NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP RESEARCH REPORT 984

Breaking Barriers: Alternative Approaches to Avoiding and Reducing Highway Traffic Noise Impacts

Judith Rochat
Doug Barrett
Shannon McKenna
Keith Yoerg
CROSS-SPECTRUM ACOUSTICS INC.
Pasadena, CA

Karel Cubick
Sean Riffle
Lisa Samples
MS CONSULTANTS, INC.
Akron, OH

Robert Rasmussen
Richard Sohaney
THE TRANSTEC GROUP, INC.
Austin, TX

Subscriber Categories
Design • Environment • Highways

Research sponsored by the American Association of State Highway and Transportation Officials
in cooperation with the Federal Highway Administration

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
TRB
TRANSPORTATION RESEARCH BOARD

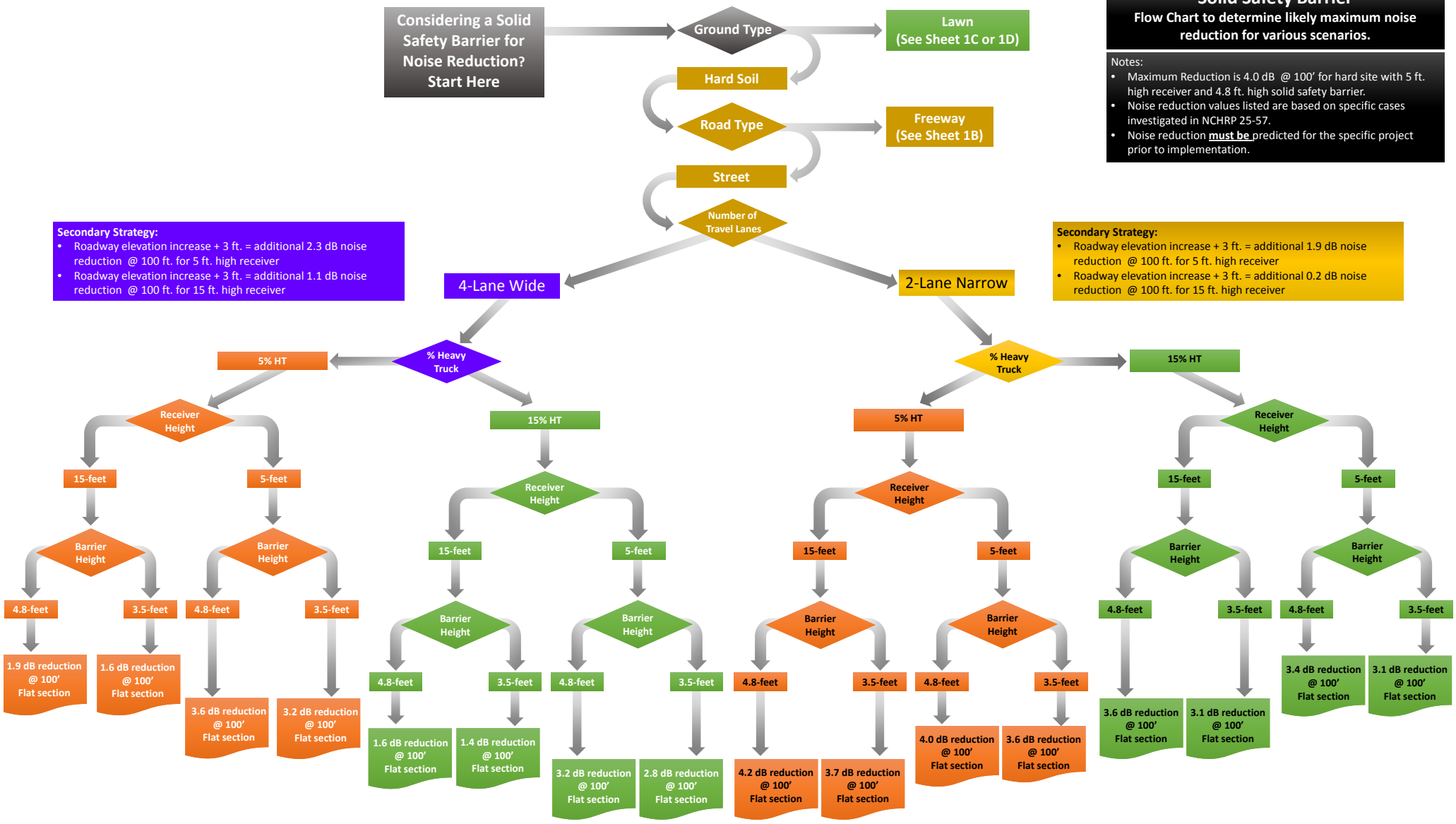
2021

Solid Safety Barrier

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Maximum Reduction is 4.0 dB @ 100' for hard site with 5 ft. high receiver and 4.8 ft. high solid safety barrier.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.

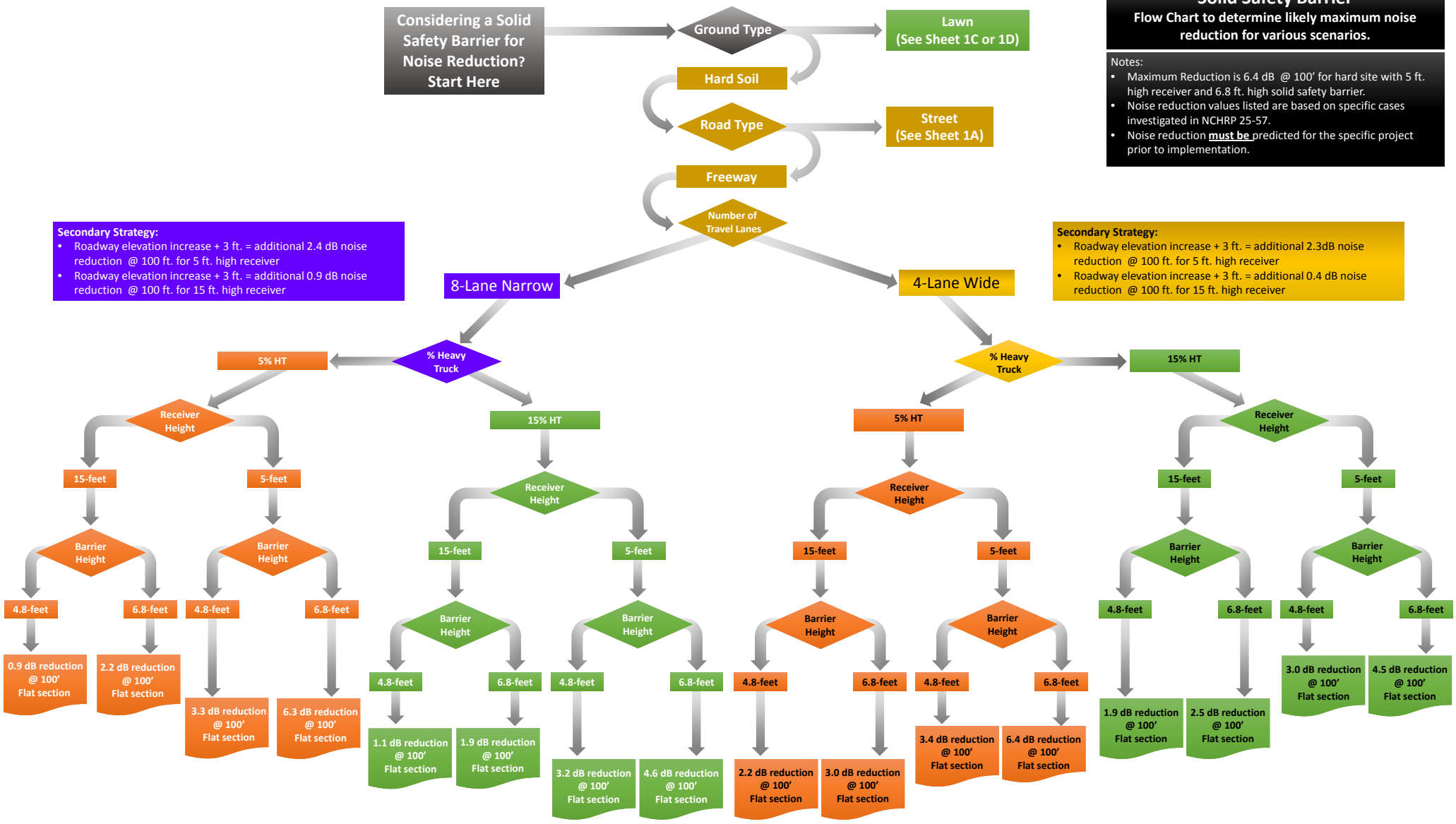


Solid Safety Barrier

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Maximum Reduction is 6.4 dB @ 100' for hard site with 5 ft. high receiver and 6.8 ft. high solid safety barrier.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.

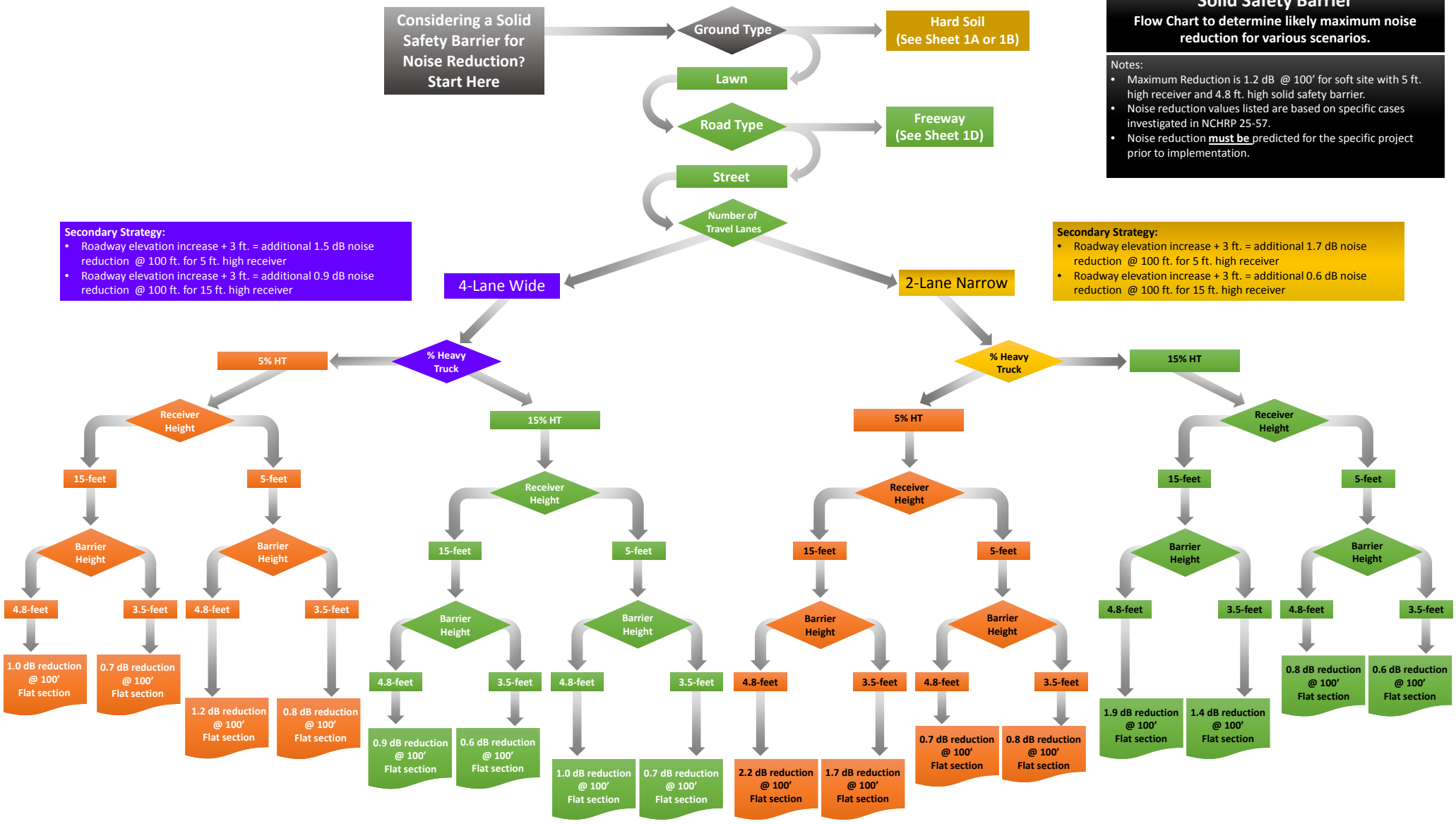


Solid Safety Barrier

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Maximum Reduction is 1.2 dB @ 100' for soft site with 5 ft. high receiver and 4.8 ft. high solid safety barrier.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.

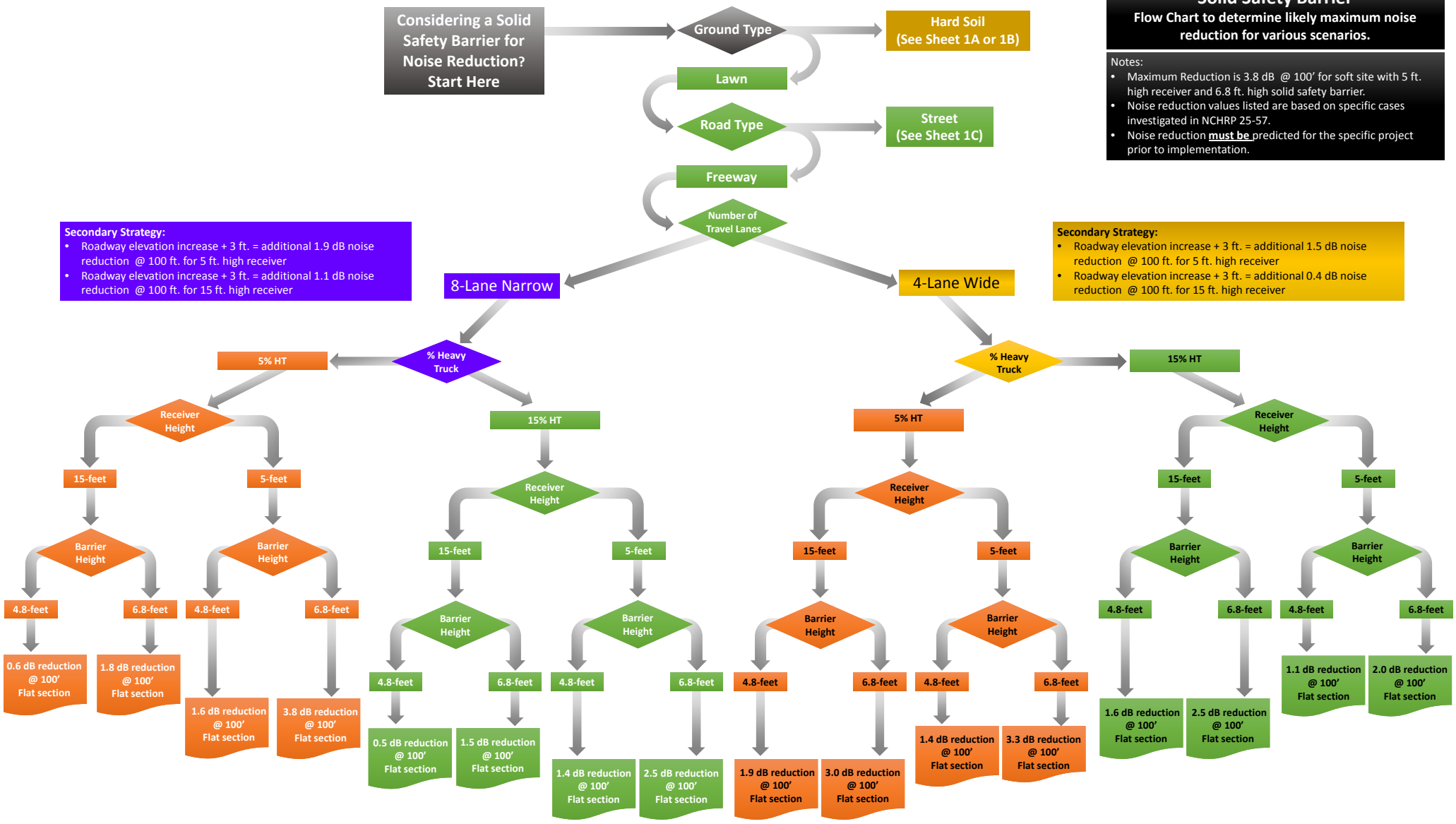


Solid Safety Barrier

Flow Chart to determine likely maximum noise reduction for various scenarios.

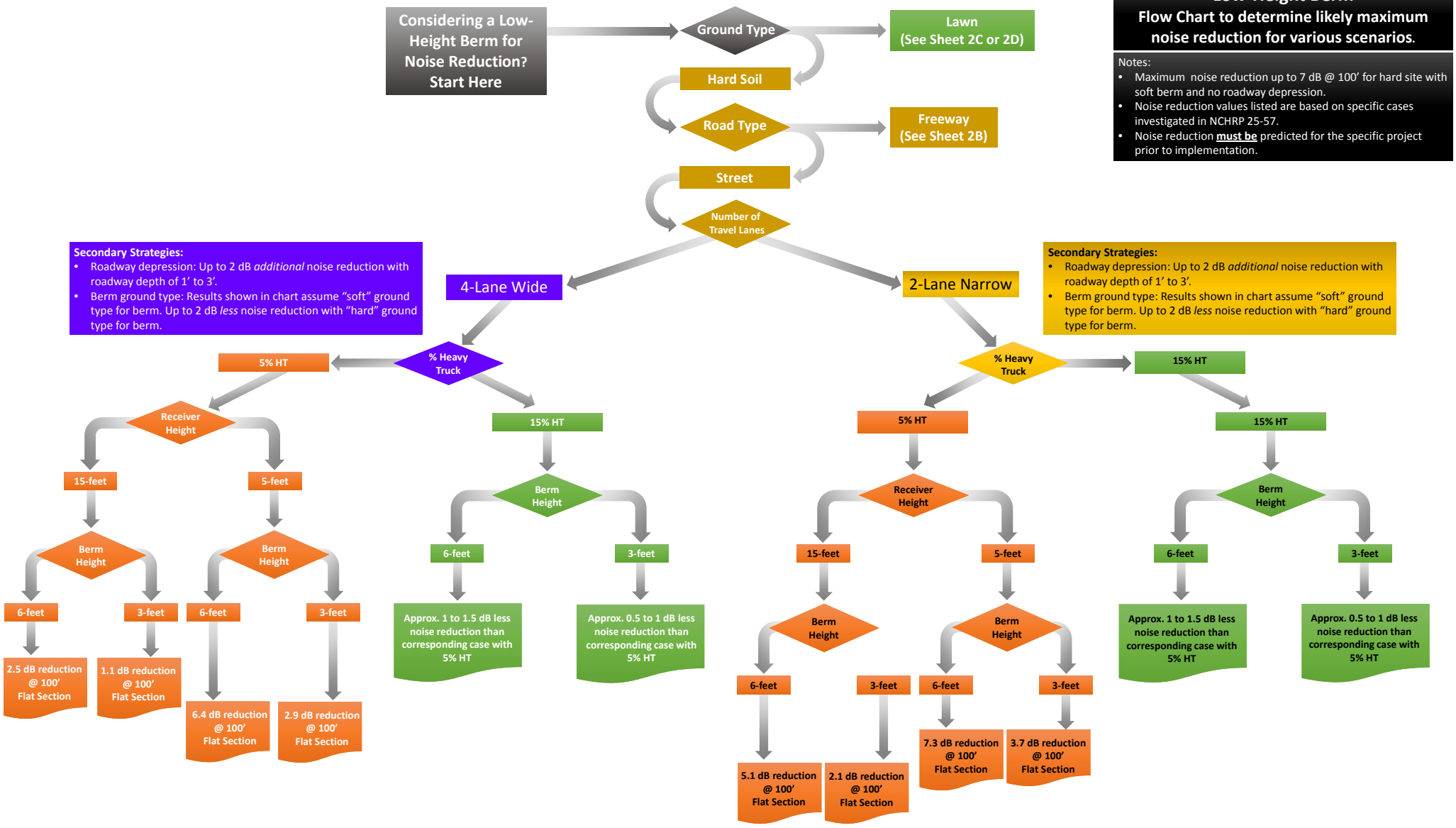
Notes:

- Maximum Reduction is 3.8 dB @ 100' for soft site with 5 ft. high receiver and 6.8 ft. high solid safety barrier.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.



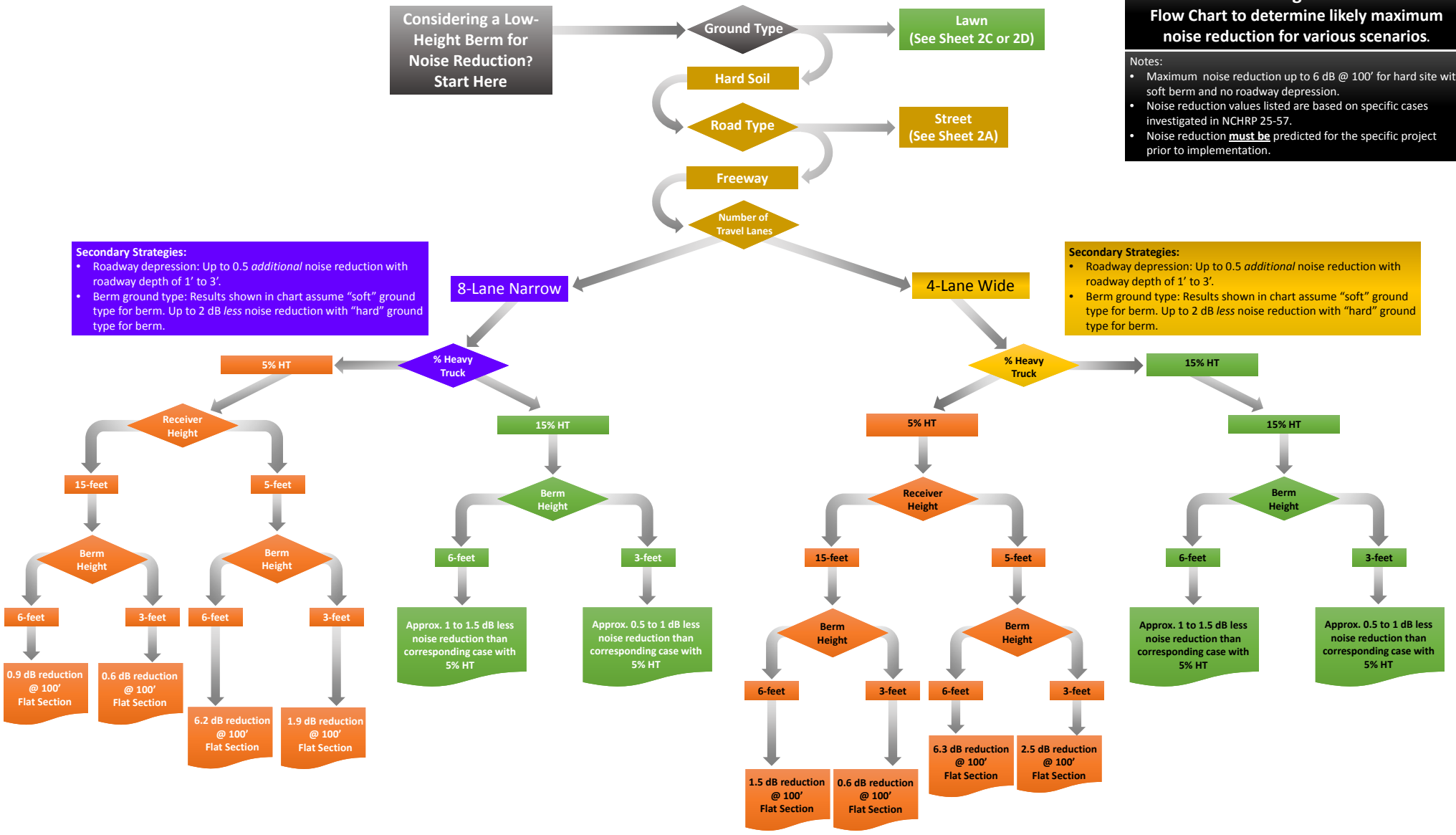
Low-Height Berm
Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:
- Maximum noise reduction up to 7 dB @ 100' for hard site with soft berm and no roadway depression.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.



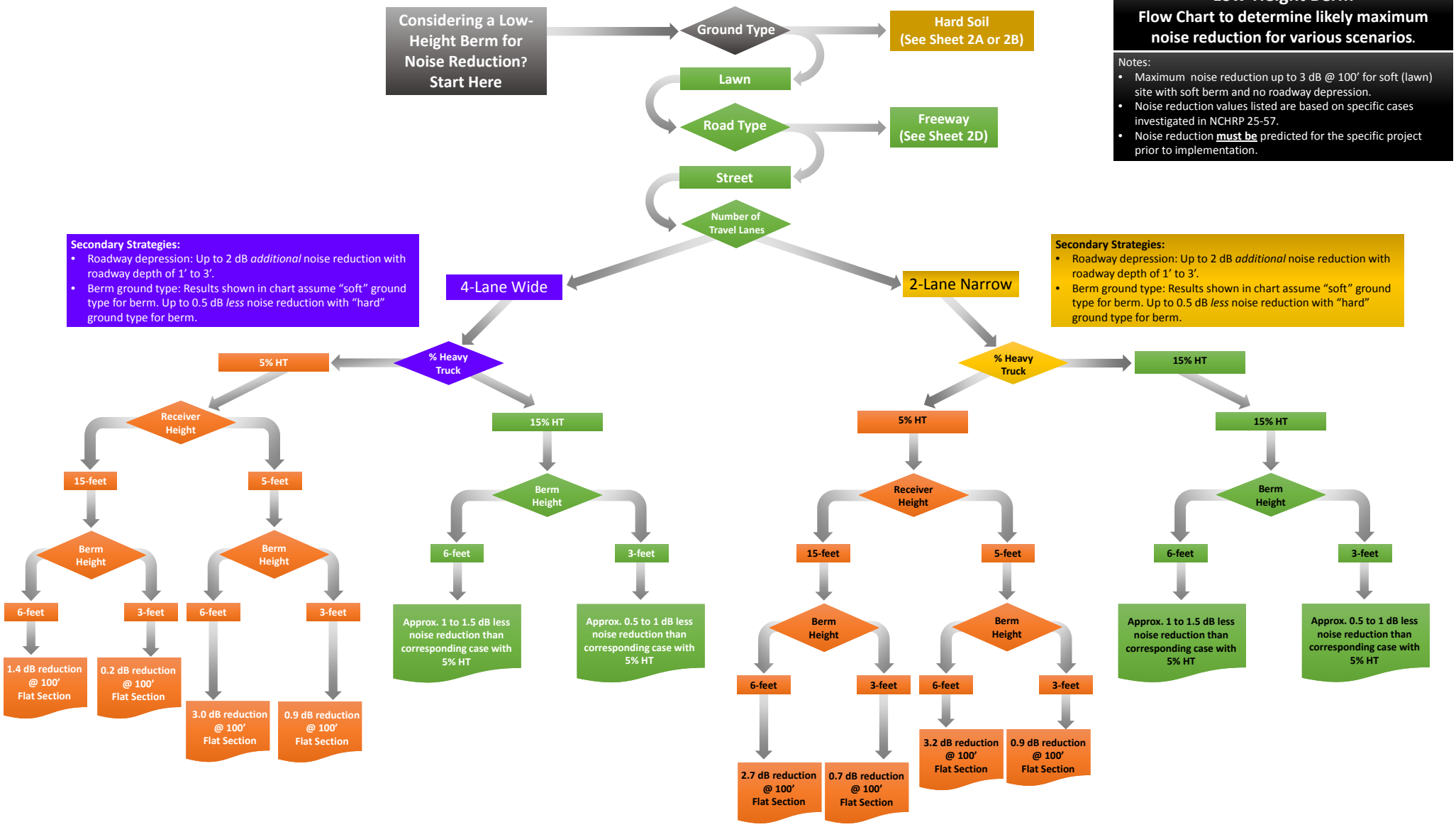
Low-Height Berm
Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:
- Maximum noise reduction up to 6 dB @ 100' for hard site with soft berm and no roadway depression.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.



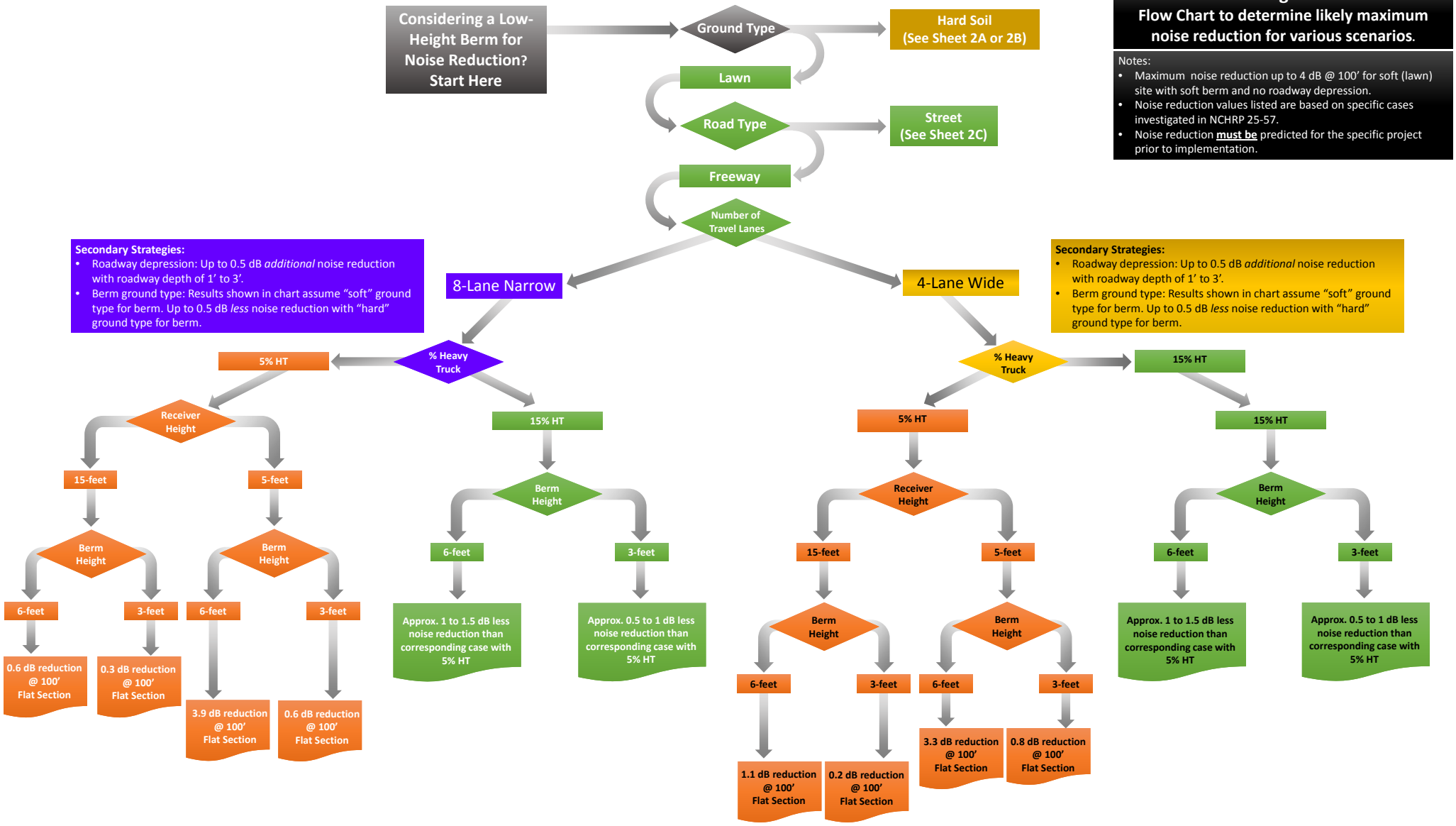
Low-Height Berm
Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:
- Maximum noise reduction up to 3 dB @ 100' for soft (lawn) site with soft berm and no roadway depression.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.



Low-Height Berm
Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:
- Maximum noise reduction up to 4 dB @ 100' for soft (lawn) site with soft berm and no roadway depression.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Noise reduction **must be** predicted for the specific project prior to implementation.



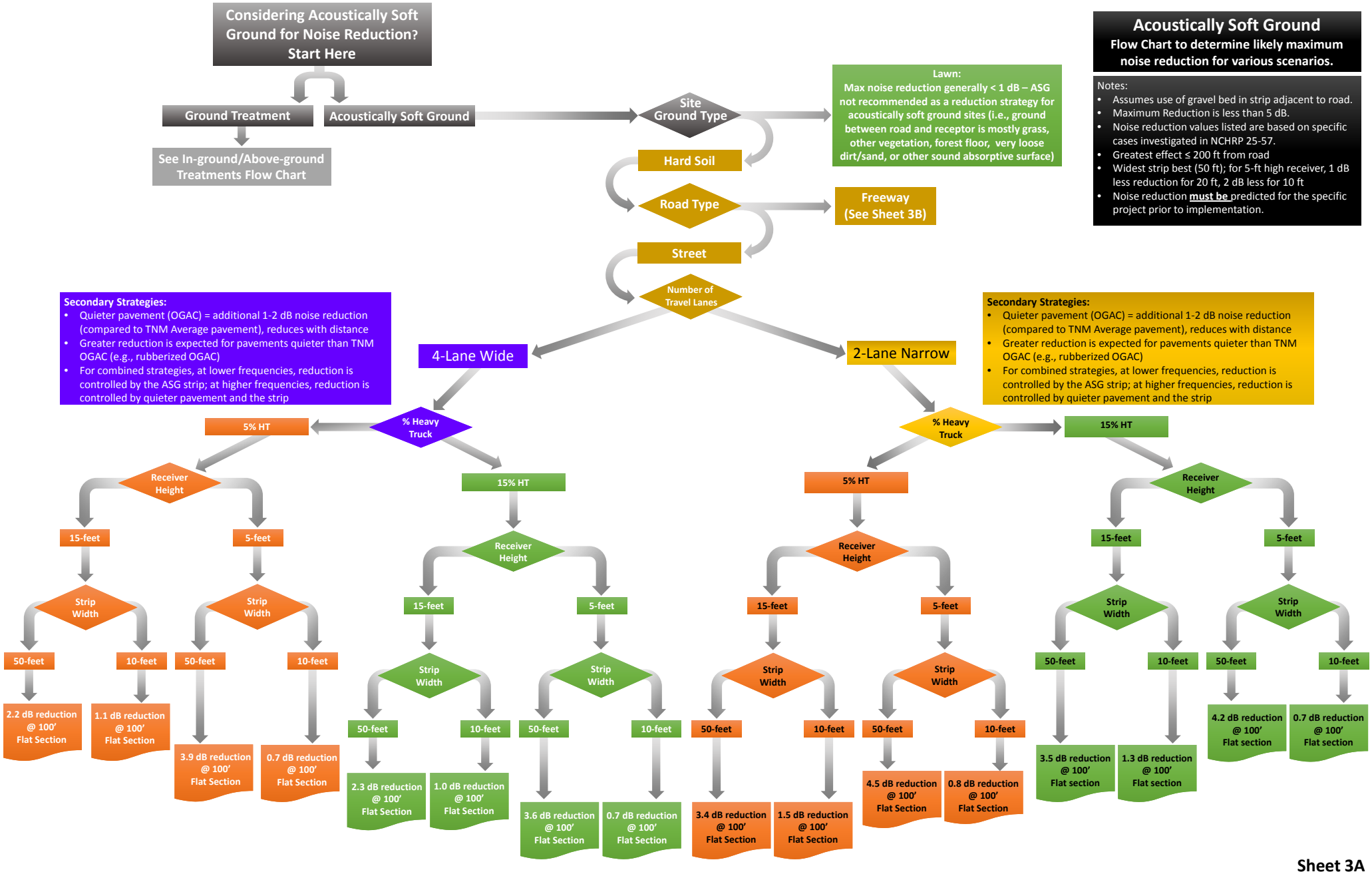
Sheet 2D

Acoustically Soft Ground

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Assumes use of gravel bed in strip adjacent to road.
- Maximum Reduction is less than 5 dB.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Greatest effect ≤ 200 ft from road
- Widest strip best (50 ft); for 5-ft high receiver, 1 dB less reduction for 20 ft, 2 dB less for 10 ft
- Noise reduction **must be** predicted for the specific project prior to implementation.



Acoustically Soft Ground Flow Chart

to determine likely maximum noise reduction for various scenarios.

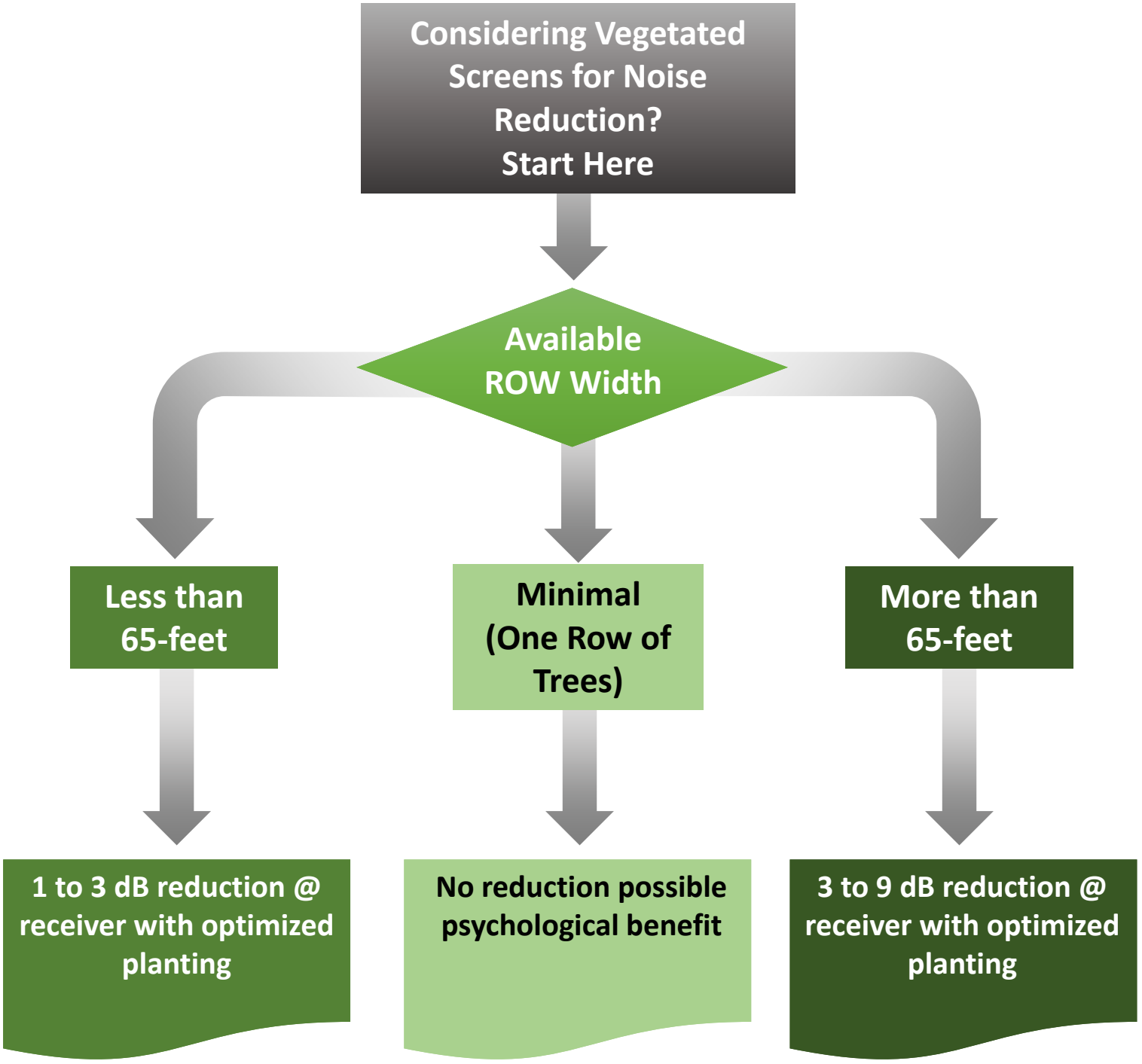
Notes:
- Assumes use of gravel bed in strip adjacent to road.
- Maximum Reduction is less than 4 dB.
- Noise reduction values listed are based on specific cases investigated in NCHRP 25-57.
- Greatest effect ≤ 200 ft from road
- Widest strip best (50 ft); for 5-ft high receiver, 1 dB less reduction for 20 ft, 2 dB less for 10 ft
- Noise reduction **must be** predicted for the specific project prior to implementation.

Vegetated Screens

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Random grid of trees, shrubs, and bushes is ideal
- Width of a vegetation belt is critical
- Deciduous trees can be effective depending upon the time of year outdoor space is used

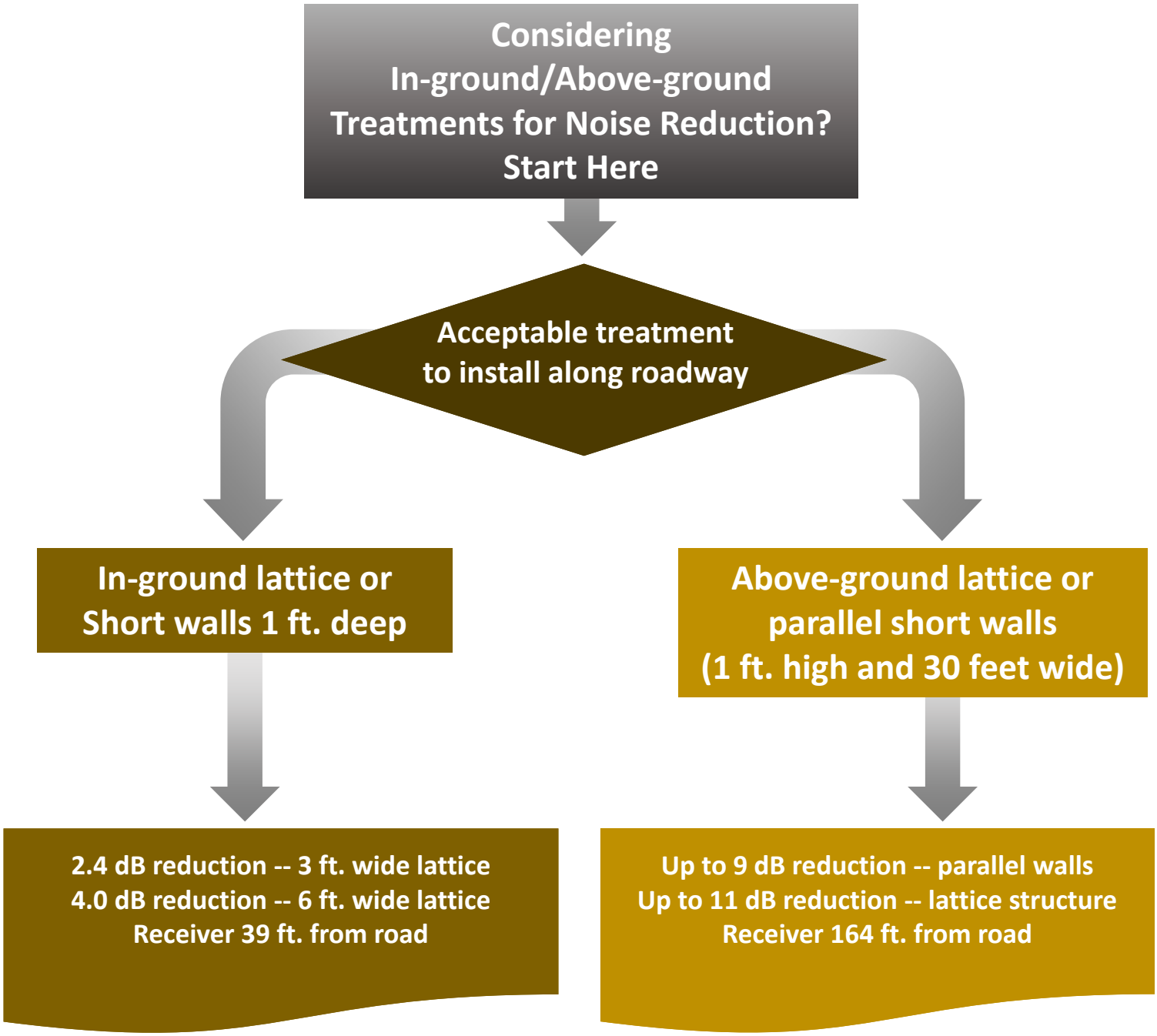


In-ground/Above-ground Treatments

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Width of treatment is the critical consideration
- Above-ground structures may pose safety concerns placed near the travel lane
- In-ground structure may be as an extension of the shoulder



Sound Absorptive Treatment

Flow Chart to determine likely maximum noise reduction for various scenarios.

Notes:

- Absorptive treatment can provide changes in spectral content, potentially reducing adverse reactions after application