes, however current guidance in the AASHTO Policy on Geometric Design of Highways and Streets recommends that for arterials where traffic volumes warrant four or more lanes, full width (8' minimum) shoulders are also warranted.
- Curb and gutter when adjacent to existing development
- 10' Sidewalk/shared use path. This path will not necessarily need to be placed at the back of curb nor will the path necessarily be placed at road level, provided that geometric design requirements and grade constraints (e.g. ADA, intersection crossings, bus stops, etc.) are accounted for.

The clear zone and foreslopes/backslopes shall meet the requirements of the AASHTO Roadside Design Guide.

- Right-of-way width shall be set to accommodate roadway section up to 6 through lanes. This shall be a minimum of 124' in width.

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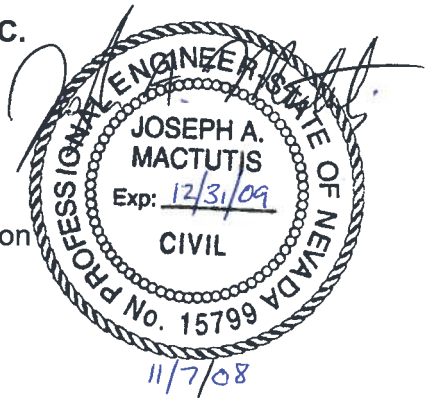
Minimum bridge width shall accommodate the roadway up to 6 through lanes and additional required auxiliary lanes from the intersection of Greg St. and the SE Connector.

A sample 6 through lane typical cross section is provided as Figure 1.

Please feel free to contact Frank Alverson or myself if you have any questions or comments.

STANTEC CONSULTING, INC.



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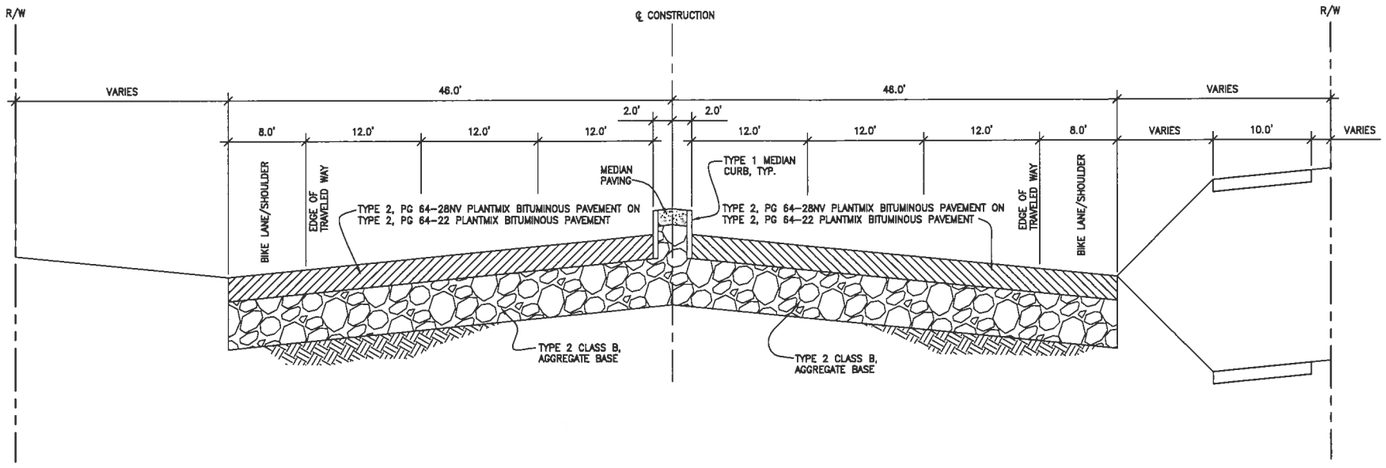

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Consultants

Legend

Notes

Revision	By	Appd.	YY.MM.DD

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Permit-Seal

Client/Project
REGIONAL TRANSPORTATION COMMISSION OF WASHOE COUNTY

PLAN LINE STUDY FOR THE SOUTHEAST CONNECTOR
Reno/Sparks Washoe County NV

Title
SECTIONS OF IMPROVEMENT

Project No.	Scale	
180101098	NTS	
Drawing No.	Sheet	Revision
SI-1	1 of 1	0