

## **APPENDIX S-D**

# **NOISE AND VIBRATION ANALYSES**



# HARRIS MILLER MILLER & HANSON INC.

77 South Bedford Street  
Burlington, MA 01803  
T 781.229.0707  
F 781.229.7939  
E info@hmmh.com  
W www.hmmh.com

## TECHNICAL MEMORANDUM

---

**Subject:** Desert Xpress Segment 2C Side Running Noise and Vibration Analysis  
**Prepared for:** John Cook, Circle Point  
**Prepared by:** Lance Meister HMMH  
**Date:** June 6, 2010  
**Reference:** HMMH Job No. 301520

---

This technical memorandum summarizes the noise and vibration assessment of the Segment 2C Side Running alignment option for the Desert Xpress project. Harris Miller Miller & Hanson Inc. was asked to conduct a supplementary noise and vibration assessment of the additional alignment alternative through Barstow.

### Affected Environment

Existing ambient noise levels in the project area were characterized through direct measurements at two sites along the proposed alignment alternative during the period from October 13 through October 14, 2009.

Table 1 Summary of Existing Ambient Noise Measurement Results

Site No.	Seg.	Measurement Location Description	Start of Measurement		Meas. Time (hrs)	Noise Exposure Ldn (dBA)
			Date	Time		
LT-11	2C	27788 Church Avenue, Barstow, CA	10-13-09	11:00	24	62
LT-12	2C	1204 Virginia Way, Barstow, CA	10-13-09	13:00	24	66

### Resources by Segment

#### Alternative 2C

Barstow, CA: There are a number of single-family residential areas located adjacent to the alignment along this segment of the corridor, which is in the median of I-15. Residential areas are located on the west side of Barstow mostly to the south of I-15 with few to the north, and on both the north and south side of I-15 through the center of Barstow. In addition, there are a number of hotels located near the outlet mall on the southwestern edge of Barstow. In all of these areas, existing noise is dominated by traffic on I-15. Other noise sources affecting the background noise levels at some of the residential areas include distant other traffic sources and neighborhood activity.

Site LT-11: 27788 Church Avenue - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 62 dBA. Traffic on I-15 dominated the noise environment at this location.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 2

Site LT-12: 1204 Virginia Way - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 66 dBA. Traffic on I-15 dominated the noise environment at this location.

## Effects by Segment

### Alternative 2C

**Operational Period Noise** - A summary of the projected noise impacts for Alternative 2C is shown in Tables 2 and 3 for the EMU and DEMU technology options, respectively for the side running alternative. A brief discussion of each area projected to have noise impact follows the tables.

**Table 2 Noise Impacts for Alternative 2C – EMU Side Running**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Days Inn, Lenwood Rd	SB	215	62	63	58	64	Impact	65	3.6	1	0
Country Inn and Suites, Lenwood Rd	NB	365	62	60	58	64	Impact	64	2.3	1	0
L St to H St	SB	130-350	62	58-63	58	64	Impact	63-65	1.7-3.7	4	0
Grace St	SB	45-150	66	61-69	61	66	Severe	67-71	1.3-5.0	7	15
Church of the Nazarene, Mount Vernon Ave	SB	45	60	71	62	68	Severe	71	11.0	0	1
Days Inn, Coolwater Ln	SB	110	66	64	61	66	Impact	68	2.3	1	0
Western Whip Ct to Muriel Dr	SB	60-190	66	61-68	61	66	Severe	67-70	1.2-4.0	7	8
Muriel Dr to Kelly Dr	SB	50-200	66	61-69	61	66	Severe	67-70	1.2-4.7	35	9
Elephant Mountain Rd	SB	170	63	60	60	65	Impact	65	1.6	3	0
Oak Tree Inn, Ghost Town Rd	NB	160	63	60	60	65	Impact	65	1.8	1	0
Total:										60	33

Notes:

- Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact. Pred – Predicted Noise Levels, Imp – Impact, Sev – Severe Impact.
- The reported noise levels represent the range of projected noise levels for each location.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 3

**Table 3 Noise Impacts for Alternative 2C – DEMU Side Running**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Days Inn, Lenwood Rd	SB	215	62	64	58	64	Impact	66	4.2	1	0
Country Inn and Suites, Lenwood Rd	NB	365	62	61	58	64	Impact	64	2.7	1	0
Ironwood Rd to L St.	NB	225-295	62	59-60	58	64	Impact	63-64	1.9-2.5	4	0
L St to H St	SB	130-775	62	59-65	58	64	Severe	63-67	1.8-5.3	11	1
Grace St	SB	45-250	66	61-72	61	66	Severe	67-73	1.2-6.9	26	17
Church of the Nazarene, Mount Vernon Ave	SB	45	60	73	62	68	Severe	73	13.4	0	1
Victory Outreach, Grace St	SB	220	60	63	62	68	Impact	65	4.8	1	0
Sandalwood Ct	NB	220-325	66	61-63	61	66	Impact	67-68	1.3-1.9	12	0
Days Inn, Coolwater Ln	SB	110	66	67	61	66	Severe	69	3.5	0	1
Western Whip Ct to Muriel Dr	SB	60-270	66	61-70	61	66	Severe	67-71	1.4-5.4	15	14
Muriel Dr to Kelly Dr	SB	50-290	66	61-71	61	66	Severe	67-72	1.3-6.5	57	14
Center Ln to Mojave River	NB	330	66	61	61	66	Impact	67	1.3	2	0
Hacienda Ln	NB	300	63	60	60	65	Impact	65	1.8	5	0
Elephant Mountain Rd	SB	170	63	61	60	65	Impact	65	2.0	3	0
Oak Tree Inn, Ghost Town Rd	NB	160	63	61	60	65	Impact	65	2.2	1	0
<b>Total:</b>										<b>139</b>	<b>48</b>

For an explanation of the notes, refer to Table 2.

Days Inn/Country Inn and Suites, Barstow – There are several motels near the outlet malls on both sides of the alignment near I-15. Noise impacts at this location are due to the low existing noise levels at this location.

Ironwood Road to H Street, Barstow – There are a number of single-family residences to the south and north of I-15 in this area on the western side of Barstow. The noise impacts at this location are due to the low existing noise levels and the proximity of the residences to the proposed alignment.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 4

---

Grace Street, Barstow – There are a number of single-family and multi-family residences to the north of I-15 in this area. The noise impact at this location is due to the close proximity of the residences to the proposed alignment.

Church of the Nazarene, Barstow – There is a church adjacent to the residential area on Grace St to the north of I-15. The noise impact at this location is due to the close proximity of the church to the proposed alignment.

Victory Outreach, Barstow – There is a church adjacent to the residential area on Grace St to the north of I-15. The noise impact at this location is due to the close proximity of the church to the proposed alignment.

Sandalwood Court, Barstow – There are a number of single-family residences to the south of I-15 in this area. The noise impact at this location is due to the close proximity of the residence to the proposed alignment.

Days Inn, Barstow – There is a motel adjacent to a single-family residential area to the north of I-15 in the center of Barstow. The noise impact at this location is due to the close proximity of the motel to the proposed alignment.

Western Whip Court to Mojave River, Barstow – There are a number of single-family residences to the north of I-15 and a mobile home park and several scattered residences to the south of I-15 in this location. The noise impact is due to the proximity of the residences to the proposed alignment.

Hacienda Lane, Barstow – There are several single-family residences to the south of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the residences to the proposed alignment.

Elephant Mountain Road, Yermo – There are a number of single-family residences to the north of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the residences to the proposed alignment.

Oak Tree Inn, Yermo – There is a motel to the south of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the motel to the proposed alignment.

***Operational Period Vibration:*** The vibration assessment for Alternative 2C was based on the projected vibration levels from high speed rail operations. Because there are less than 70 events per day, the vibration criterion used for the assessment is 80 VdB. For aerial structure operations, there is a 10 VdB reduction in vibration levels applied to the analysis. This is due to the attenuation of vibration as it travels through the structure into the ground. This typically results in significantly lower vibration levels relative to at-grade operations. The resulting vibration levels on the side running alternative range from a low of 50 VdB at the largest distances to a high of 74 VdB at the closest residences. Therefore, there are no vibration impacts projected for Alternative 2C for the side running alternative.

## Mitigation Measures

***Noise:*** Based on the results of the noise assessment, potential mitigation locations have been identified based on the FRA noise criteria. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. For Alternative 2C side running, the noise barriers could be at the wayside or on the elevated structure. If feasible, the most effective location for barriers would be on the structure.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 5

However, in many of the locations along the corridor, especially in the Barstow area, the residences with noise impact are scattered, and mitigation by noise barriers may be impractical. At these locations, sound insulation or property acquisitions or easements may be the most effective ways to mitigate the noise impacts. This determination should be made during the design of the project.

Table 4 indicates the approximate locations and side of track for noise mitigation, as well as the civil stations and the length of mitigation required for the EMU vehicle. Table 5 provides the same information for the DEMU vehicle. The noise mitigation locations in Tables 4 and 5 are preliminary, and should be refined during the design phase of the project. The locations in Tables 4 and 5 represent areas where 4-foot high noise barriers (above top of rail) with absorptive material on the track side located on the elevated structure would be effective at mitigating noise from high-speed rail operations. With the inclusion of this mitigation, all noise impacts on the side-running alternative for Segment 2C would be eliminated.

**Table 4 Potential Noise Mitigation Locations, EMU Side Running**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Lenwood Road	NB	2C	1557 – 1563	600
Lenwood Road	SB	2C	1580 – 1587	700
L Street to H Street	SB	2C	1735 – 1743	800
Grace Street	SB	2C	1791 – 1821	3,000
Coolwater Lane	SB	2C	1882 – 1892	1,000
Western Whip Court to Kelly Drive	SB	2C	1842 – 1886	4,400
Elephant Mountain Road	SB	2C	2225 – 2235	1,000
Ghost Town Road	NB	2C	2245 – 2255	1,000
Total				12,500

**Table 5 Potential Noise Mitigation Locations, DEMU Side Running**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Lenwood Road	NB	2C	1557 – 1563	600
Lenwood Road	SB	2C	1580 – 1587	700
Ironwood Road to L Street	NB	2C	1690 – 1713	2,300
L Street to H Street	SB	2C	1732 – 1743	1,100
Grace Street	SB	2C	1791 – 1822	3,100
Sandalwood Court	NB	2C	1824 – 1842	1,800
Coolwater Lane	SB	2C	1882 – 1892	1,000
Western Whip Court to Kelly Drive	SB	2C	1838 – 1886	4,800

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 6

---

Center Lane to Mojave River	NB	2C	1888 – 1891	300
Hacienda Lane	NB	2C	1945 – 1955	1,000
Elephant Mountain Road	SB	2C	2225 – 2235	1,000
Ghost Town Road	NB	2C	2245 – 2255	1,000
Total				18,700

**Vibration:** There are no vibration impacts for the side running alternative; therefore no vibration mitigation is required.





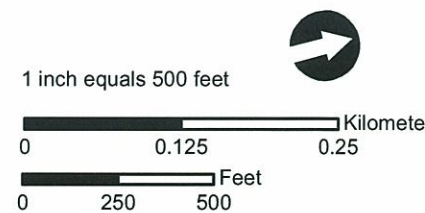
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

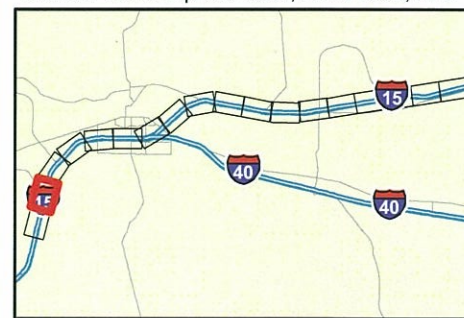
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





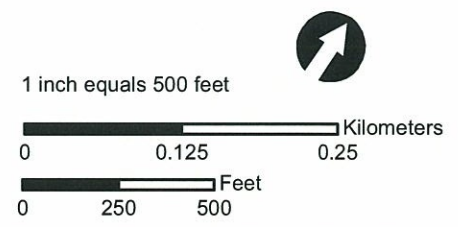
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

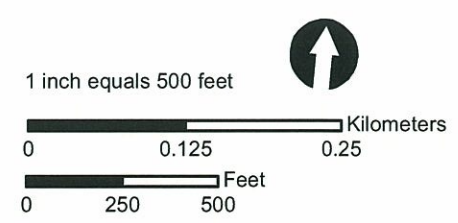


Source: DesertXpress 2007, ESRI 2005, NAIP





- Legend**
- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





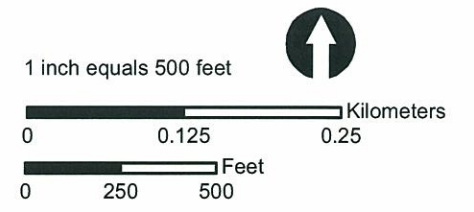
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





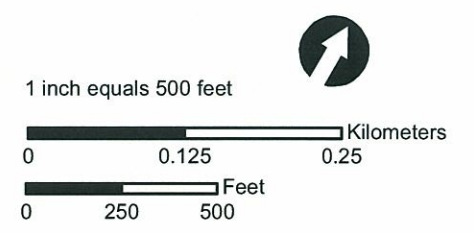
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C







Source: DesertXpress 2007, ESRI 2005, NAIP








**Legend**

- DesertXpress Alignment**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C

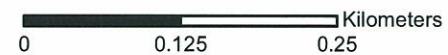
- Stations and Maintenance Facilities**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Temporary Construction Easements**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Autotransformers**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C



1 inch equals 500 feet










Source: DesertXpress 2007, ESRI 2005, NAIP












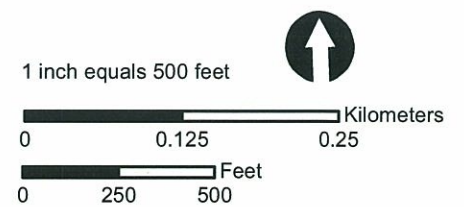
**Legend**

- DesertXpress Alignment**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C

- Stations and Maintenance Facilities**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Temporary Construction Easements**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Autotransformers**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





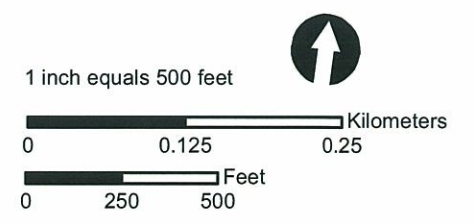
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP







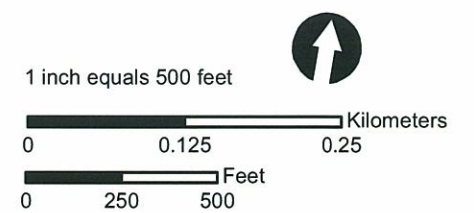
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

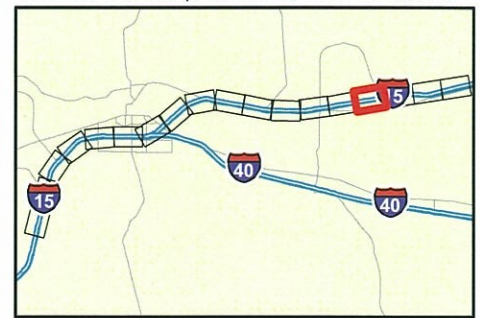
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





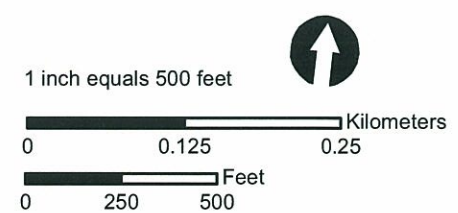
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C







Source: DesertXpress 2007, ESRI 2005, NAIP








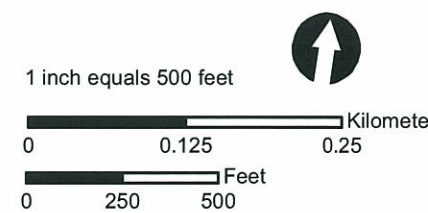
**Legend**

- DesertXpress Alignment**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C

- Stations and Maintenance Facilities**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Temporary Construction Easements**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Autotransformers**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





# HARRIS MILLER MILLER & HANSON INC.

77 South Bedford Street  
Burlington, MA 01803  
T 781.229.0707  
F 781.229.7939  
E info@hmmh.com  
W www.hmmh.com

## TECHNICAL MEMORANDUM

---

**Subject:** Desert Xpress Segment 2C Median Noise and Vibration Analysis  
**Prepared for:** John Cook, Circle Point  
**Prepared by:** Lance Meister HMMH  
**Date:** June 6, 2010  
**Reference:** HMMH Job No. 301520

---

This technical memorandum summarizes the noise and vibration assessment of the Segment 2C Median alignment option for the Desert Xpress project. Harris Miller Miller & Hanson Inc. was asked to conduct a supplementary noise and vibration assessment of the additional alignment alternative through Barstow.

### Affected Environment

Existing ambient noise levels in the project area were characterized through direct measurements at two sites along the proposed alignment alternative during the period from October 13 through October 14, 2009.

Table 1 Summary of Existing Ambient Noise Measurement Results

Site No.	Seg.	Measurement Location Description	Start of Measurement		Meas. Time (hrs)	Noise Exposure Ldn (dBA)
			Date	Time		
LT-11	2C	27788 Church Avenue, Barstow, CA	10-13-09	11:00	24	62
LT-12	2C	1204 Virginia Way, Barstow, CA	10-13-09	13:00	24	66

### Resources by Segment

#### Alternative 2C

Barstow, CA: There are a number of single-family residential areas located adjacent to the alignment along this segment of the corridor, which is in the median of I-15. Residential areas are located on the west side of Barstow mostly to the south of I-15 with few to the north, and on both the north and south side of I-15 through the center of Barstow. In addition, there are a number of hotels located near the outlet mall on the southwestern edge of Barstow. In all of these areas, existing noise is dominated by traffic on I-15. Other noise sources affecting the background noise levels at some of the residential areas include distant other traffic sources and neighborhood activity.

Site LT-11: 27788 Church Avenue - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 62 dBA. Traffic on I-15 dominated the noise environment at this location.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side-to-Median Running Alignment Alternative Noise and Vibration Analysis  
 June 6, 2010  
 Page 2

Site LT-12: 1204 Virginia Way - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 66 dBA. Traffic on I-15 dominated the noise environment at this location.

## Effects by Segment

### Alternative 2C

**Operational Period Noise** - A summary of the projected noise impacts for Alternative 2C is shown in Tables 2 and 3 for the EMU and DEMU technology options, respectively for the side-to-median running alternative. A brief discussion of each area projected to have noise impact follows the tables.

**Table 2 Noise Impacts for Alternative 2C – EMU Side-to-Median Running**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Days Inn, Lenwood Rd	SB	215	62	63	58	64	Impact	65	3.6	1	0
Country Inn and Suites, Lenwood Rd	NB	365	62	60	58	64	Impact	64	2.3	1	0
L St to H St	SB	130-350	62	58-63	58	64	Impact	63-65	1.7-3.7	4	0
Grace St	SB	150-170	66	61-62	61	66	Impact	67	1.3-1.5	14	0
Church of the Nazarene, Mount Vernon Ave	SB	150	60	63	62	68	Impact	65	5.2	1	0
Sandalwood Ct	NB	120-180	66	62-64	61	66	Impact	67-68	1.4-2.1	9	0
Western Whip Ct to Muriel Dr	SB	110	66	64	61	66	Impact	68	2.3	14	0
Muriel Dr to Kelly Dr	SB	125-170	66	61-64	61	66	Impact	67-68	1.2-2.1	29	0
Center Ln to Mojave River	NB	190	66	61	61	66	Impact	67	1.3	3	0
Elephant Mountain Rd	SB	170	63	60	60	65	Impact	65	1.6	3	0
Oak Tree Inn, Ghost Town Rd	NB	160	63	60	60	65	Impact	65	1.8	1	0
Total:										80	0

Notes:

- Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact. Pred – Predicted Noise Levels, Imp – Impact, Sev – Severe Impact.
- The reported noise levels represent the range of projected noise levels for each location.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side-to-Median Running Alignment Alternative Noise and Vibration Analysis  
 June 6, 2010  
 Page 3

**Table 3 Noise Impacts for Alternative 2C – DEMU Side-to-Median Running**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Days Inn, Lenwood Rd	SB	215	62	64	58	64	Impact	66	4.2	1	0
Country Inn and Suites, Lenwood Rd	NB	365	62	61	58	64	Impact	64	2.7	1	0
Ironwood Rd to L St.	NB	225-295	62	59-60	58	64	Impact	63-64	1.9-2.5	4	0
L St to H St	SB	130-775	62	59-65	58	64	Severe	63-67	1.8-5.3	11	1
L St to H St	NB	330	62	59	58	64	Impact	64	1.9	1	0
Grace St	SB	150-250	66	61-64	61	66	Impact	67-68	1.3-2.3	22	0
Church of the Nazarene, Mount Vernon Ave	SB	150	60	66	62	68	Impact	67	7.0	1	0
Sandalwood Ct	NB	120-350	66	61-66	61	66	Severe	67-69	1.2-3.3	21	2
Western Whip Ct to Muriel Dr	SB	110-250	66	62-67	61	66	Severe	67-69	1.6-3.5	12	14
Muriel Dr to Kelly Dr	SB	100-250	66	61-66	61	66	Severe	67-69	1.3-3.3	38	5
Center Ln to Mojave River	NB	190-270	66	61-63	61	66	Impact	67-68	1.3-2.0	6	0
Hacienda Ln	NB	300	63	60	60	65	Impact	65	1.8	5	0
Elephant Mountain Rd	SB	170	63	61	60	65	Impact	65	2.0	3	0
Oak Tree Inn, Ghost Town Rd	NB	160	63	61	60	65	Impact	65	2.2	1	0
<b>Total:</b>										<b>127</b>	<b>22</b>

For an explanation of the notes, refer to Table 2.

Days Inn/Country Inn and Suites, Barstow – There are several motels near the outlet malls on both sides of the alignment near I-15. Noise impacts at this location are due to the low existing noise levels at this location.

Ironwood Road to H Street, Barstow – There are a number of single-family residences to the south and north of I-15 in this area on the western side of Barstow. The noise impacts at this location are due to the low existing noise levels and the proximity of the residences to the proposed alignment.

Grace Street, Barstow – There are a number of single-family and multi-family residences to the north of I-15 in this area. The noise impact at this location is due to the close proximity of the residences to the proposed alignment.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side-to-Median Running Alignment Alternative Noise and Vibration Analysis  
June 6, 2010  
Page 4

---

Church of the Nazarene, Barstow – There is a church adjacent to the residential area on Grace St to the north of I-15. The noise impact at this location is due to the close proximity of the church to the proposed alignment.

Sandalwood Court, Barstow – There are a number of single-family residences to the south of I-15 in this area. The noise impact at this location is due to the close proximity of the residence to the proposed alignment.

Western Whip Court to Mojave River, Barstow – There are a number of single-family residences to the north of I-15 and a mobile home park and several scattered residences to the south of I-15 in this location. The noise impact is due to the proximity of the residences to the proposed alignment.

Hacienda Lane, Barstow – There are several single-family residences to the south of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the residences to the proposed alignment.

Elephant Mountain Road, Yermo – There are a number of single-family residences to the north of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the residences to the proposed alignment.

Oak Tree Inn, Yermo – There is a motel to the south of I-15 at this location. The noise impact is due to the low existing noise levels and the close proximity of the motel to the proposed alignment.

***Operational Period Vibration:*** The vibration assessment for Alternative 2C was based on the projected vibration levels from high speed rail operations. Because there are less than 70 events per day, the vibration criterion used for the assessment is 80 VdB. For aerial structure operations, there is a 10 VdB reduction in vibration levels applied to the analysis. This is due to the attenuation of vibration as it travels through the structure into the ground. This typically results in significantly lower vibration levels relative to at-grade operations. The resulting vibration levels on the side running alternative range from a low of 50 VdB at the largest distances to a high of 69 VdB at the closest residences. Therefore, there are no vibration impacts projected for Alternative 2C for the side running alternative.

## Mitigation Measures

***Noise:*** Based on the results of the noise assessment, potential mitigation locations have been identified based on the FRA noise criteria. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. For Alternative 2C side-to-median running, the noise barriers could be at the wayside or on the elevated structure. If feasible, the most effective location for barriers would be on the structure.

However, in many of the locations along the corridor, especially in the Barstow area, the residences with noise impact are scattered, and mitigation by noise barriers may be impractical. At these locations, sound insulation or property acquisitions or easements may be the most effective ways to mitigate the noise impacts. This determination should be made during the design of the project.

Table 4 indicates the approximate locations and side of track for noise mitigation, as well as the civil stations and the length of mitigation required for the EMU vehicle. Table 5 provides the same information for the DEMU vehicle. The noise mitigation locations in Tables 4 and 5 are preliminary, and should be refined during the design phase of the project. The locations in Tables 4 and 5 represent areas where 4-foot high noise barriers (above top of rail) with absorptive material on the track side located on the elevated structure would be effective at mitigating noise from high-



# HARRIS MILLER MILLER & HANSON INC.

speed rail operations. With the inclusion of this mitigation, all noise impacts on the median to side running alternative for Segment 2C would be eliminated.

**Table 4 Potential Noise Mitigation Locations, EMU Side-to Median Running**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Lenwood Road	NB	2C	1557 – 1563	600
Lenwood Road	SB	2C	1580 – 1587	700
L Street to H Street	SB	2C	1735 – 1743	800
Grace Street	SB	2C	1791 – 1812	2,100
Sandalwood Court	NB	2C	1824 – 1842	1,800
Western Whip Court to Kelly Drive	SB	2C	1842 – 1886	4,400
Center Lane to Mojave River	NB	2C	1888 – 1891	300
Elephant Mountain Road	SB	2C	2225 – 2235	1,000
Ghost Town Road	NB	2C	2245 – 2255	1,000
Total				12,700

**Table 5 Potential Noise Mitigation Locations, DEMU Side-to-Median Running**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Lenwood Road	NB	2C	1557 – 1563	600
Lenwood Road	SB	2C	1580 – 1587	700
Ironwood Road to L Street	NB	2C	1690 – 1713	2,300
L Street to H Street	SB	2C	1732 – 1743	1,100
Grace Street	SB	2C	1791 – 1821	3,000
Sandalwood Court	NB	2C	1822 – 1844	2,300
Western Whip Court to Kelly Drive	SB	2C	1842 – 1886	4,400
Center Lane to Mojave River	NB	2C	1887 – 1892	500
Hacienda Lane	NB	2C	1945 – 1955	1,000
Elephant Mountain Road	SB	2C	2225 – 2235	1,000
Ghost Town Road	NB	2C	2245 – 2255	1,000
Total				17,900

**Vibration:** There are no vibration impacts for the side-to-median running alternative; therefore no vibration mitigation is required.

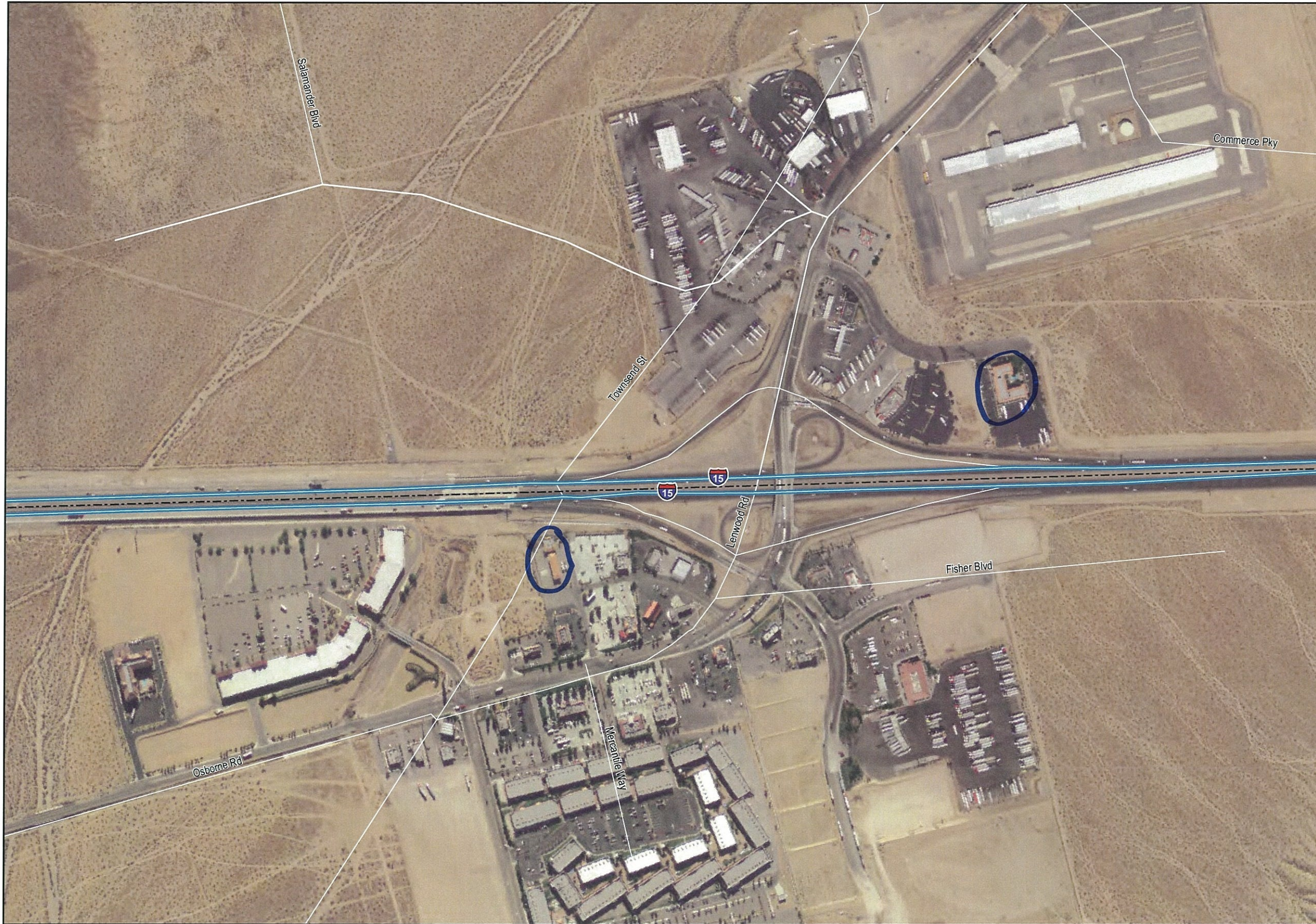
# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress Barstow Side-to-Median Running Alignment Alternative Noise and Vibration Analysis

June 6, 2010

Page 6

---



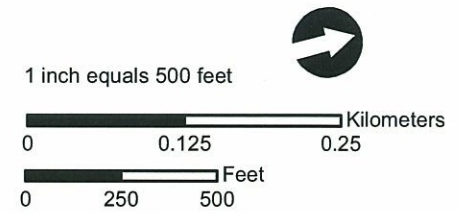
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





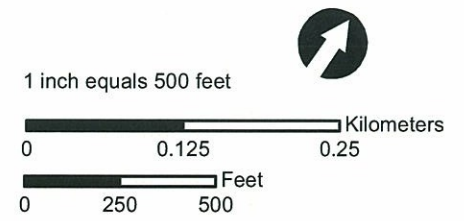
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





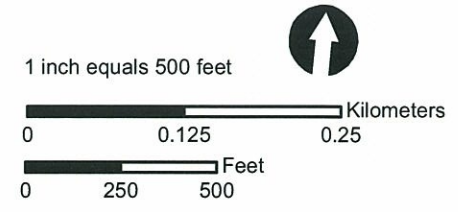
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

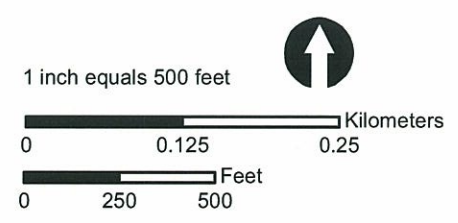


Source: DesertXpress 2007, ESRI 2005, NAIP





- Legend**
- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





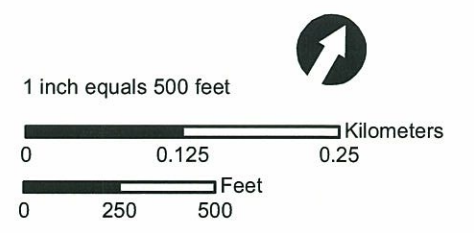
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C







Source: DesertXpress 2007, ESRI 2005, NAIP








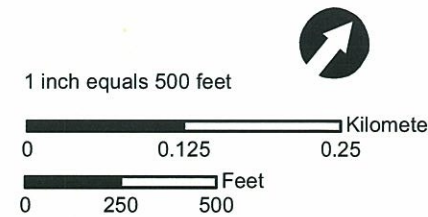
**Legend**

- DesertXpress Alignment**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C

- Stations and Maintenance Facilities**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Temporary Construction Easements**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Autotransformers**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C



Source: DesertXpress 2007, ESRI 2005, NAIP







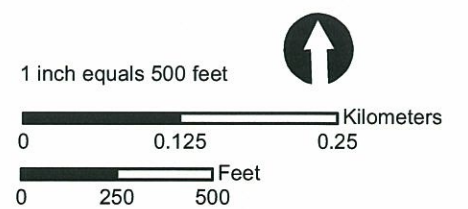
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





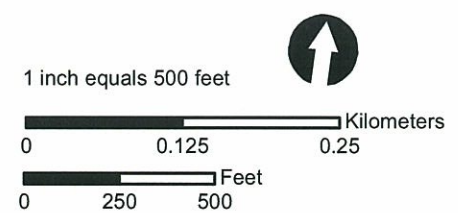
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

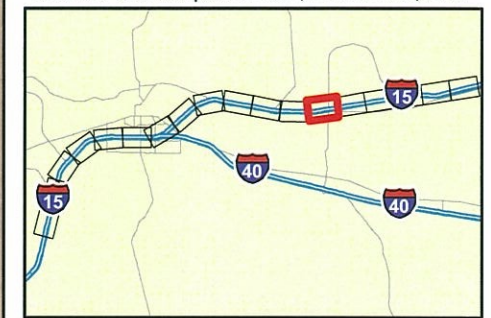
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C







Source: DesertXpress 2007, ESRI 2005, NAIP








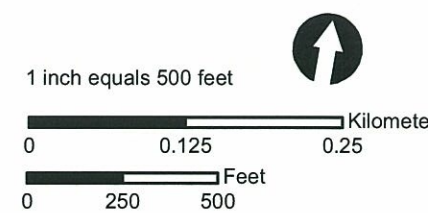
**Legend**

- DesertXpress Alignment**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C

- Stations and Maintenance Facilities**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Temporary Construction Easements**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B

- Autotransformers**
-  Proposed Action Alternative
  -  Alternative A
  -  Alternative B
  -  Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





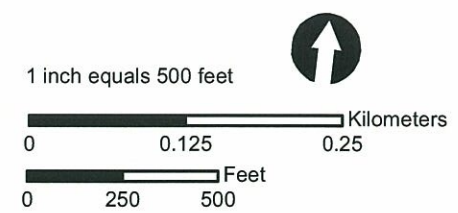
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





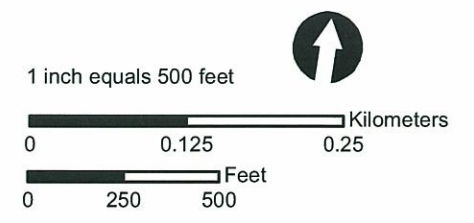
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





# HARRIS MILLER MILLER & HANSON INC.

77 South Bedford Street  
Burlington, MA 01803  
T 781.229.0707  
F 781.229.7939  
E info@hmmh.com  
W www.hmmh.com

## TECHNICAL MEMORANDUM

---

**Subject:** Desert Xpress Alignment Adjustment Area 8 (Segment 6B) Noise and Vibration Analysis

**Prepared for:** John Cook, Circle Point

**Prepared by:** Lance Meister HMMH

**Date:** June 9, 2010

**Reference:** HMMH Job No. 301520

---

This technical memorandum summarizes the noise and vibration assessment of the 6B alignment adjustment (AAA 8) for the Desert Xpress project. Harris Miller Miller & Hanson Inc. was asked to conduct a supplementary noise and vibration assessment of the additional alignment alternative through Las Vegas.

### Affected Environment

Existing ambient noise levels in the project area were characterized through direct measurements at one site along the proposed alignment alternative during the period from July 25 through July 26, 2006.

Table 1 Summary of Existing Ambient Noise Measurement Results

Site No.	Seg.	Measurement Location Description	Start of Measurement		Meas. Time (hrs)	Noise Exposure Ldn (dBA)
			Date	Time		
LT-7	6B	3075 Haleh St. Las Vegas, NV	7-25-06	19:00	24	66

### Resources by Segment

#### Alternative 6B

Las Vegas, NV: Noise sensitive land use along this alignment alternative includes residential areas on the west side of I-15, a large mobile home park on the east side of I-15 and a number of hotels and multi-family residences.

Site LT-7: 3075 Haleh Street - Las Vegas, NV. The Ldn measured over a 24-hour period in the backyard of this single-family residence was 66 dBA. The dominant source of noise at this location was freeway traffic on I-15. Other noise sources included insects and local activity.

### Effects by Segment

#### Alternative 6B

**Operational Period Noise** - A summary of the projected noise impacts for Alternative 6B is shown in Tables 2 and 3 for the EMU and DEMU technology options, respectively. A brief discussion of each area projected to have noise impact follows the tables.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress 6B Alignment Adjustment Noise and Vibration Analysis

June 9, 2010

Page 2

**Table 2 Noise Impacts for Alternative 6B – EMU**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Saffredi Ln	SB	50-70	66	64-66	61	66	Impact	68-69	2.2-3.2	11	0
Deluna St	SB	40-60	66	65-67	61	66	Impact/ Severe	68-70	2.6-4	11	12
Silverton Casino Lodge, Industrial Rd	SB	80	66	66	61	66	Impact	69	3.0	1	0
Americana 5 Inn, Dean Martin Dr	SB	55	66	67	61	66	Severe	70	4.0	0	1
Total:										23	13

Notes:

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact. Pred – Predicted Noise Levels, Imp – Impact, Sev – Severe Impact.

2. The reported noise levels represent the range of projected noise levels for each location.

**Table 3 Noise Impacts for Alternative 6B – DEMU**

Location	Side of Track	Dist to Near Track	Exist. Noise Level <sup>1</sup>	Project Noise Level <sup>1</sup>			Impact Category	Total Noise Level <sup>1</sup>	Increase in Noise Level <sup>1</sup>	# of Impacts	
				Pred. <sup>2</sup>	Impact Criteria					Imp	Sev
					Imp	Sev					
Saffredi Ln	SB	50-70	66	66-68	61	66	Severe	69-70	3.3-4.6	0	11
Deluna St	SB	40-60	66	67-70	61	66	Severe	70-71	3.9-5.5	0	23
Tremezzo Bay St	SB	120	66	63	61	66	Impact	67	1.8	6	0
Silverton Casino Lodge, Industrial Rd	SB	80	66	70	61	66	Severe	71	5.8	0	1
Wigwam Ave to Blue Diamond Rd	NB	310-460	66	61-63	61	66	Impact	67-68	1.2-1.8	290	0
Residence Inn, Dean Martin Dr	SB	265	66	63	61	66	Impact	68	2.0	1	0
Courtyard Hotel, Dean Martin Dr	SB	300	66	63	61	66	Impact	67	1.8	1	0
Fairfield Inn, Dean Martin Dr	SB	350	66	62	61	66	Impact	67	1.6	1	0
Americana 5 Inn, Dean Martin Dr	SB	55	66	72	61	66	Severe	73	7.2	0	1
Motel 6, Dean Martin	SB	105	66	65	61	66	Impact	68	2.7	1	0



# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress 6B Alignment Adjustment Noise and Vibration Analysis

June 9, 2010

Page 3

Dr											
Golden Palm Hotel, Dean Martin Dr	SB	80	66	67	61	66	Severe	69	3.5	0	1
Panorama Towers, Dean Martin Dr	SB	300	66	63	61	66	Impact	68	2.0	3	0
Total:										303	37

For an explanation of the notes, refer to Table 2.

Saffredi Lane – There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment.

Deluna Street - There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment.

Tremezzo Bay Street - There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment and the higher noise levels generated by the DEMU vehicle.

Silverton Casino Lodge, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Wigwam Avenue to Blue Diamond Road, Las Vegas – There is a mobile home park to the east of I-15 in this area. The number of potential impacts at this location is an estimate based on aerial photography. The impacts are due to the high speeds and the aerial structure.

Residence Inn, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Courtyard Hotel, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Fairfield Inn, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Americana 5 Inn, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Golden Palm Hotel, Las Vegas – There is a motel on the west side of I-15. The noise impact at this location is due to the proximity of the hotel to the proposed alignment and the aerial structure.

Panorama Towers, Las Vegas – There is a group of high-rise condominiums to the west of I-15 in this area. The number of impacts shown is the number of buildings in the complex. A count of the number of residences was not possible. The noise impact at this location is due to the high speeds and the aerial structure.

While the tracks have moved slightly closer to a number of the hotels on the west side of I-15 due to the alignment shift, the impacts are similar or reduced due to the refined design details for the aerial structure and the lower speeds shown in the plan and profile drawings.

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress 6B Alignment Adjustment Noise and Vibration Analysis

June 9, 2010

Page 4

---

**Operational Period Vibration:** The vibration assessment for Alternative 6B was based on the projected vibration levels from high speed rail operations. Because there are less than 70 events per day, the vibration criterion used for the assessment is 80 VdB. For aerial structure operations, there is a 10 VdB reduction in vibration levels applied to the analysis. This is due to the attenuation of vibration as it travels through the structure into the ground. This typically results in significantly lower vibration levels relative to at-grade operations. The resulting vibration levels for this alternative range from a low of 50 VdB at the largest distances to a high of 67 VdB at the closest residences. Therefore, there are no vibration impacts projected for Alternative 6B.

## Mitigation Measures

**Noise:** Based on the results of the noise assessment, potential mitigation locations have been identified based on the FRA noise criteria. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. For Alternative 6B, the noise barriers could be at the wayside or on the elevated structure. If feasible, the most effective location for barriers would be on the structure.

Table 4 indicates the approximate locations and side of track for noise mitigation, as well as the civil stations and the length of mitigation required for the EMU vehicle. Table 5 provides the same information for the DEMU vehicle. The noise mitigation locations in Tables 4 and 5 are preliminary only, and will be refined during the design phase of the project. The locations in Tables 4 and 5 represent areas where noise barriers would be effective at mitigating noise from high-speed rail operations.

**Table 4 Potential Noise Mitigation Locations, EMU**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Saffredi Ln/Deluna St	SB	6B	9469 – 9531	6,200
South of Blue Diamond Rd	SB	6B	9715 – 9732	1,700
South of W Tropicana Ave	SB	6B	9926 – 9934	800
Total				7,700

**Table 5 Potential Noise Mitigation Locations, DEMU**

Location	Side of Track	Align Alt	Civil Station	Length (ft)
Saffredi Ln/Deluna St/Tremezzo Bay St	SB	6B	9469 – 9548	7,900
South of Blue Diamond Rd	SB	6B	9715 – 9732	1,700
South of Blue Diamond Rd	NB	6B	9702 – 9732	3,000
South of W Russell Rd	SB	6B	9872 – 9888	1,600
South of W Tropicana Ave	SB	6B	9926 – 9942	1,600

# HARRIS MILLER MILLER & HANSON INC.

Desert Xpress 6B Alignment Adjustment Noise and Vibration Analysis

June 9, 2010

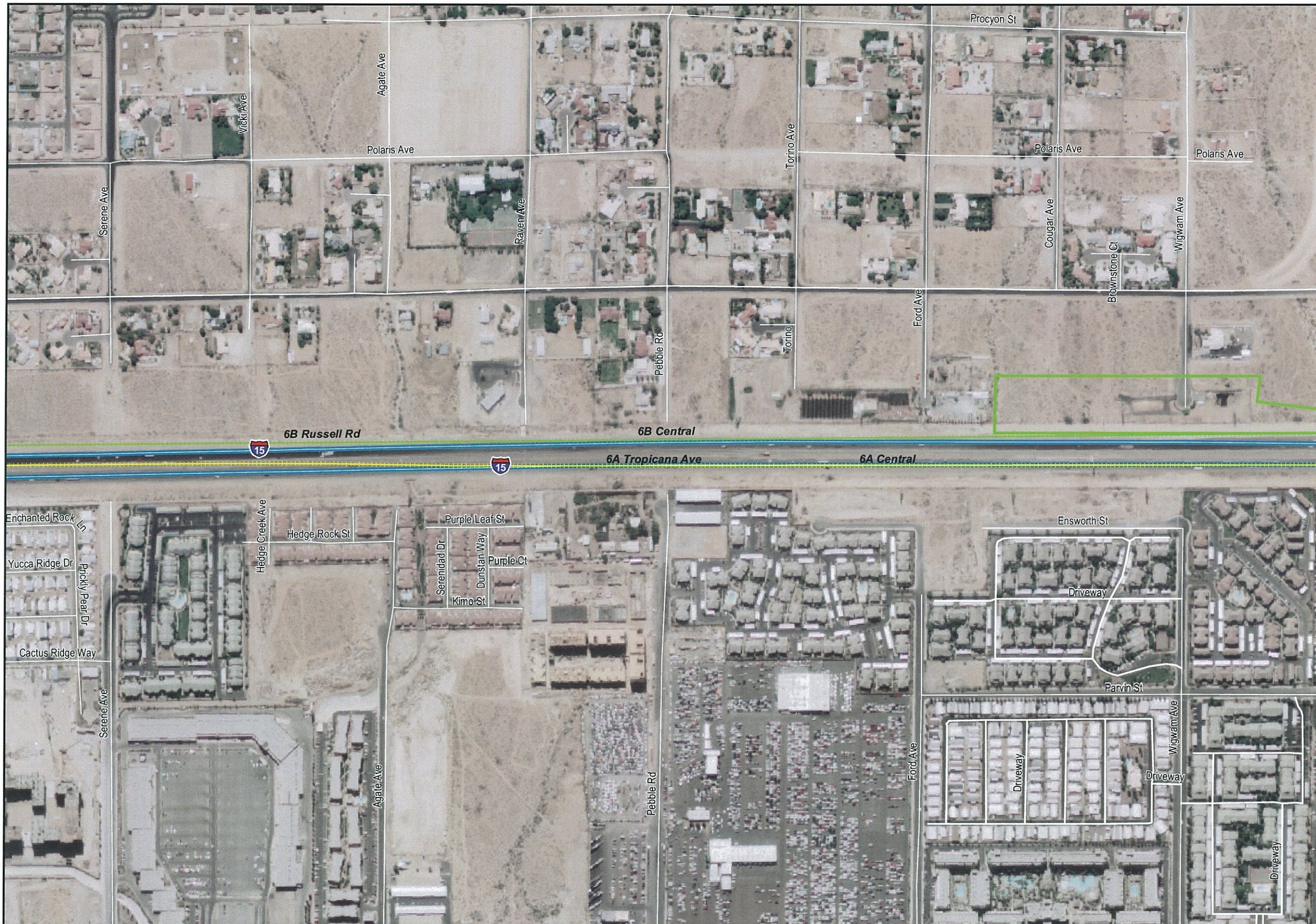
Page 5

---

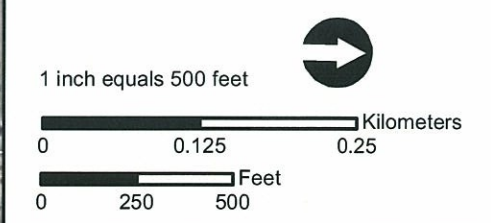
Harmon Ave	SB	6B	9957 – 9975	1,800
Total				17,600

**Vibration:** There are no vibration impacts; therefore no vibration mitigation is required.

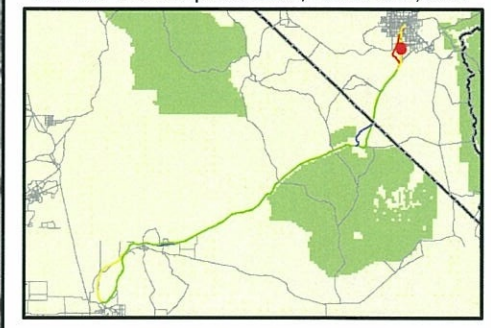




- Legend**
- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





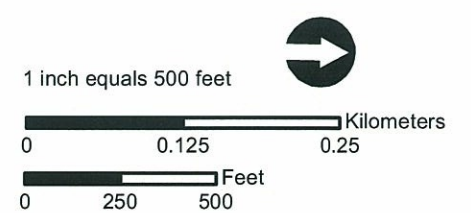
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

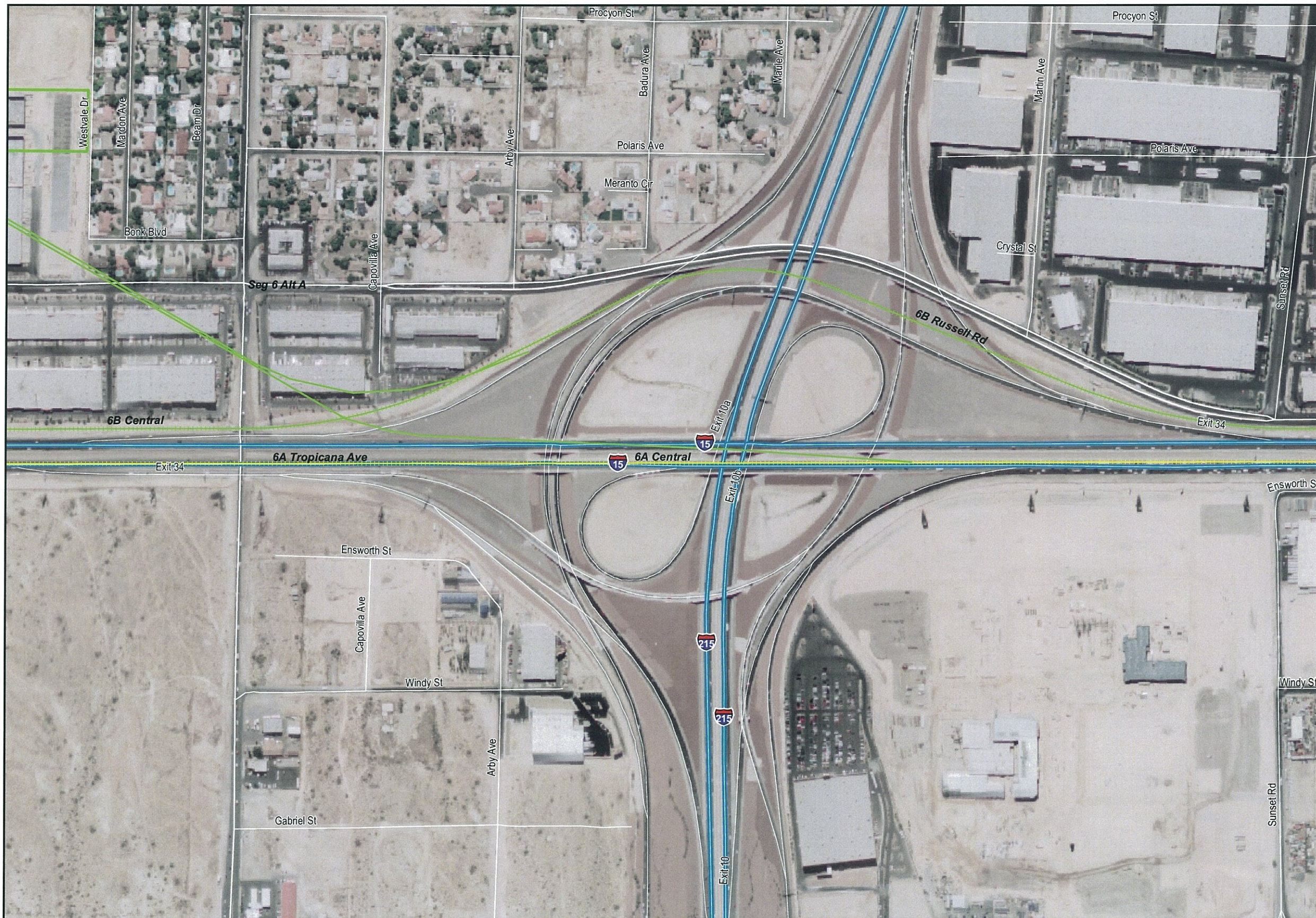
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

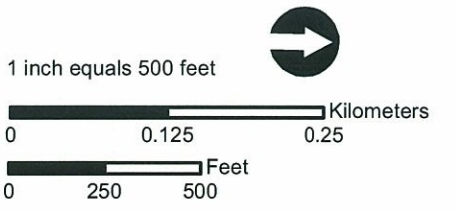


Source: DesertXpress 2007, ESRI 2005, NAIP





- Legend**
- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP





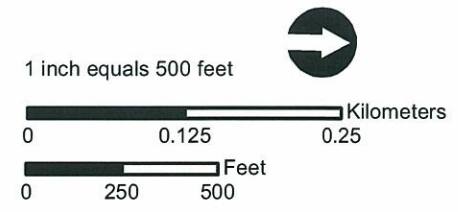
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

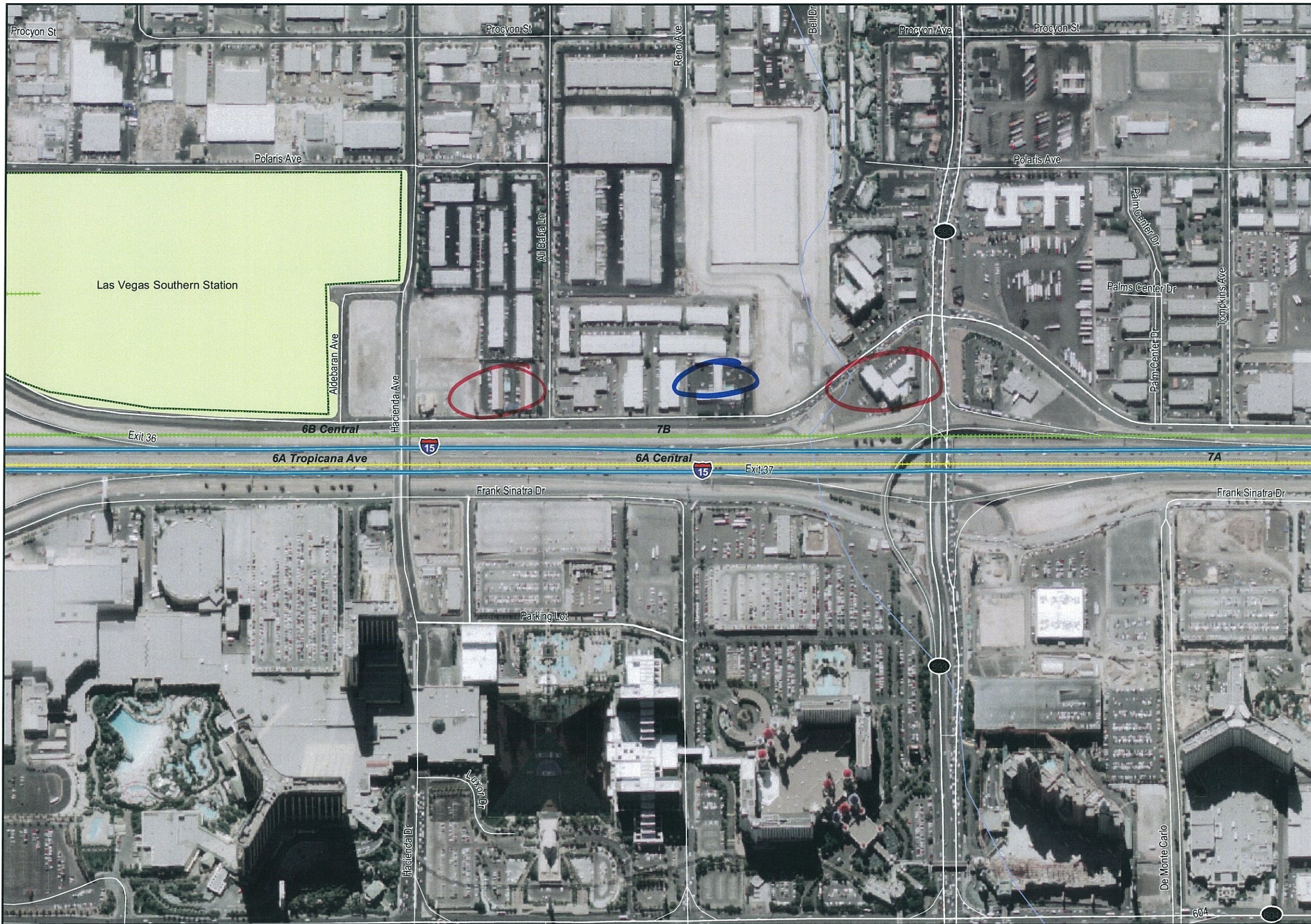
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP







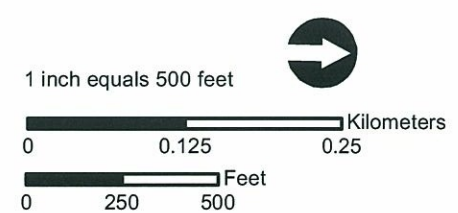
**Legend**

- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

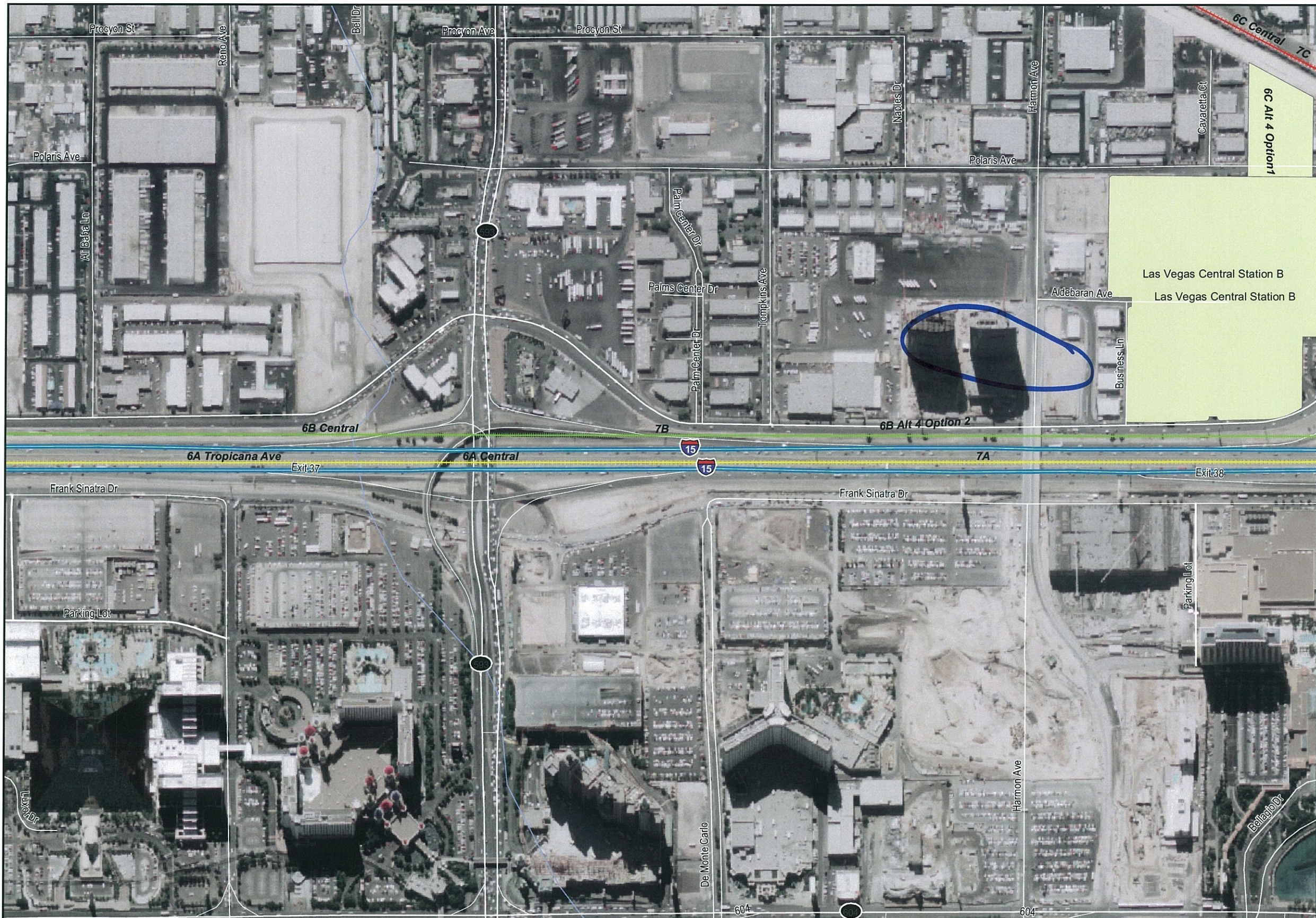
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B

- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C

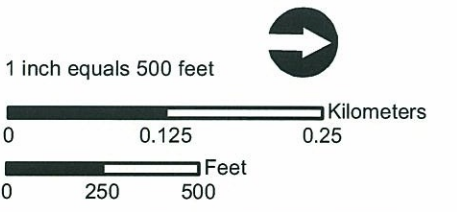


Source: DesertXpress 2007, ESRI 2005, NAIP





- ### Legend
- DesertXpress Alignment**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C
- Stations and Maintenance Facilities**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Temporary Construction Easements**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
- Autotransformers**
- Proposed Action Alternative
  - Alternative A
  - Alternative B
  - Option C



Source: DesertXpress 2007, ESRI 2005, NAIP

