

What is noise?

Noise is unwanted or excessive sound. In many ways, under this definition, noise is undesirable but it is, by fact, a real by-product of today’s way of life. Noise can be intrusive and annoying. It can interfere with sleep, work, or recreation. Noise, in today’s society, comes from many sources; a vacuum cleaner, for example, can be disruptive to a family member who is trying to read a book. But it is recognized that transportation noise is perhaps the most pervasive and difficult source to avoid in society today. Noise from airplanes flying overhead, from trains passing by, from motorized boats on a lake, and from cars and trucks traveling on the nation’s roads and highways has become a daily part of our lives. And of these, highway traffic noise is admittedly a major contributor to overall transportation noise.

Therefore, the construction and operation of a freeway of the magnitude of a project like the proposed action would introduce a major noise source into locations where such noise may not have existed in the past. Therefore, a project like the proposed freeway could cause great concern to those who live and work near such a project. It could pass by residences, schools, parks, churches, and myriad land uses that would be particularly sensitive to the noise generated by such a project. The project team, using federal and State guidance, analyzed how a project like the proposed action would increase noise levels to adjacent areas and, for those areas that would warrant protection from the expected noise, proposed ways for ADOT and FHWA to reduce the noise to acceptable levels.

Noise mitigation strategies typically consist of placing a noise barrier, such as a concrete or masonry wall or an earth berm (or a combination of the two), along the main line or at the R/W line of a transportation corridor. Noise barriers are usually the most feasible and cost-effective strategy for mitigating highway transportation noise impacts.

NOISE

NOISE CRITERIA

The basic unit of measurement for noise is the decibel, which is a logarithmic unit that expresses the ratio of the sound pressure level being measured to a standard reference level. Environmental noise is typically frequency-weighted using the A-scale (dBA) to approximate the frequency response of the human ear. Noise analyses for transportation projects use the hourly equivalent sound level ( $L_{Aeq1h}$ , or simply  $L_{eq}$ ), which is a logarithmic energy average over a 1-hour period.

Under 23 C.F.R. § 772, FHWA is required to identify noise-sensitive land uses near its projects, to evaluate the noise impacts on those land uses, and to consider noise abatement options (see Activity Category B, in Table 4-38). To further clarify the process of noise analysis and the evaluation of noise abatement, ADOT adopted a Noise Abatement Policy (NAP), last updated in 2007. This policy was formally approved by FHWA.

Federal regulations specify noise abatement criteria (NAC) for various types of land use activity categories, summarized in Table 4-38, and state that noise abatement must be considered when the predicted future peak-hour traffic noise from a project would approach or exceed the NAC. The NAP defines “approach” to mean being within 3 dBA, thereby requiring noise abatement considerations when the predicted future peak-hour traffic noise at Category B (residential) land uses is 64  $L_{eq}$  (i.e., within 3 dBA of 67  $L_{eq}$ ). Additionally, mitigation must be considered for residential properties if predicted traffic noise levels substantially exceed existing levels. “Substantially exceed” is defined in the NAP as 15 dBA.

Part of the noise abatement consideration process specifies that the abatement must be reasonable and feasible. Feasibility evaluations consist of various constructibility issues and assessments of whether the proposed noise abatement could provide substantial noise reduction. Reasonability criteria consist of cost-benefit considerations, maximum barrier heights, and other barrier design issues.

Table 4-38 Federal Highway Administration Noise Abatement Criteria

| Activity Category | $L_{Aeq1h}$ <sup>a</sup> | Description of Activity Category  |
|-------------------|--------------------------|---|
| A                 | 57 (exterior)            | Land on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose |
| B                 | 67 (exterior)            | Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals  |
| C                 | 72 (exterior)            | Developed land, properties, or activities not included in Categories A or B above   |
| D                 | — <sup>b</sup>           | Undeveloped land  |
| E                 | 52 (interior)            | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums  |

Source: 23 Code of Federal Regulations § 772

<sup>a</sup>  $L_{Aeq1h}$ , 1-hour equivalent sound level; logarithmic energy average over a 1-hour period (measured in dBA, a logarithmic unit that expresses the ratio of the sound pressure level being measured to a standard reference level and is frequency-weighted using the A-scale, to approximate the frequency response of the human ear)

<sup>b</sup> not applicable (or no standard exists)

The NAP defines specific exceptions to conditions where the NAC would suggest that noise mitigation is warranted. These exceptions include, among others, isolated receivers and the cost of abatement per residence. These exceptions are defined in the ADOT noise policy as:

- **Isolated receivers** – “An isolated receiver is defined as one or two sensitive affected receivers (e.g., residences) set apart from other receivers in the project area. It generally would not be considered reasonable to provide abatement for isolated receivers.” (ADOT 2005b)
- **Cost of abatement** – “The maximum recommended cost of abatement is \$46,000 per benefited developed property. Benefited residential properties include all single-family dwelling residences (i.e., manufactured homes, condominiums, detached homes) whether occupied by the owner or a renter, that receive a dBA noise reduction from proposed mitigation measures. For benefited developed properties such as parks, schools, hospitals, and churches, noise abatement will be considered on a case by case basis, as specified in ADOT’s noise guidelines.” (ADOT 2007d)

EXISTING NOISE LEVELS

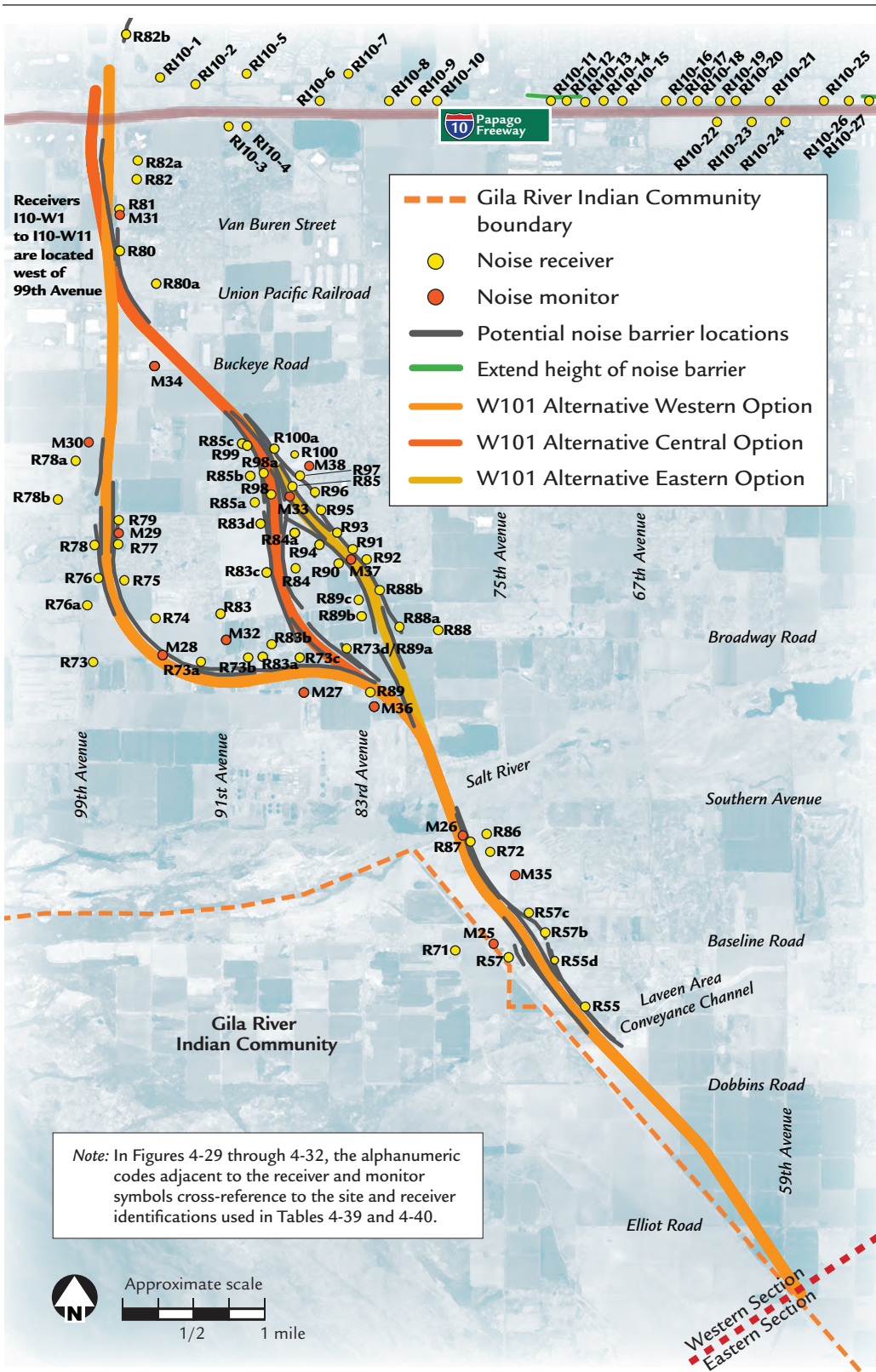
Ambient or existing noise level readings were taken at 44 locations in the Study Area. The monitoring sites, described below, were located at approximately 1-mile spacings along the corridor. Receiver locations are shown on Figures 4-29 through 4-32.

The existing noise levels were recorded at the monitoring sites with Larson Davis Model 812 and Model 820 Type I integrating sound level meters. The readings were taken on numerous occasions from September 2003 to July 2004 during nonpeak traffic conditions.

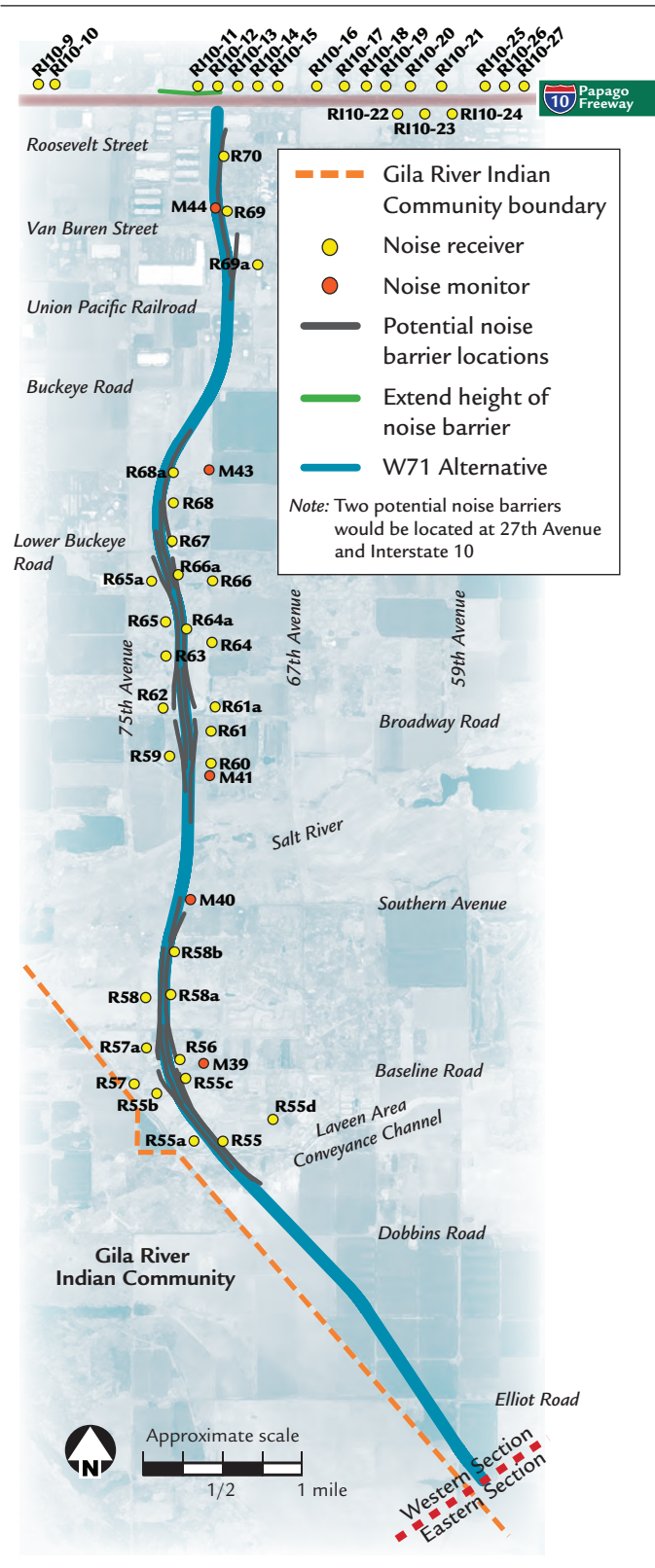
Weather conditions during the readings ranged from clear skies to mostly cloudy skies, 58° to 103° Fahrenheit and 8 to 35 percent relative humidity, with breezes averaging 0 miles per hour (mph) to 5.9 mph from variable directions. Such weather conditions are within the parameters established by FHWA in *Measurement of Highway-Related Noise* (FHWA 1996) and have little effect on the transmission of sound energy for the receivers in the Study Area.



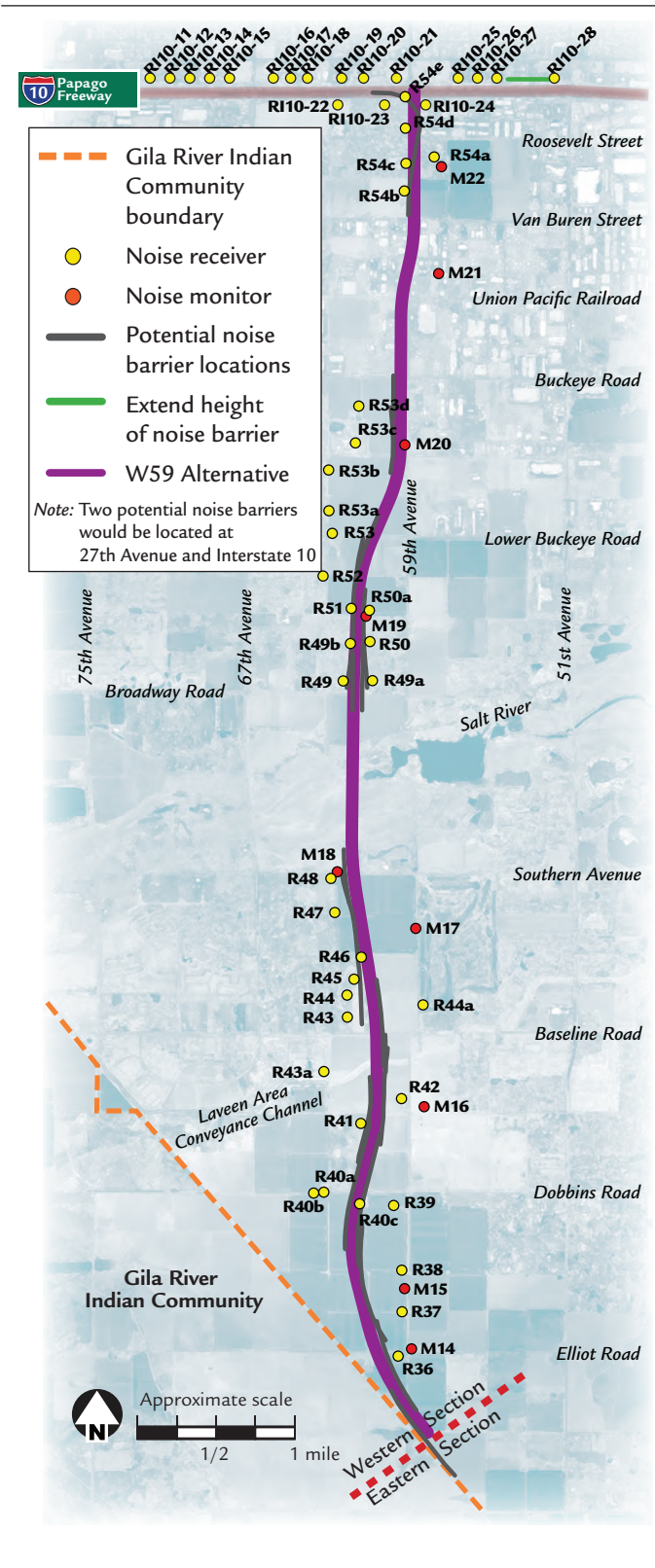
**Figure 4-29** Noise Receiver and Potential Barrier Locations, W101 Alternative and Options



**Figure 4-30** Noise Receiver and Potential Barrier Locations, W71 Alternative



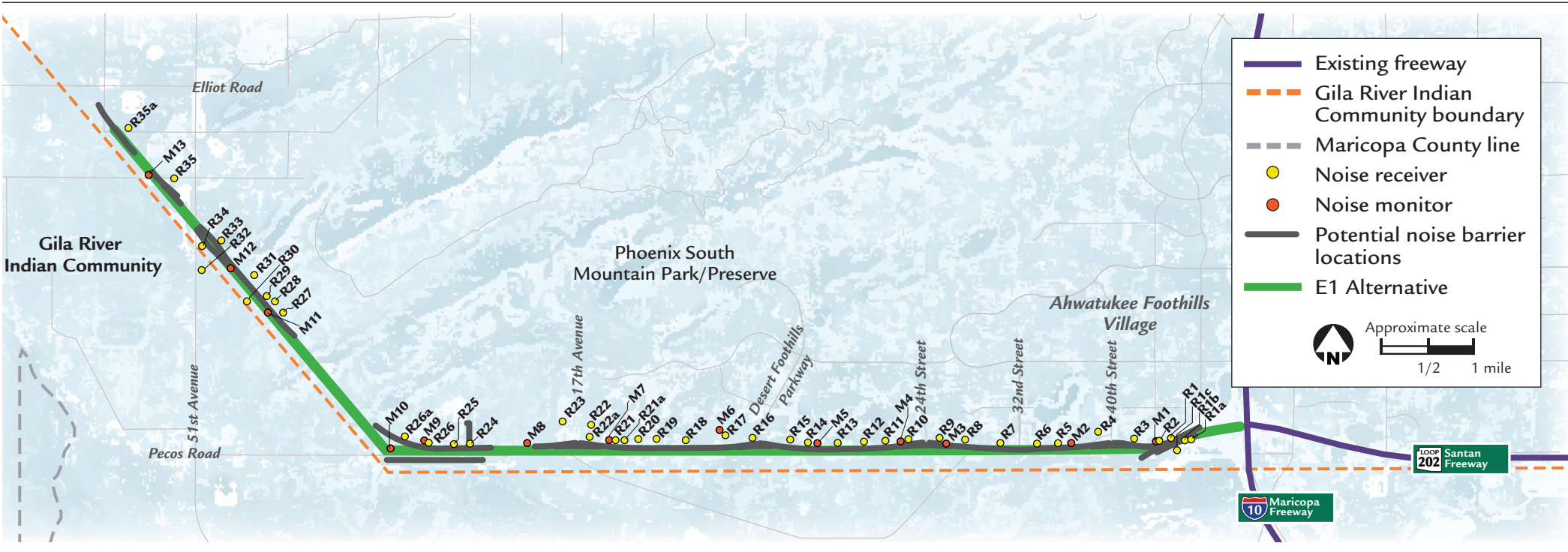
**Figure 4-31** Noise Receiver and Potential Barrier Locations, W59 Alternative



Noise receivers were modeled adjacent to known noise-sensitive locations along the action alternatives' alignments in the Western Section. Locations and/or extent of barriers could change. Exact noise barrier locations and dimensions would be determined during the design phase. The public would continue to be engaged in freeway-related noise issues through construction and operation of the proposed action (see Figure 4-33, on page 4-92).



Figure 4-32 Noise Receiver and Potential Barrier Locations, Eastern Section



Noise receivers were modeled adjacent to known noise-sensitive locations along the E1 Alternative in the Eastern Section. Locations and/or extent of barriers could change. Exact noise barrier locations and dimensions would be determined during the design phase. The public would be encouraged to continue to be engaged in freeway-related noise issues through construction and operation of the proposed action (see Figure 4-33, on page 4-92).

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**Are the noise barriers shown in the DEIS the exact locations?**

The noise analysis was based on preliminary design and traffic information. Numerous “state-of-the-practice” assumptions were made to complete the noise analysis. As the design of the proposed action further develops, additional noise analyses would be conducted. The results of this analysis and the mitigation recommendations should not be considered final and would need to be verified and refined as the design would progress.

Each monitoring period consisted of a 15- to 30-minute sound level recording using an integrating sound level meter. Most readings were conducted for a period of 15 minutes. Based on FHWA guidance, the longer monitoring periods were used at locations with little traffic noise and greater short-term variabilities in ambient noise. The duration of each reading was sufficient to record the existing noise characteristics at the monitoring location. At all locations, the meter was placed approximately 5 feet above the ground. Results of the ambient noise monitoring are shown in Table 4-39.

ENVIRONMENTAL CONSEQUENCES

For the three Western Section action alternatives and options and the Eastern Section action alternative, over 220 sensitive receivers were evaluated from a traffic noise perspective. All of the receivers represent noise-sensitive Activity Category B land uses, as described

in Table 4-40, with the exception of the casino (R30), which is a commercial land use (Category C). Receiver locations for the Western Section of the Study Area are indicated on Figures 4-29 through 4-31. Receiver locations for the Eastern Section of the Study Area are indicated on Figure 4-32. The impacts from each of the action alternatives and options and those of the No-Action Alternative are discussed in more detail later in this section.

In areas where the Western Section action alternatives are located close together, nearby receivers were evaluated for both action alternatives and are listed in Table 4-40 under both alternatives. Also, several new residential subdivisions have been developed since the initial noise evaluations began in 2003. To include these new receiver locations without altering the sequential numbering system, additional receivers were assigned an identification beginning with the nearest receiver number, followed by a letter to distinguish the new receiver. For

instance, if the nearest existing receiver was numbered 26, the additional nearby receiver was numbered 26a.

Results of the noise analysis for each receiver are summarized in Table 4-40. The first column of Table 4-40 lists a consecutive number assigned to identify each receiver. The second column in the table identifies the approximate distance and direction from the given action alternative’s centerline to the receiver. The third column identifies the receiver, such as school or park, neighborhood, subdivision, or the area where the receiver is located. The fourth column displays the projected future noise level (in dBA  $L_{eq}$ ) without noise mitigation, based on Traffic Noise Model 2.5 modeling (traffic noise model endorsed by FHWA—see the technical report on traffic noise) and the 2035 design year. Noise mitigation was then added to the model, resulting in the mitigated future noise levels shown in the fifth column. For some of the receivers, noise from nearby arterial street traffic limited the amount of noise reduction that could be achieved for the proposed action alternatives. Mitigation is discussed in further detail in the next section.

Action Alternatives, Western Section

The evaluation of impacts on noise-sensitive receivers included modeling noise level impacts from the W59 Alternative, W71 Alternative, and W101 Alternative and Options along I-10 (Papago Freeway) near and including where the new system traffic interchange would connect I-10 and the proposed action. The receivers for this analysis can be found in Table 4-40 and are denoted by the prefix “I-10” in the first column. Because the W101 Alternative and its Options would result in the same impacts along I-10, the results are presented only for the Western Option.

W59 (Preferred) Alternative

Projected peak-hour noise levels along the W59 Alternative and I-10 (Papago Freeway) would range from 60 to 78 dBA  $L_{eq}$  at the 84 receivers. The projected noise levels at 65 of the 84 receivers would approach or exceed the ADOT mitigation criterion. The 65 affected receivers along this action alternative and I-10 would be eligible for noise abatement consideration.

Table 4-39 Ambient Noise Monitoring Results, Western and Eastern Sections

| Site Identification | Alternative/Alignment Option     | Location Description  | Ambient Noise Level (L <sub>Aeq1h</sub> ) <sup>a</sup> |
|---------------------|----------------------------------|---|--|
| Western Section     |                                  |   |  |
| M14 <sup>b</sup>    | W101, W71, W59                   | Corner of 59th Avenue and Elliot Road                                 | 49   |
| M15                 | W59                              | 59th Avenue, 3/8 mile north of Elliot Road                            | 45   |
| M16                 | W59                              | South Mountain Avenue, west of 59th Avenue                            | 47   |
| M17                 | W59                              | Corner of 59th Avenue and Vineyard Road                               | 50   |
| M18                 | W59                              | Southern Avenue, 1/2 mile west of 59th Avenue                         | 58   |
| M19                 | W59                              | Corner of 61st Avenue and Warner Street                               | 51   |
| M20                 | W59                              | 59th Avenue and Roosevelt Irrigation District canal                   | 64   |
| M21                 | W59                              | 57th Drive south of Jefferson Street                                  | 58   |
| M22                 | W59                              | Southwest Village Apartments, 777 North 59th Avenue, southeast corner | 49   |
| M23                 | W101, W71, W59                   | Elliot Road at Community <sup>c</sup> boundary                        | 49   |
| M24                 | W101, W71                        | Dobbins Road at Community boundary                                    | 54   |
| M25                 | W101 Western Option              | Baseline Road at Community boundary                                   | 61   |
| M26                 | W101 Western and Central Options | Alta Vista Road, west of 75th Avenue                                  | 50   |
| M27                 | W101 Western and Central Options | 87th Avenue, 1/4 mile south of Broadway Road                          | 52   |
| M28                 | W101 Western Option              | Broadway Road, 1/2 mile west of 91st Avenue                           | 62   |
| M29                 | W101 Western Option              | Kingman Street, east of 97th Avenue                                   | 48   |
| M30                 | W101 Western Option              | 99th Avenue, 1/2 mile north of Lower Buckeye Road                     | 57   |
| M31                 | W101 Central Option              | Apartments on 96th Avenue, north of Van Buren Street                  | 50   |
| M32                 | W101 Central Option              | 91st Avenue, 500 feet north of Broadway Road                          | 62   |
| M33                 | W101 Central Option              | 87th Avenue, north of Lower Buckeye Road                              | 53   |
| M34                 | W101 Central and Eastern Options | Buckeye Road, 1/2 mile east of 99th Avenue                            | 59   |

| Site Identification | Alternative/Alignment Option | Location Description                                       | Ambient Noise Level (L <sub>Aeq1h</sub> ) <sup>a</sup> |
|---------------------|------------------------------|--|--|
| M35                 | W101 Eastern Option          | 75th Avenue, 1/2 mile south of Southern Avenue             | 49   |
| M36                 | W101 Eastern Option          | 83rd Avenue, 3/4 mile south of Broadway Road               | 53   |
| M37                 | W101 Eastern Option          | Elwood Street, west of 83rd Avenue                         | 53   |
| M38                 | W101 Eastern Option          | Watkins Street, east of 86th Drive                         | 54   |
| M39                 | W71                          | Baseline Road, east of 75th Avenue                         | 63   |
| M40                 | W71                          | Southern Avenue, east of 75th Avenue                       | 62   |
| M41                 | W71                          | 71st Avenue, south of Wier Avenue                          | 44   |
| M42                 | W71                          | Crown King Road, east of 73rd Drive                        | 54   |
| M43                 | W71                          | Durango Street, west of 71st Avenue                        | 48   |
| M44                 | W71                          | Corner of 71st Avenue and Polk Street                      | 55   |
| Eastern Section     |                              |  |  |
| M1                  | E1                           | Near 44th Street and Cedarwood Lane                        | 55   |
| M2                  | E1                           | Near 36th Place and Windsong Drive                         | 52   |
| M3                  | E1                           | End of 26th Street, south of Redwood Lane                  | 56   |
| M4                  | E1                           | Apartments at 21st Street and Liberty Lane, southwest side | 53   |
| M5                  | E1                           | Church near 15th Street and Liberty Lane                   | 54   |
| M6                  | E1                           | Near Ashurst Drive and 2nd Place                           | 45   |
| M7                  | E1                           | Near 15th Avenue and Liberty Lane                          | 44   |
| M8                  | E1                           | North of Pecos Road, between 17th and 27th avenues         | 46   |
| M9                  | E1                           | Corner of 30th Lane and Redwood Lane                       | 51   |
| M10                 | E1                           | Far west end of Pecos Road at Community boundary           | 45   |
| M11                 | E1                           | Corner of 45th Avenue and Galveston                        | 48   |
| M12                 | E1                           | Corner of Dusty Lane and Ray Road                          | 54   |
| M13                 | E1                           | Estrella Drive at Community boundary                       | 55   |

<sup>a</sup> L<sub>Aeq1h</sub>, 1-hour equivalent sound level; logarithmic energy average over a 1-hour period (measured in dBA, a logarithmic unit that expresses the ratio of the sound pressure level being measured to a standard reference level and is frequency-weighted using the A-scale, to approximate the frequency response of the human ear)

<sup>b</sup> Sites M1 to M13 are located in the Eastern Section and are presented later in the table.

<sup>c</sup> Gila River Indian Community



Table 4-40 Noise Analysis Results, Western and Eastern Sections

| Receiver ID                             | Distance and Direction from Centerline | Neighborhood or Area                  | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|---|--|---------------------------------------|---|------------------------------------|
| Western Section                         |  |                                       |   |                                    |
| W59 Alternative (Preferred Alternative) |  |                                       |   |                                    |
| 36 <sup>b</sup>                         | 580 feet east                          | 59th Avenue and Elliot Road           | 69  | 63                                 |
| 37                                      | 1,170 feet east                        | 59th Avenue north of Elliot Road      | 66  | 60                                 |
| 38                                      | 1,500 feet east                        | 59th Avenue and Olney Avenue          | 64  | 58                                 |
| 39                                      | 1,225 feet east                        | 59th Avenue and Dobbins Road          | 65  | 58                                 |
| 40a                                     | 925 feet west                          | 63rd Avenue and Dobbins Road          | 65  | 60                                 |
| 40b                                     | 1,220 feet west                        | 63rd Avenue and Dobbins Road          | 65  | 59                                 |
| 40c                                     | 250 feet west                          | 61st Avenue and Dobbins Road          | 72  | 63                                 |
| 41                                      | 385 feet west                          | 61st Avenue and South Mountain Avenue | 74  | 63                                 |
| 42                                      | 790 feet east                          | 59th Avenue and South Mountain Avenue | 69  | 62                                 |
| 43                                      | 920 feet west                          | Rancho Grande                         | 67  | 61                                 |
| 43a <sup>d</sup>                        | 1,750 feet west                        | Avalon Village                        | 63  | 58                                 |
| 44                                      | 835 feet west                          | Rancho Grande                         | 67  | 61                                 |
| 44a                                     | 1,590 feet east                        | Cottonwood Golf Course                | 63  | 61                                 |
| 45                                      | 530 feet west                          | Rancho Grande                         | 71  | 63                                 |
| 46                                      | 145 feet west                          | Rancho Grande                         | 78  | 63                                 |
| 47                                      | 895 feet west                          | Rancho Grande                         | 68  | 61                                 |
| 48                                      | 840 feet west                          | Rancho Grande                         | 67  | 62                                 |
| 49                                      | 485 feet west                          | Rio Del Rey Unit 1                    | 71  | 63                                 |
| 49a                                     | 470 feet east                          | Rio Del Rey Unit 2                    | 70  | 63                                 |
| 49b                                     | 270 feet west                          | Rio Del Rey Unit 1                    | 74  | 62                                 |
| 50                                      | 375 feet east                          | Rio Del Rey Unit 2                    | 73  | 61                                 |
| 50a                                     | 345 feet east                          | Rio Del Rey Unit 2                    | 74  | 63                                 |
| 51                                      | 250 feet west                          | Rio Del Rey Unit 1                    | 76  | 63                                 |
| 52                                      | 1,245 feet west                        | Estrella Manor                        | 65  | 58                                 |
| 53                                      | 1,285 feet west                        | Meadows                               | 64  | 59                                 |
| 53a                                     | 1,825 feet west                        | Park at Terralea                      | 62  | 58                                 |
| 53b                                     | 2,350 feet west                        | Park at Terralea                      | 61  | 58                                 |
| 53c                                     | 1,520 feet west                        | Western Valley Elementary School      | 64  | 60 <sup>c</sup>                    |
| 53d                                     | 1,405 feet west                        | 61st Avenue and Buckeye Road          | 65  | 60                                 |
| 54b                                     | 355 feet west                          | 59th Avenue north of Van Buren Street | 72  | 67 <sup>e</sup>                    |
| 54c                                     | 430 feet west                          | Centura West                          | 72  | 69 <sup>e</sup>                    |

| Receiver ID  | Distance and Direction from Centerline | Neighborhood or Area                       | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|--|--|--|---|------------------------------------|
| 54d  | 700 feet west                          | Centura West                               | 71  | 70 <sup>e</sup>                    |
| 54e  | 900 feet west                          | Patio Homes West                           | 73  | 71 <sup>e</sup>                    |
| Interstate 10 with W59 Alternative (Preferred Alternative) |  |  |   |                                    |
| I-10-1   | 1,350 feet north                       | Sheely Farms Parcel 3                      | 62  | 62                                 |
| I-10-2   | 1,180 feet north                       | Apartments – McDowell Road and 93rd Avenue | 61  | 61                                 |
| I-10-3   | 510 feet south                         | Tolsun Farms                               | 67  | 61                                 |
| I-10-4   | 520 feet south                         | Tolsun Farms                               | 68  | 62                                 |
| I-10-5   | 1,440 feet north                       | Westpoint                                  | 60  | 60                                 |
| I-10-6   | 470 feet north                         | EconoLodge                                 | 70  | — <sup>f</sup>                     |
| I-10-7   | 1,440 feet north                       | Amberlea Cottages                          | 60  | 60                                 |
| I-10-8   | 460 feet north                         | Legacy Suites Apartments                   | 63  | 58                                 |
| I-10-9   | 410 feet north                         | Daravante                                  | 63  | 56                                 |
| I-10-10  | 380 feet north                         | Daravante                                  | 67  | 56                                 |
| I-10-11  | 440 feet north                         | Hampton Square Apartments                  | 62  | 61                                 |
| I-10-12  | 420 feet north                         | Hampton Square Apartments                  | 62  | 58                                 |
| I-10-13  | 390 feet north                         | Sunpointe Apartments                       | 63  | 59                                 |
| I-10-14  | 420 feet north                         | Las Gardenias Apartments                   | 64  | 59                                 |
| I-10-15  | 460 feet north                         | Las Gardenias Apartments                   | 63  | 61                                 |
| I-10-16  | 490 feet north                         | Westover Parc Condominiums                 | 62  | 59                                 |
| I-10-17  | 440 feet north                         | Apartments – McDowell Road and 85th Avenue | 62  | 58                                 |
| I-10-18  | 420 feet north                         | Apartments – McDowell Road and 84th Avenue | 61  | 59                                 |
| I-10-19  | 410 feet north                         | Apartments – McDowell Road and 83rd Avenue | 61  | 58                                 |
| I-10-20  | 400 feet north                         | Avanti Apartments                          | 64  | 58                                 |
| I-10-21  | 500 feet north                         | Avanti Apartments                          | 63  | 59                                 |
| I-10-22  | 340 feet south                         | La Terraza                                 | 64  | 60                                 |
| I-10-23  | 280 feet south                         | Patio Homes West                           | 70  | 62                                 |
| I-10-24  | 350 feet south                         | Patio Homes West                           | 66  | 63                                 |
| I-10-25  | 430 feet north                         | Apartments – McDowell Road and 57th Avenue | 67  | 62                                 |
| I-10-26  | 390 feet north                         | Apartments – McDowell Road and 56th Avenue | 68  | 60                                 |
| I-10-27  | 360 feet north                         | Hallcraft Villas West Condominiums         | 71  | 59                                 |
| I-10-28  | 380 feet north                         | Hallcraft Villas West Condominiums         | 72  | 62                                 |
| I-10-29  | 320 feet north                         | Winona Park 1                              | 68  | 60                                 |
| I-10-30  | 250 feet north                         | Winona Park 6A                             | 67  | 61                                 |

Note: Footnotes are at the end of the table, page 4-88.

(continued on next page)

Table 4-40 Noise Analysis Results, Western and Eastern Sections (continued)

| Receiver ID     | Distance and Direction from Centerline | Neighborhood or Area             | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|-----------------|--|----------------------------------|---|------------------------------------|
| I-10-31         | 250 feet north                         | Winona Park 6A                   | 67  | 61                                 |
| I-10-32         | 310 feet south                         | Winona Park 2                    | 68  | 61                                 |
| I-10-33         | 270 feet south                         | Deluxe Mobile Home Park          | 66  | 61                                 |
| I-10-34         | 280 feet south                         | Deluxe Mobile Home Park          | 66  | 61                                 |
| I-10-35         | 300 feet north                         | Franmar Manor                    | 67  | 60                                 |
| I-10-36         | 300 feet north                         | West View Manor                  | 72  | 61                                 |
| I-10-37         | 310 feet north                         | West View Manor                  | 71  | 61                                 |
| I-10-38         | 270 feet south                         | West Phoenix No. 4               | 67  | 61                                 |
| I-10-39         | 220 feet south                         | West Phoenix No. 4               | 72  | 62                                 |
| I-10-40         | 370 feet south                         | West Phoenix No. 4               | 69  | 62                                 |
| I-10-41         | 340 feet north                         | Westcroft Place                  | 71  | 60                                 |
| I-10-42         | 250 feet north                         | Isaac Infill                     | 71  | 61                                 |
| I-10-43         | 360 feet north                         | Westcroft Place Plat 2           | 64  | 59                                 |
| I-10-44         | 260 feet north                         | El Retiro Block 1 and 2          | 69  | 61                                 |
| I-10-45         | 240 feet north                         | Sharon Gardens                   | 72  | 62                                 |
| I-10-46         | 370 feet south                         | Westcroft Place Plat 2           | 67  | 61                                 |
| I-10-47         | 220 feet south                         | Westcroft Place Plat 2           | 69  | 61                                 |
| I-10-48         | 330 feet south                         | El Retiro Block 1 and 2          | 66  | 62                                 |
| I-10-49         | 280 feet south                         | North Willow Square              | 70  | 62                                 |
| I-10-50         | 370 feet south                         | North Willow Square              | 70  | 62                                 |
| I-10-51         | 370 feet south                         | North Willow Square Plat 2       | 65  | 59                                 |
| W71 Alternative |  |                                  |   |                                    |
| 55              | 415 feet east                          | Laveen Meadows                   | 72  | 65 <sup>c</sup>                    |
| 55a             | 305 feet west                          | Laveen Meadows Parcel 3          | 74  | 67 <sup>c</sup>                    |
| 55b             | 450 feet west                          | Laveen Meadows Parcel 2          | 71  | 60                                 |
| 55c             | 590 feet east                          | Laveen Meadows Parcel 15         | 71  | 63                                 |
| 55d             | 2,000 feet east                        | Laveen Meadows Elementary School | 64  | 59                                 |
| 56              | 590 feet east                          | Rancho Grande                    | 70  | 63                                 |
| 57              | 1,040 feet west                        | 75th Avenue and Baseline Road    | 66  | 63                                 |
| 57a             | 400 feet west                          | Laveen Ranch                     | 72  | 63                                 |
| 58              | 410 feet west                          | 75th Avenue and Vineyard Road    | 74  | 63                                 |
| 58a             | 410 feet east                          | Laveen Farms Phase 1             | 74  | 63                                 |
| 58b             | 425 feet east                          | Laveen Farms Phase 1             | 74  | 63                                 |

| Receiver ID                        | Distance and Direction from Centerline | Neighborhood or Area                       | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|------------------------------------|--|--|---|------------------------------------|
| 59                                 | 435 feet west                          | Western Heritage Estates                   | 72  | 62                                 |
| 60                                 | 890 feet east                          | Western Heritage Estates 2                 | 68  | 61                                 |
| 61                                 | 930 feet east                          | Western Heritage Estates 2                 | 67  | 62                                 |
| 61a                                | 1,150 feet east                        | Sienna Vista                               | 66  | 61                                 |
| 62                                 | 495 feet west                          | Sienna Vista                               | 72  | 63                                 |
| 63                                 | 290 feet west                          | Marbella                                   | 74  | 61                                 |
| 64                                 | 1,160 feet east                        | 71st Avenue and Elwood Street              | 66  | 59                                 |
| 64a                                | 345 feet east                          | Sienna Vista                               | 74  | 63                                 |
| 65                                 | 260 feet west                          | Suncrest at Estrella Village               | 76  | 63                                 |
| 65a                                | 410 feet west                          | Travertine at Estrella Village             | 72  | 61                                 |
| 66                                 | 1,440 feet east                        | Santa Marie Townsite                       | 64  | 59                                 |
| 66a                                | 445 feet east                          | Sienna Vista                               | 70  | 61                                 |
| 67                                 | 535 feet east                          | Santa Maria Elementary School              | 71  | 65 <sup>c</sup>                    |
| 68                                 | 600 feet east                          | Valle Eldorado                             | 71  | 61                                 |
| 68a                                | 385 feet east                          | Valle Eldorado                             | 74  | 63                                 |
| 69                                 | 460 feet east                          | Westridge Park 4                           | 70  | 65 <sup>c</sup>                    |
| 69a                                | 1,135 feet east                        | Western Acres                              | 65  | 60                                 |
| 70                                 | 400 feet east                          | Westridge Park 2                           | 69  | 62                                 |
| Interstate 10 with W71 Alternative |  |  |   |                                    |
| I-10-1                             | 1,350 feet north                       | Sheely Farms Parcel 3                      | 62  | 62                                 |
| I-10-2                             | 1,180 feet north                       | Apartments – McDowell Road and 93rd Avenue | 61  | 61                                 |
| I-10-3                             | 510 feet south                         | Tolsun Farms                               | 66  | 61                                 |
| I-10-4                             | 520 feet south                         | Tolsun Farms                               | 68  | 62                                 |
| I-10-5                             | 1,440 feet north                       | Westpoint                                  | 60  | 60                                 |
| I-10-6                             | 470 feet north                         | EconoLodge                                 | 70  | — <sup>f</sup>                     |
| I-10-7                             | 1,440 feet north                       | Amberlea Cottages                          | 60  | 60                                 |
| I-10-8                             | 460 feet north                         | Legacy Suites Apartments                   | 63  | 58                                 |
| I-10-9                             | 410 feet north                         | Daravante                                  | 63  | 56                                 |
| I-10-10                            | 380 feet north                         | Daravante                                  | 67  | 57                                 |
| I-10-11                            | 440 feet north                         | Hampton Square Apartments                  | 69  | 62                                 |
| I-10-12                            | 420 feet north                         | Hampton Square Apartments                  | 67  | 59                                 |
| I-10-13                            | 390 feet north                         | Sunpointe Apartments                       | 66  | 61                                 |
| I-10-14                            | 420 feet north                         | Las Gardenias Apartments                   | 63  | 63                                 |

(continued on next page)

Table 4-40 Noise Analysis Results, Western and Eastern Sections (continued)

| Receiver ID | Distance and Direction from Centerline | Neighborhood or Area                       | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|-------------|--|--|---|------------------------------------|
| I-10-15     | 460 feet north                         | Las Gardenias Apartments                   | 63  | 63                                 |
| I-10-16     | 490 feet north                         | Westover Parc Condominiums                 | 63  | 59                                 |
| I-10-17     | 440 feet north                         | Apartments – McDowell Road and 85th Avenue | 62  | 58                                 |
| I-10-18     | 420 feet north                         | Apartments – McDowell Road and 84th Avenue | 61  | 58                                 |
| I-10-19     | 410 feet north                         | Apartments – McDowell Road and 83rd Avenue | 61  | 57                                 |
| I-10-20     | 400 feet north                         | Avanti Apartments                          | 63  | 57                                 |
| I-10-21     | 500 feet north                         | Avanti Apartments                          | 62  | 58                                 |
| I-10-22     | 340 feet south                         | La Terraza                                 | 60  | 60                                 |
| I-10-23     | 280 feet south                         | Patio Homes West                           | 69  | 61                                 |
| I-10-24     | 350 feet south                         | Patio Homes West                           | 63  | 61                                 |
| I-10-25     | 430 feet north                         | Apartments – McDowell Road and 57th Avenue | 61  | 61                                 |
| I-10-26     | 390 feet north                         | Apartments – McDowell Road and 56th Avenue | 68  | 59                                 |
| I-10-27     | 360 feet north                         | Hallcraft Villas West Condominiums         | 72  | 59                                 |
| I-10-28     | 380 feet north                         | Hallcraft Villas West Condominiums         | 72  | 60                                 |
| I-10-29     | 320 feet north                         | Winona Park 1                              | 68  | 59                                 |
| I-10-30     | 250 feet north                         | Winona Park 6A                             | 66  | 60                                 |
| I-10-31     | 250 feet north                         | Winona Park 6A                             | 67  | 61                                 |
| I-10-32     | 310 feet south                         | Winona Park 2                              | 68  | 60                                 |
| I-10-33     | 270 feet south                         | Deluxe Mobile Home Park                    | 66  | 60                                 |
| I-10-34     | 280 feet south                         | Deluxe Mobile Home Park                    | 66  | 60                                 |
| I-10-35     | 300 feet north                         | Franmar Manor                              | 67  | 60                                 |
| I-10-36     | 300 feet north                         | West View Manor                            | 72  | 61                                 |
| I-10-37     | 310 feet north                         | West View Manor                            | 70  | 60                                 |
| I-10-38     | 270 feet south                         | West Phoenix No. 4                         | 67  | 60                                 |
| I-10-39     | 220 feet south                         | West Phoenix No. 4                         | 72  | 62                                 |
| I-10-40     | 370 feet south                         | West Phoenix No. 4                         | 69  | 62                                 |
| I-10-41     | 340 feet north                         | Westcroft Place                            | 71  | 60                                 |
| I-10-42     | 250 feet north                         | Isaac Infill                               | 71  | 61                                 |
| I-10-43     | 360 feet north                         | Westcroft Place Plat 2                     | 64  | 59                                 |
| I-10-44     | 260 feet north                         | El Retiro Block 1 and 2                    | 69  | 61                                 |
| I-10-45     | 240 feet north                         | Sharon Gardens                             | 72  | 61                                 |
| I-10-46     | 370 feet south                         | Westcroft Place Plat 2                     | 67  | 61                                 |
| I-10-47     | 220 feet south                         | Westcroft Place Plat 2                     | 69  | 61                                 |
| I-10-48     | 330 feet south                         | El Retiro Block 1 and 2                    | 66  | 61                                 |
| I-10-49     | 280 feet south                         | North Willow Square                        | 70  | 62                                 |

| Receiver ID  | Distance and Direction from Centerline | Neighborhood or Area                                   | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|--|--|--|---|------------------------------------|
| I-10-50  | 370 feet south                         | North Willow Square                                    | 70  | 61                                 |
| I-10-51  | 370 feet south                         | North Willow Square Plat 2                             | 65  | 58                                 |
| W101 Alternative Western Option  |  |  |   |                                    |
| 55   | 410 feet east                          | Laveen Meadows   | 73  | 63                                 |
| 55d  | 545 feet east                          | Laveen Meadows Parcel 15                               | 71  | 63                                 |
| 57   | 820 feet west                          | 75th Avenue and Baseline Road                          | 69  | 63                                 |
| 57b  | 800 feet east                          | Laveen Ranch   | 69  | 63                                 |
| 57c  | 670 feet east                          | Laveen Ranch   | 70  | 60                                 |
| 71   | 2,270 feet west                        | Community <sup>g</sup> , 78th Avenue and Baseline Road | 62  | 61                                 |
| 72   | 945 feet east                          | 75th Avenue and Southern Avenue                        | 69  | 61                                 |
| 73   | 1,750 feet west                        | 95th Avenue and Broadway Road                          | 63  | 62                                 |
| 73a  | 535 feet east                          | 93rd Avenue and Broadway Road                          | 71  | 66 <sup>c</sup>                    |
| 73b  | 745 feet east                          | 89th Avenue and Broadway Road                          | 70  | 63                                 |
| 73c  | 450 feet east                          | 87th Avenue and Broadway Road                          | 74  | 63                                 |
| 73d  | 950 feet east                          | 84th Avenue and Broadway Road                          | 69  | 61                                 |
| 74   | 1,040 feet east                        | Tivoli   | 68  | 62                                 |
| 75   | 615 feet east                          | Country Place Parcel 26                                | 72  | 63                                 |
| 76   | 275 feet west                          | Country Place Parcel 25                                | 76  | 63                                 |
| 76a  | 925 feet west                          | 99th Avenue and Illini Street                          | 69  | 63                                 |
| 77   | 485 feet east                          | Country Place Parcel 22                                | 72  | 63                                 |
| 78   | 350 feet west                          | Country Place Parcel 21                                | 73  | 61                                 |
| 78a  | 1,080 feet west                        | Country Place Phase 4                                  | 67  | 62                                 |
| 78b  | 1,705 feet west                        | Country Place Phase 4                                  | 64  | 59                                 |
| 79   | 485 feet east                          | Country Place Parcel 23                                | 73  | 67 <sup>c</sup>                    |
| 80   | 445 feet east                          | Tolleson High School                                   | 72  | 63                                 |
| 80a  | 1,730 feet east                        | Tolleson-Goetz Tract, Block 100                        | 64  | 59                                 |
| 81   | 475 feet east                          | Concord Sundancer Apartments                           | 73  | 65 <sup>c</sup>                    |
| 82   | 1,090 feet east                        | Villa de Tolleson 1                                    | 66  | 61                                 |
| 82a  | 1,060 feet east                        | Parkview Casitas                                       | 64  | 59                                 |
| 82b  | 380 feet east                          | Sheely Farms Parcel 5                                  | 70  | 62                                 |
| 86   | 1,060 feet east                        | 75th and Southern avenues                              | 68  | 61                                 |
| 87   | 400 feet east                          | 75th and Southern avenues                              | 75  | 63                                 |
| Interstate 10 with W101 Alternative (Western, Central, and Eastern Options) <sup>h</sup> |  |  |   |                                    |
| I-10-1   | 1,350 feet north                       | Sheely Farms Parcel 3                                  | 62  | 62                                 |
| I-10-2   | 1,180 feet north                       | Apartments – McDowell Road and 93rd Avenue             | 61  | 61                                 |

(continued on next page)

Table 4-40 Noise Analysis Results, Western and Eastern Sections (continued)

| Receiver ID                     | Distance and Direction from Centerline | Neighborhood or Area                              | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|---------------------------------|--|---|---|------------------------------------|
| I-10-3                          | 510 feet south                         | Tolsun Farms                                      | 61  | 61                                 |
| I-10-4                          | 520 feet south                         | Tolsun Farms                                      | 62  | 62                                 |
| I-10-5                          | 1,440 feet north                       | Westpoint   | 60  | 60                                 |
| I-10-6                          | 470 feet north                         | EconoLodge  | 70  | — <sup>f</sup>                     |
| I-10-7                          | 1,440 feet north                       | Amberlea Cottages                                 | 60  | 60                                 |
| I-10-8                          | 460 feet north                         | Legacy Suites Apartments                          | 58  | 58                                 |
| I-10-9                          | 410 feet north                         | Daravante   | 55  | 55                                 |
| I-10-10                         | 380 feet north                         | Daravante   | 56  | 56                                 |
| I-10-11                         | 440 feet north                         | Hampton Square Apartments                         | 60  | 60                                 |
| I-10-12                         | 420 feet north                         | Hampton Square Apartments                         | 58  | 58                                 |
| I-10-13                         | 390 feet north                         | Sunpointe Apartments                              | 58  | 58                                 |
| I-10-14                         | 420 feet north                         | Las Gardenias Apartments                          | 58  | 58                                 |
| I-10-15                         | 460 feet north                         | Las Gardenias Apartments                          | 60  | 60                                 |
| I-10-16                         | 490 feet north                         | Westover Parc Condominiums                        | 58  | 58                                 |
| I-10-17                         | 440 feet north                         | Apartments – McDowell Road and 85th Avenue        | 57  | 57                                 |
| I-10-18                         | 420 feet north                         | Apartments – McDowell Road and 84th Avenue        | 58  | 58                                 |
| I-10-19                         | 410 feet north                         | Apartments – McDowell Road and 83rd Avenue        | 56  | 56                                 |
| I-10-20                         | 400 feet north                         | Avanti Apartments                                 | 56  | 56                                 |
| I-10-21                         | 500 feet north                         | Avanti Apartments                                 | 57  | 57                                 |
| I-10-22                         | 340 feet south                         | La Terraza  | 59  | 59                                 |
| I-10-23                         | 280 feet south                         | Patio Homes West                                  | 60  | 60                                 |
| I-10-24                         | 350 feet south                         | Patio Homes West                                  | 60  | 60                                 |
| I-10-W1                         | 1,280 feet north                       | Apartments – McDowell Road and 103rd Avenue       | 63  | 63                                 |
| I-10-W2                         | 1,270 feet north                       | Crystal Gardens Parcel 2A                         | 63  | 63                                 |
| I-10-W3                         | 1,400 feet north                       | Crystal Point                                     | 62  | 62                                 |
| I-10-W4                         | 670 feet south                         | Hotel   | 66  | — <sup>f</sup>                     |
| I-10-W5                         | 960 feet north                         | Crystal Springs Apartments                        | 58  | 58                                 |
| I-10-W6                         | 980 feet north                         | Mobile Home Park – McDowell Road and 119th Avenue | 63  | 63                                 |
| I-10-W7                         | 810 feet south                         | Isolated homes – east of El Mirage Road           | 66  | 66 <sup>i</sup>                    |
| I-10-W8                         | 1,040 feet north                       | Avondale Friendship Park                          | 63  | 63                                 |
| I-10-W9                         | 1,240 feet north                       | Avondale Friendship Park                          | 62  | 62                                 |
| I-10-W10                        | 1,070 feet north                       | Rio Santa Fe Apartments                           | 59  | 59                                 |
| I-10-W11                        | 350 feet south                         | Desert Sage Apartments                            | 63  | 63                                 |
| W101 Alternative Central Option |  |   |   |                                    |
| 83                              | 2,375 feet west                        | Union Elementary School                           | 71  | 63                                 |

| Receiver ID                     | Distance and Direction from Centerline | Neighborhood or Area               | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|---------------------------------|--|------------------------------------|---|------------------------------------|
| 83a                             | 1,750 feet west                        | 89th Avenue and Broadway Road      | 64  | 59                                 |
| 83b                             | 1,200 feet west                        | 89th Avenue and Broadway Road      | 61  | 56                                 |
| 83c                             | 330 feet west                          | Hurley Ranch Parcel 3              | 63  | 59                                 |
| 83d                             | 445 feet west                          | Hurley Ranch Parcels 1 and 2       | 66  | 61                                 |
| 84                              | 765 feet east                          | Volterra                           | 77  | 65                                 |
| 84a                             | 750 feet east                          | Volterra                           | 72  | 63                                 |
| 85                              | 835 feet east                          | Ryland at Heritage Point           | 71  | 63                                 |
| 85a                             | 595 feet west                          | Farmington Park                    | 69  | 63                                 |
| 85b                             | 550 feet west                          | Farmington Park                    | 68  | 63                                 |
| 85c                             | 295 feet west                          | Farmington Park                    | 71  | 66 <sup>e</sup>                    |
| 89a                             | 580 feet east                          | 84th Avenue and Broadway Road      | 71  | 63                                 |
| 89b                             | 1,805 feet east                        | 83rd Avenue north of Broadway Road | 75  | 63                                 |
| 100                             | 1,240 feet east                        | Ryland at Heritage Point           | 66  | 61                                 |
| W101 Alternative Eastern Option |  |                                    |   |                                    |
| 72                              | 930 feet east                          | 75th and Southern avenues          | 70  | 62                                 |
| 80                              | 490 feet east                          | Tolleson High School               | 72  | 63                                 |
| 80a                             | 1,395 feet east                        | Tolleson-Goetz Tract Block 100     | 66  | 61                                 |
| 84a                             | 650 feet west                          | Volterra                           | 70  | 60                                 |
| 86                              | 1,060 feet east                        | 75th and Southern avenues          | 69  | 62                                 |
| 87                              | 400 feet east                          | 75th and Southern avenues          | 73  | 63                                 |
| 88                              | 1,920 feet east                        | Estrella Village Manor             | 63  | 60                                 |
| 88a                             | 625 feet east                          | Tuscano Phase 2 Parcel C           | 71  | 63                                 |
| 88b                             | 410 feet east                          | Tuscano Phase 2 Parcel A           | 72  | 61                                 |
| 89                              | 1,205 feet west                        | 83rd Avenue and Mobile Street      | 67  | 61                                 |
| 89a                             | 1,460 feet west                        | 84th Avenue and Broadway Road      | 65  | 62 <sup>e</sup>                    |
| 89b                             | 550 feet west                          | 83rd Avenue north of Broadway Road | 72  | 63                                 |
| 89c                             | 400 feet west                          | 83rd Avenue north of Broadway Road | 72  | 62                                 |
| 90                              | 300 feet west                          | Volterra                           | 73  | 63                                 |
| 91                              | 370 feet east                          | Volterra                           | 72  | 63                                 |
| 92                              | 520 feet east                          | Tuscano Phase 1                    | 70  | 61                                 |
| 93                              | 400 feet east                          | Volterra                           | 73  | 63                                 |
| 94                              | 325 feet west                          | Volterra                           | 73  | 62                                 |
| 95                              | 580 feet east                          | Volterra                           | 71  | 62                                 |
| 96                              | 840 feet east                          | Ryland at Heritage Point           | 69  | 63                                 |
| 97                              | 690 feet east                          | Ryland at Heritage Point           | 70  | 61                                 |

(continued on next page)



Table 4-40 Noise Analysis Results, Western and Eastern Sections (continued)

| Receiver ID     | Distance and Direction from Centerline | Neighborhood or Area                     | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|-----------------|--|--|---|------------------------------------|
| 98              | 520 feet west                          | Farmington Park                          | 72  | 62                                 |
| 98a             | 330 feet west                          | Farmington Park                          | 74  | 63                                 |
| 99              | 305 feet west                          | Farmington Park                          | 75  | 65 <sup>c</sup>                    |
| 100             | 950 feet east                          | Ryland at Heritage Point                 | 68  | 61                                 |
| 100a            | 450 feet east                          | School at 87th Avenue and Durango Street | 73  | 63                                 |
| Eastern Section |  |  |   |                                    |
| E1 Alternative  |  |  |   |                                    |
| 1               | 250 feet north                         | Foothills Paseo 2                        | 78  | 64 <sup>c</sup>                    |
| 1a              | 460 feet south                         | Pecos Park                               | 74  | 62                                 |
| 1b              | 320 feet south                         | Pecos Park                               | 77  | 63                                 |
| 1c              | 440 feet south                         | Pecos Park                               | 74  | 61                                 |
| 2               | 260 feet north                         | Foothills Paseo 2                        | 77  | 63                                 |
| 3               | 335 feet north                         | Foothills Paseo 2                        | 73  | 62                                 |
| 4               | 785 feet north                         | Wilton Commons                           | 69  | 63                                 |
| 5               | 235 feet north                         | Kyrene de los Lagos Elementary School    | 76  | 63                                 |
| 6               | 220 feet north                         | Lakewood Parcel 20                       | 74  | 64 <sup>c</sup>                    |
| 7               | 215 feet north                         | Lakepoint 21 at Lakewood                 | 76  | 63                                 |
| 8               | 380 feet north                         | Kyrene Akimel Middle School              | 75  | 62                                 |
| 9               | 390 feet north                         | Foothills Mountain Ranch 2               | 71  | 63                                 |
| 10              | 280 feet north                         | Foothills Apartments                     | 72  | 63                                 |
| 11              | 320 feet north                         | Foothills Parcel 5B                      | 75  | 63                                 |
| 12              | 325 feet north                         | Foothills Parcel 5A                      | 75  | 63                                 |
| 13              | 305 feet north                         | Foothills Parcel 5C                      | 76  | 63                                 |
| 14              | 290 feet north                         | Parcel 6A at the Foothills               | 75  | 63                                 |
| 15              | 370 feet north                         | Parcel 6A at the Foothills               | 74  | 68 <sup>c</sup>                    |

| Receiver ID | Distance and Direction from Centerline | Neighborhood or Area                              | Unmitigated Action Alternative Noise Level <sup>a</sup> | Mitigated Noise Level <sup>a</sup> |
|-------------|--|---|---|------------------------------------|
| 16          | 400 feet north                         | Foothills Parcels 12A, B, C                       | 74  | 70 <sup>e</sup>                    |
| 17          | 690 feet north                         | Foothills Parcels 12A, B, C                       | 70  | 63                                 |
| 18          | 405 feet north                         | Fairway Hills at Club West                        | 74  | 63                                 |
| 19          | 455 feet north                         | Fairway Hills at Club West                        | 72  | 62                                 |
| 20          | 460 feet north                         | Parcel 9G at Foothills Club West                  | 73  | 62                                 |
| 21          | 350 feet north                         | Parcels 18A, 19D, 19E, 26B at Foothills Club West | 75  | 63                                 |
| 21a         | 395 feet north                         | Parcels 18A, 19D, 19E, 26B at Foothills Club West | 74  | 61                                 |
| 22          | 1,175 feet north                       | Parcel 26 at Foothills Club West                  | 66  | 61                                 |
| 22a         | 470 feet north                         | Foothills Club West Parcels 20 and 25 Amended     | 71  | 64 <sup>c</sup>                    |
| 23          | 1,370 feet north                       | Parcel 23 at Foothills Club West                  | 65  | 60                                 |
| 24          | 210 feet north                         | Foothills Reserve Parcel D                        | 78  | 63                                 |
| 24a         | 865 feet north                         | Foothills Reserve                                 | 67  | 59                                 |
| 24b         | 1,400 feet north                       | Foothills Reserve                                 | 68  | 60                                 |
| 25          | 195 feet north                         | Foothills Reserve Parcel D                        | 76  | 63                                 |
| 26          | 240 feet north                         | Foothills Reserve Parcel C                        | 76  | 63                                 |
| 26a         | 350 feet north                         | Foothills 80                                      | 76  | 63                                 |
| 27          | 470 feet east                          | Dusty Lane area                                   | 73  | 62                                 |
| 28          | 490 feet east                          | Dusty Lane area                                   | 72  | 62                                 |
| 29          | 335 feet east                          | Dusty Lane area                                   | 74  | 63                                 |
| 30          | 760 feet west                          | Community Casino                                  | 68  | — <sup>f</sup>                     |
| 31          | 580 feet east                          | Dusty Lane area                                   | 70  | 61                                 |
| 32          | 1,540 feet west                        | Community, 51st Avenue area                       | 64  | 59                                 |
| 33          | 420 feet east                          | Dusty Lane area                                   | 75  | 69 <sup>c</sup>                    |
| 34          | 760 feet west                          | Community, 51st Avenue area                       | 68  | 63                                 |
| 35          | 670 feet east                          | 53rd Avenue and Estrella Drive                    | 68  | 63                                 |
| 35a         | 770 feet east                          | Tierra Montana Phase 1                            | 70  | 63                                 |

<sup>a</sup> in decibels (dBA), which are logarithmic units that express the ratio of the sound pressure level being measured to a standard reference level and is frequency-weighted using the A-scale, to approximate the frequency response of the human ear

<sup>b</sup> Sites 1 to 35 are located in the Eastern Section and are presented later in the table.

<sup>c</sup> Further mitigation would require a noise barrier taller than 20 feet, which would not meet the Arizona Department of Transportation Noise Abatement Policy.

<sup>d</sup> Numerous new receivers were added to represent new development since the initial analysis began in 2003. These receivers are designated with a letter following the receiver number to maintain the sequential numbering system.

<sup>e</sup> Traffic noise from nearby cross street prevented further noise reduction at this receiver.

<sup>f</sup> mitigation typically not recommended for hotels, motels, and casinos

<sup>g</sup> Gila River Indian Community

<sup>h</sup> The noise analysis results along Interstate 10 are the same for all of the W101 Alternative Options.

<sup>i</sup> not eligible for mitigation based on land use category

Construction Noise

Short-term noise impacts may be experienced during construction along any of the various action alternatives. Quantification of such impacts is difficult without data on the proposed freeway’s construction schedule and equipment to be used. Therefore, several assumptions were made to project the approximate noise level at R/W boundaries. These projections are based on the use of the noisiest equipment expected during each construction stage of a typical roadway project. Data on construction equipment noise are available from *FHWA Highway Construction Noise Handbook* (FHWA 2006b).

Measurements were taken during a freeway construction project in Arizona that assessed the collective impact of construction noise. The maximum noise levels ( $L_{max}$ ) were calculated at the R/W line. The distance between the R/W and the construction activity was estimated based on the type of work being performed.

Results of the preliminary estimates, shown below, indicate that sensitive receivers could be adversely affected by construction noise if the receivers were immediately adjacent to the proposed R/W. The highest noise levels would occur during the grading/earthwork phase of the construction project.

Construction Equipment Noise

| Phase             | Equipment       | Equipment ( $L_{max}$ ) <sup>a</sup> | Feet to R/W <sup>b</sup> | $L_{max}$ at R/W |
|-------------------|-----------------|--------------------------------------|--------------------------|------------------|
| Site clearing     | Dozer/Backhoe   | 82/78                                | 50                       | 83               |
| Grading/Earthwork | Scraper/Grader  | 84/85                                | 75                       | 85               |
| Foundation        | Backhoe/Loader  | 78/79                                | 100                      | 78               |
| Base preparation  | Compactor/Dozer | 83/82                                | 100                      | 82               |

<sup>a</sup> maximum noise level, measured in dBA (a logarithmic unit that expresses the ratio of the sound pressure level being measured to a standard reference level and is frequency-weighted using the A-scale, to approximate the frequency response of the human ear)

<sup>b</sup> right-of-way

W71 Alternative

Projected peak-hour noise levels along the W71 Alternative and I-10 (Papago Freeway) would range from 60 to 76 dBA  $L_{eq}$  at the 80 receivers. The projected noise levels at 63 of the 80 receivers would approach or exceed the ADOT mitigation criterion. The 63 affected receivers along this action alternative and I-10 would be eligible for noise abatement consideration.

W101 Alternative and Options

- Projected peak-hour noise levels along the W101 Alternative Western Option would range from 62 to 76 dBA  $L_{eq}$  at the 29 receivers. The projected noise levels at 27 of the 29 receivers would approach or exceed the ADOT mitigation criterion.

- The 27 affected receivers along this option would be eligible for noise abatement consideration.
- Projected peak-hour noise levels along the W101 Alternative Central Option would range from 61 to 77 dBA  $L_{eq}$  at the 14 receivers. The projected noise levels at 12 of the 14 receivers would approach or exceed the ADOT mitigation criterion. The 12 affected receivers along this option would be eligible for noise abatement consideration.
  - Projected peak-hour noise levels along the W101 Alternative Eastern Option would range from 63 to 75 dBA  $L_{eq}$  at the 26 receivers. The projected noise levels at 25 of the 26 receivers would approach or exceed the ADOT mitigation criterion. The 25 affected receivers along this option would be eligible for noise abatement consideration.

- Projected peak-hour noise levels along I-10 (Papago Freeway) for the W101 Alternative would range from 55 to 70 dBA  $L_{eq}$  at the 35 receivers. The projected noise levels at 3 of the 35 receivers would approach or exceed the ADOT mitigation criterion. The 3 affected receivers along I-10 (Papago Freeway) would not be eligible for noise abatement considerations. Two of the receivers are hotels; hotel owners typically consider noise walls to be undesirable because they reduce the hotel’s visibility. The third affected receiver represents an area of isolated homes, which would not be considered eligible for mitigation according to the ADOT NAP.

Action Alternative, Eastern Section

E1 (Preferred) Alternative

Most of the 44 receivers are located along the existing Pecos Road; the remainder of the receivers are located between 43rd and 55th avenues.

Projected peak-hour noise levels along the E1 Alternative would range from 64 to 78 dBA  $L_{eq}$  at the 44 receivers. The projected noise level at 43 of the 44 receivers would exceed the ADOT mitigation criterion. Receiver 30 represents the casino near 51st Avenue, and because it is not considered a noise-sensitive land use, would not be eligible for noise abatement consideration. The 43 affected receivers along this action alternative, including one on Community land (Receiver 34), would be eligible for noise abatement consideration.

No-Action Alternative

Noise impacts from the No-Action Alternative would be caused by vehicle traffic along arterial and other area surface streets. Based on projected growth throughout the region, traffic congestion would increase under this alternative, which would reduce travel speeds and thereby reduce traffic noise levels. As such, the No-Action Alternative would generally result in lower noise levels at the selected receivers than would any of the action alternatives, but would result in higher noise levels at other locations, such as along arterial streets. Noise from this alternative would be generated by traffic



*Noise policy as it applies to the proposed action*

According to ADOT policy, noise mitigation should achieve a reduction of 5 dBA and result in a noise level of less than 64 dBA (ADOT 2005b). Some of the receivers along the proposed action alternatives would be affected by noise from adjacent surface streets in addition to that from the proposed freeway. For some of these receivers, the proposed noise barriers would achieve a 5 dBA reduction, but the mitigated noise level would remain above the 64 dBA NAC approach level. For many of these receivers, however, the proposed noise barriers would achieve only a 3 to 4 dBA reduction, because the dominant noise source at the receiver would be the local arterial street rather than the proposed freeway. It would not be feasible to achieve additional noise reduction because of the impact from the local streets. Noise barriers would need to be constructed outside of the proposed R/W of the action alternatives to effectively reduce noise levels from local streets at these receivers. It would not be feasible to construct noise barriers outside of the proposed R/W. Each of these receivers would achieve the ADOT NAP criterion when modeled without the local street traffic.

on neighborhood and arterial streets, as well as by nontraffic noise sources and other general neighborhood activity. Therefore, it is difficult to quantify the projected noise levels from the No-Action Alternative.

**MITIGATION**

**ADOT Environmental Planning Group and Design Responsibilities**

Projected noise levels would approach or exceed the Activity Category B NAC at 196 of the receiver locations. Noise mitigation was evaluated for these receivers. Noise mitigation, in the form of noise walls or earth berms, is discussed for each of the action alternatives and options. Noise walls and earth berms are the most common type of noise mitigation used along ADOT freeways. General locations of noise barriers for the Western and Eastern Sections are shown in Figures 4-29 through 4-32. Other noise mitigation strategies that could be applied in addition to or instead of standard noise walls or earth berms are discussed later in this section.

Where the main line would be elevated, each of the noise barriers would be placed on the freeway embankment, near the edge of the shoulder, to take advantage of the elevated profile. (Placing a noise barrier on an elevated section of freeway results in a lower wall height to achieve the same noise reduction.) Where feasible (but not likely in the areas where the main line would be elevated), noise barriers would be constructed as early as possible in the construction phasing to shield adjacent properties from construction-related noise impacts.

In addition, the ADOT NAP specifies that noise abatement should provide at least 5 dBA in noise reduction and result in a noise level below the 64 dBA criterion. Also, the ADOT NAP specifies that the maximum reasonable barrier height is 20 feet.

For some of the receivers along the action alternatives, a barrier as high as 20 feet would provide more than 5 dBA of noise reduction, but a noise level below 64 dBA could not be achieved. According to ADOT policy, barriers generally will not be constructed higher than 20 feet because of cost, aesthetics, and

constructibility. Therefore, no further noise reduction would be provided.

**Action Alternatives, Western Section W59 (Preferred) Alternative**

Nineteen new barriers and one raised barrier would be needed to reduce noise levels in accordance with the ADOT NAP along the W59 Alternative and I-10 (Papago Freeway). The barriers would range in height from 10 to 20 feet and would reduce noise levels at the 84 receivers to between 56 and 71 dBA  $L_{eq}$ . The noise levels at 1 of the receivers (R53c), even with a 20-foot-high noise barrier, would not be reduced to by at least 5 dBA, ADOT’s goal for reducing traffic noise on new roadway projects. This receiver, however, would achieve a 4 dBA reduction in the projected noise levels and would be reduced to less than the approach threshold of 64 dBA. Additionally, the noise level at 4 of the receivers (R54b, R54c, R54d, and R54e) would not be reduced in full accordance with the ADOT NAP because of noise impacts from adjacent arterial streets. These receivers would achieve noise reductions of 1 to 5 dBA, but would still be higher than 64 dBA. Three of the receivers (R37, R38, and R42) would be affected because of a “substantial increase” and would all be mitigated with a 5 to 7 dBA reduction. The barriers would total approximately 745,500 square feet in area. Using the standard \$33 per square foot of barrier recommended by ADOT, the cost of noise mitigation for the W59 Alternative would be approximately \$24.6 million. The ADOT-recommended cost per square foot is subject to future increase.

**W71 Alternative**

Eighteen new barriers and one raised barrier would be needed to reduce noise levels in accordance with the ADOT NAP along the W71 Alternative and I-10 (Papago Freeway). The barriers would range in height from 10 to 20 feet and would reduce noise levels at the 80 receivers to between 56 and 67 dBA  $L_{eq}$ . The noise level at 4 of the receivers (R55, R55a, R67, and R69), even with a 20-foot-high noise barrier, would not be reduced to less than the approach threshold of 64 dBA, which is

ADOT’s goal for reducing traffic noise on new roadway projects. These receivers, however, would experience at least a 5 dBA reduction in the projected noise level. The barriers would total approximately 1,036,100 square feet in area. Using the standard \$33 per square foot recommended by ADOT, the cost of noise mitigation for the W71 Alternative would be approximately \$34.2 million.

**W101 Alternatives and Options**

- Seventeen barriers would be needed to reduce noise levels in accordance with the ADOT NAP along the W101 Alternative Western Option. The barriers would range in height from 10 to 20 feet and would reduce noise levels at the 29 receivers to between 59 and 67 dBA  $L_{eq}$ . The noise level at 3 of the receivers (R73a, R79, and R81) would not be reduced in full accordance with the ADOT NAP. These receivers would achieve a noise reduction of at least 5 dBA. The barriers would total approximately 835,100 square feet in area. Using the standard \$33 per square foot recommended by ADOT, the cost of noise mitigation for the W101 Alternative Western Option would be approximately \$27.6 million.
- Twenty barriers would be needed to reduce noise levels in accordance with the ADOT NAP along the W101 Alternative Central Option. The barriers would range in height from 10 to 20 feet and would reduce noise levels at the 14 receivers to between 56 and 66 dBA  $L_{eq}$ . The noise level at one of the receivers (R85a) would not be reduced in full accordance with the ADOT NAP because of noise impacts from adjacent arterial streets. This receiver would achieve a noise reduction of 5 dBA. The barriers would total approximately 825,500 square feet in area. Using the standard \$33 per square foot recommended by ADOT, the cost of noise mitigation for the W101 Alternative Central Option would be approximately \$27.2 million.
- Sixteen barriers would be needed to reduce noise levels in accordance with the ADOT NAP along the W101 Alternative Eastern Option. The barriers would range in height from 10 to 20 feet and would

reduce noise levels at the 26 receivers to between 60 and 65 dBA  $L_{eq}$ . The noise level at one of the receivers (R89a) would not be reduced in full accordance with the ADOT NAP because of noise impacts from adjacent arterial streets. Noise levels at this receiver would be reduced to a sound level below 64 dBA, but would achieve a noise reduction of only 3 dBA. The noise level at one of the receivers (R99), even with a 20-foot-high noise barrier, would not be reduced to less than the approach threshold of 64 dBA. This receiver, however, would experience a noise reduction of 5 dBA. The barriers would total approximately 859,400 square feet in area. Using the standard \$33 per square foot recommended by ADOT, the cost of the noise mitigation for the W101 Alternative Eastern Option would be approximately \$28.4 million.

- For the W101 Alternative and Options along I-10 (Papago Freeway), no barriers would be needed to reduce noise levels in accordance with the ADOT NAP.

**Action Alternative, Eastern Section  
E1 (Preferred) Alternative**

Twenty barriers would be needed to reduce noise levels in accordance with the ADOT NAP along the E1 Alternative. The barriers would range in height from 8 to 20 feet and would reduce noise levels at the 44 receivers to between 59 and 70 dBA  $L_{eq}$ . One receiver (R30), the Vee Quiva Casino near 51st Avenue, is not considered noise-sensitive and is not eligible for noise mitigation. The noise levels at five of the receivers (R1, R6, R15, R22a, and R33) would not be reduced in full accordance with the ADOT NAP even with a 20-foot-high noise barrier. Each of these receivers, however, would achieve at least a 5 dBA reduction in projected noise levels. Additionally, the noise level at one of the receivers (R16) would not be reduced in full accordance with the ADOT NAP because of noise impacts from adjacent arterial streets. This receiver would achieve a noise reduction of 4 dBA. The barriers would total approximately 1,356,200 square feet in area. Using the

standard \$33 per square foot recommended by ADOT, the cost of the noise mitigation for the E1 Alternative would be approximately \$44.8 million.

**No-Action Alternative**

The No-Action Alternative assumes that the proposed action would not be selected. Consequently, under the No-Action Alternative, noise mitigation would not be provided for any of the receivers.

**OTHER POSSIBLE MITIGATION STRATEGIES**

A number of mitigation strategies are available that could be used instead of, or in addition to, noise barriers. These involve elements of the action alternatives’ alignments, design features, and restrictions.

- **Depressing the freeway** – For most alignments of each of the action alternatives, the proposed freeway would be elevated above the natural grade of the surrounding land. This elevated profile would allow noise to carry farther, creating noise impacts at greater distances from the freeway. Depressing the profile of the freeway below grade (see *Depressed Freeway Options*, on page 3-15) may result in reduced traffic noise levels adjacent to depressed sections (FHWA 1980). However, it would be necessary to also construct at-grade noise barriers to achieve noise reduction goals at receiver locations adjacent to depressed freeway sections. This strategy would also reduce the visual impacts associated with high noise walls on elevated freeways (FHWA 1994). A major disadvantage of this strategy, however, would be the added substantial construction cost of depressing the freeway, including possible acquisition of R/W and provision of drainage (pumping systems and retention basins).
- **Rubberized asphalt pavement surface** – Until recently, new freeways constructed by ADOT were composed of concrete pavement. ADOT has embarked on a multiyear pilot program in cooperation with FHWA to overlay the metropolitan Phoenix freeway system with a rubberized asphalt

pavement surface. The rubberized asphalt paving program seeks to reduce freeway traffic noise levels by at least 4 dBA. At this point in the pilot study, such results appear to be achievable.

ADOT would overlay the proposed action’s concrete pavement with rubberized asphalt, but is not making any predictions at this time regarding expected noise reductions. Noise modeling during the final design phase would reflect the most current FHWA modeling criteria, which may include rubberized asphalt.

- **Truck traffic restrictions or reduced posted speed limits** – Discussions regarding reduction of transportation noise impacts have at times focused on restricting truck traffic entirely or during certain hours of the day and on reducing the posted speed limit of a transportation facility. Reducing weight limits is another potential noise reduction strategy. In theory, all of these strategies would reduce the noise impacts on adjacent properties because trucks produce higher noise levels than automobiles and higher speeds generate more noise than lower speeds (FHWA 1976). None of these strategies would, however, be consistent with the purpose and need for the proposed action and, therefore, are not feasible for the proposed freeway.

**CONCLUSIONS**

Implementation of the proposed action would introduce traffic noise where it currently does not exist or at higher levels than now experienced. There are sensitive receivers [e.g., residences, Section 4(f) resources, schools, parks, churches] where freeway noise might be perceived adversely by users of such facilities. Depending on which action alternatives might be implemented (Western Section combined with the Eastern Section), between 55 and 108 affected receivers would be eligible for noise abatement consideration. The combinations of the W59/E1 (Preferred) Alternative and W71/E1 Alternative would have the most affected eligible receivers, followed by the W101/E1 Alternative. These numbers are expected for a project of this magnitude located in a rapidly growing region. With the placement of noise

*Evening traffic noise*

The loudest traffic noise near an urban freeway is thought to occur during the morning and afternoon peaks associated with commuting cycles. Traffic noise analysis, therefore, has evolved to focus on these time periods. However, based on past experiences, ADOT also monitors noise levels during off-peak hours. Noise levels could be distinctly higher in the evening because vehicles cause substantially more noise at higher speeds. With fewer vehicles on freeways in the evening, vehicles are able to travel at higher speeds than in the peak periods. Higher speeds were found to cause high late-evening traffic noise.

If this condition were to be experienced along the proposed freeway ADOT would first investigate the occurrence and, if warranted, seek to reduce the noise to levels that would meet ADOT policy and FHWA regulations. It is ADOT policy to monitor a new freeway for 3 years.



**Rubberized asphalt pavement pilot program**

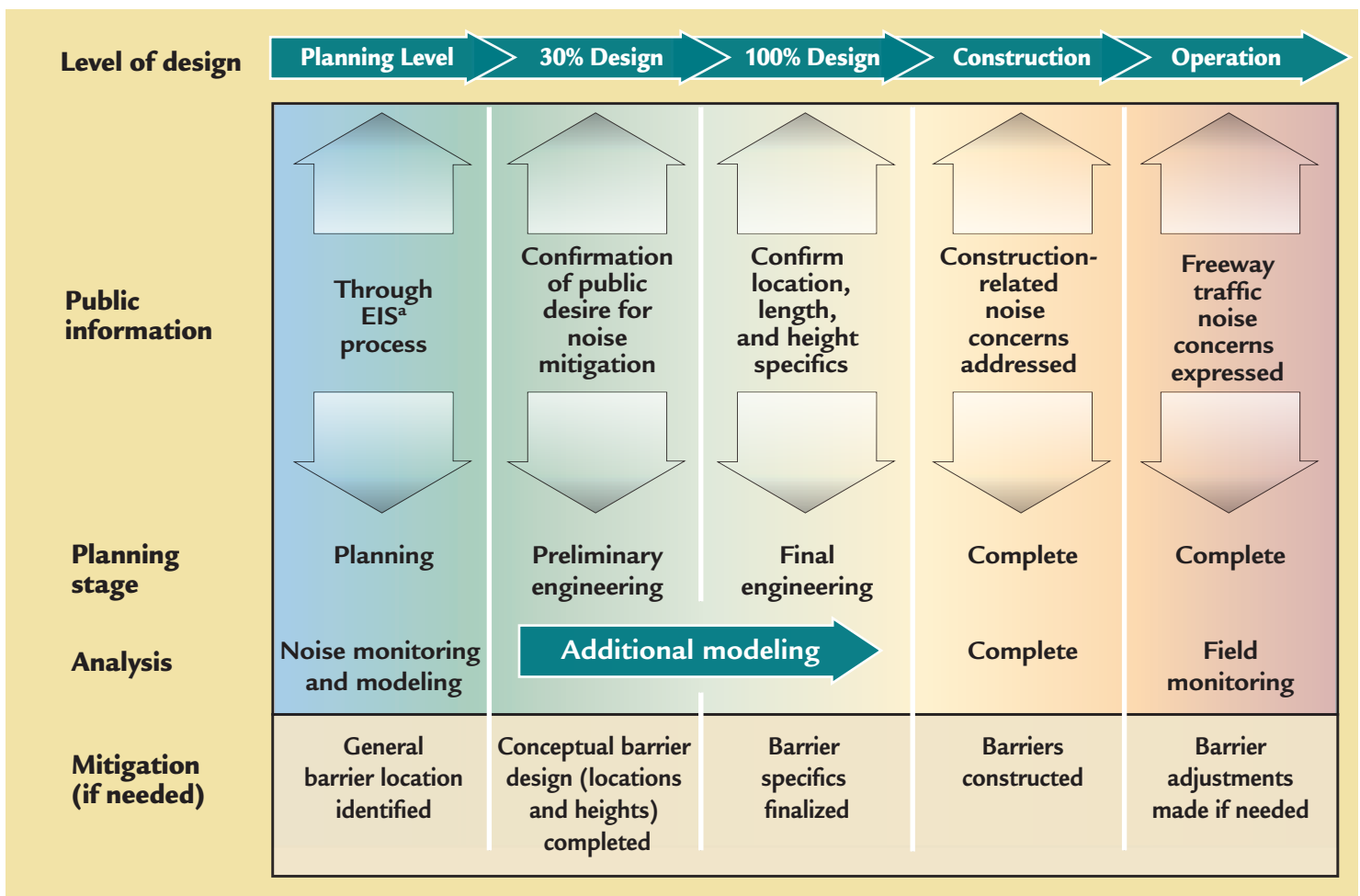
In 2003, ADOT and FHWA started a pilot program to study the noise reduction potential of rubberized asphalt pavement overlays.

The goal of the rubberized asphalt overlay program is to reduce traffic noise levels from freeways by 4 dBA. Initial noise measurements completed for the pilot study indicate the traffic noise reduction goal of 4 dBA for rubberized asphalt pavement is realistic; however, mitigation credit cannot be taken for potential noise reductions.

barriers in selected locations along whatever action alternatives might be implemented—if any—freeway noise would be reduced to levels that would meet ADOT policy and FHWA regulations for abatement. Under the No-Action Alternative, travel speeds would generally be reduced (along with noise levels) because of increased congestion near modeled receivers, but noise levels would increase in other areas, such as along arterial streets.

ADOT would continue to encourage the public’s involvement in freeway-related noise issues through final design, construction, and operation of the proposed action (see Figure 4-33).

**Figure 4-33** Noise Barrier Process



<sup>a</sup> environmental impact statement

*The determination of the location, length, and height of noise barriers requires multiple stages of modeling analysis and offers the public a number of opportunities to gather information and provide comments.*