



A Guide for Sequencing and Placement of Noise Walls and Retaining Walls on TxDOT Projects



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Sequencing and Placement of Noise Walls and Retaining Walls on TxDOT Projects

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CHAPTER 1.

Introduction



Background

During construction of noise walls and retaining walls, difficulties can arise due to utility conflicts, construction phasing, and inadequate access. Texas Department of Transportation (TxDOT) design manuals and design guides mention that these potential conflicts should be considered when designing noise walls and retaining walls.

Noise Walls and Retaining Walls

Noise walls and retaining walls serve different purposes on highway projects but have similarities in terms of the design and construction process.

Noise Walls

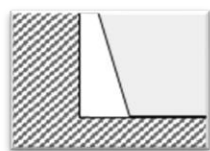
As roadway capacities and traffic volumes increase, so does the number of schools, residences, parks, businesses, and other areas that are impacted by unwanted noise produced from highway traffic, mainly from the tires, engines, and mufflers of cars and trucks. The Federal Highway Administration and state departments of transportation are required to consider the potential traffic noise impact of roadway projects on nearby residences and areas where human activities may occur. In considering the potential noise impacts, TxDOT may need to mitigate the impact, such as using noise abatement measures like a noise wall.

A noise wall is a structure designed and constructed to reduce the impact of traffic-related noise on nearby communities and sensitive areas.



A noise wall is a structure designed and constructed to reduce the impact of traffic-related noise on nearby communities and sensitive areas. Noise walls have reduced noise levels in nearby areas and are commonly constructed along highway projects. Noise walls may also be known as sound walls or noise barriers, and they are the most common traffic noise abatement measure used by TxDOT. Noise walls can be made from a variety of materials, such as precast concrete, cast-in-place concrete, concrete block, wood, metal, earth berm, and even transparent acrylic.

Retaining Walls



A retaining wall is a structure designed and constructed to resist the lateral pressure of soil. TxDOT's *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* divides retaining walls into permanent and temporary walls (1). A permanent retaining wall

is designed to have a service life of 75 years, while a temporary wall has a service life of 3 years. This guidebook is a reference for permanent retaining walls.

A retaining wall is a structure designed and constructed to resist the lateral pressure of soil.

Mechanically stabilized earth (MSE) walls are the most common type of retaining wall used on TxDOT projects and consist of select backfill with tensile earth reinforcement elements distributed throughout the wall. MSE walls use a precast concrete panel as a facing element. Other types of retaining walls used by TxDOT include concrete block, cantilever drilled shaft, soil nail, rock nail, tied-back, and spread footing walls.

For more reference information on noise walls and retaining walls, please refer to the information in chapter 3, “Additional Resources and Information.”

About the Guidebook

Purpose

The purpose of this guidebook is to provide guidance on the sequencing and placement of noise walls and retaining walls on TxDOT projects. This includes recommendations for noise wall and retaining wall selection, preferred methods and best practices for sequencing and placement, and design and construction procedures to help reduce issues during

The purpose of this guidebook is to provide guidance on the sequencing and placement of noise walls and retaining walls.

construction and maintenance.

This guidebook was developed based on information collected from stakeholder interviews, data analysis, and case studies regarding sequencing and placement of noise walls and retaining walls.

The guidebook focuses on a how-to approach and includes guidelines and best practices for the sequencing and placement of noise walls and retaining walls. The guidebook

includes information for a variety of users and stakeholders and can be grouped into six general areas: design, environmental, utility coordination, right of way, construction, and maintenance. These six areas have a variety of stakeholders for each. Table 1 provides a few examples of stakeholders in each of the areas.

Table 1. Guidebook Stakeholders.

General Area	Stakeholders
Design	<ul style="list-style-type: none"> • Designers • Design Project Managers • Design Team Leads • Roadway Designers • Engineers
Environmental	<ul style="list-style-type: none"> • Environmental Specialists • Environmental Managers
Utility Coordination	<ul style="list-style-type: none"> • Utility Coordinators • Utility Engineers • Utility Project Managers • Utility Team Leads
Right of Way	<ul style="list-style-type: none"> • Right-of-Way Project Managers • Right-of-Way Agents
Construction	<ul style="list-style-type: none"> • Construction Inspectors • Construction Project Managers • Construction Engineers
Maintenance	<ul style="list-style-type: none"> • Maintenance Engineers • Operations Directors

How to Use This Guidebook

This guidebook provides guidance for TxDOT project stakeholders on best practices for the sequencing and placement of noise walls and retaining walls. The guidebook is presented in sections that correlate with major areas or activities related to noise walls and retaining walls. Information in this guidebook is intended to assist in the planning and development of a TxDOT project. Table 2 describes the layout of the guidebook.

The two icons, seen on page 8, are representations of a noise wall and a retaining wall. They are used in chapter 2 to mark areas that are related to the respective icon. They provide a quick visual way to identify content related to noise walls or retaining walls. Areas related to noise walls and retaining walls may be identified with both icons.

Table 2. Chapter 2 Information.

Section Title	Page Number	Summary
Sequencing	14	Sequencing during design and construction of noise walls.
Design	15	Design of noise walls and retaining walls. Includes recommendations on when to include noise walls in design plans, the use of alternative materials and designs, and inclusion of project stakeholders.
Placement	16	Topics related to placement relative to the right of way, easements, spacing, and noise walls and retaining walls planned in the same area.
Utilities	19	Utility conflicts, coordination, and recommendations related to placement and design of noise walls and retaining walls.
Maintenance	21	Information on easements and placement of walls to provide access for maintenance activities.
Right of Way	22	Placement relative to the right of way (on and off TxDOT right of way), spacing, and easements.
Other Items	24	Recommendations on survey, geological, and bike and pedestrian considerations.

Chapter 3 provides information on additional related documents and information sources and the appendix includes an example noise wall section and related notes for spacing regarding the right of way and utilities.

CHAPTER 2.

Recommendations



Introduction

This chapter provides an overview of the research team’s recommendations for sequencing and placement of noise walls and retaining walls on TxDOT projects. The recommendations are based on the findings from the literature review, interviews conducted with stakeholders, data analysis, and case studies the researchers conducted throughout the project.

Recommendations in this chapter are organized around major themes, including sequencing, design, and placement of noise walls and retaining walls. Secondly, recommendations are grouped by issues that might impact the sequencing and placement of noise walls and retaining walls, including utilities, maintenance, right of way, and other issues such as surveys and geological considerations. Where applicable, each section provides recommendations related to noise walls followed by recommendations related to retaining walls or a combination of both.

Recommendations are organized around major themes such as sequencing, design, and placement of noise walls and retaining walls.

Sequencing



During Design

Identify noise walls early in the project development process. The need for a noise wall is typically identified around 60 percent schematic design.

Identifying noise walls closer to 30 percent design will help inform the rest of the design that a noise wall is needed in the area.

During Construction

Consider installing noise walls early in project construction. The typical construction process allows the contractor to determine the project timeline, but if possible, building the noise wall earlier will help with the following: reduce the number of public complaints due to construction noise, secure the construction worksite, and allow for coordination with relocating overhead utilities.

Design

Noise Walls



Include the placement of noise walls in schematic design plans. Including noise walls in schematic plans, even if the walls have not been evaluated for feasibility and reasonableness or been voted on by the public, helps inform utility coordinators and other stakeholders of the need for a noise wall early. This will also help project stakeholders, including engineers, designers, environmental, right of way, and utility coordination, engage one another to make proactive adjustments earlier in the project development process.

Identify noise walls earlier in design. Final roadway geometry, which should be complete around 30 percent schematic design, is required for the environmental team to develop the traffic noise model. The earlier in design that noise walls are identified, the earlier they can be considered when making other design decisions.

Consider alternative noise wall types, materials, and designs. The more noise wall options available, the better it is for projects since designers can be more flexible. Alternative noise wall designs have been used to lessen the impact of drill shaft installation equipment, and lighter-material noise wall panels may help with constructability.

Include utility coordinators in the noise wall constructability assessment. The cost of utility relocations may be considered if utility coordinators are involved in the feasibility and reasonableness process.

Retaining Walls



Ensure effective communication and coordination between designers and project stakeholders. Since the retaining wall designer may be different than the project designer, project managers should ensure that designers for all aspects of the project are effectively communicating. Also, stakeholders such as bridge design personnel, right-of-way personnel, and utility coordinators should be included in meetings at the beginning of the project since these subject matter experts can provide information to help make better decisions regarding retaining walls.

Consider different retaining wall types and designs. Different types of retaining walls may be more appropriate when placed near other design features or existing utilities. The cost, schedule, availability of sloping, and impact to utilities should be considered when weighing design alternatives.

Placement

Noise Walls



Involve the design team and utility coordinators when first setting the placement of noise walls.

Environmental specialists should strive to coordinate with project personnel. This will afford the noise modeler information on utilities,

safety, pedestrian facilities, adjacent property, drainage, and other factors that may not be readily available otherwise. The design team can also consider the placement of the noise wall with respect to other design features.

Involve the design team and utility coordinators when first setting the placement of noise walls.

View the placement of the noise wall with some degree of flexibility. This can be helpful to designers during project design. When conflicts arise with the placement of the wall and other project features, designers can collaborate with environmental personnel to relieve the issue. If some degree of flexibility is not viewed in the placement of the noise wall, then it may have a greater impact to the project. It may be a helpful for environmental personnel to run the noise analysis a few times with varying placements of the noise wall to provide multiple locations to project designers. This will allow designers to determine which placement works best within the project's design.

Utility impacts should be considered when placing noise walls. Conflicts between noise walls and utilities are one of the biggest reasons for delay claims when dealing with noise walls. Providing subsurface utility engineering (SUE) information, location of utility easements, and right-of-way maps to environmental personnel will help inform them where existing utilities are located when placing a noise wall for the noise analysis.

Relative to the Right of Way

Consider placing noise walls between the frontage road and main lanes. Locating a noise wall between the frontage road and main lanes is uncommon. Typically, noise walls are located near the edge of the right of way close to affected receivers, but there are times when placing a noise wall between the frontage road and main lane may be preferred. Some examples include the following:

- Noise walls are primarily needed to decrease noise from the main travel lanes.
- The main lanes are elevated with respect to affected receivers.
- The use of transparent noise wall panels is preferred.
- Space is limited between the right-of-way line and frontage road.

- Access for maintenance and utilities is limited near the right-of-way line, side streets, alleyways, and driveways that feed onto the frontage road.
- A noise wall would normally block visibility or access to commercial businesses and adjacent property.

Consider placing noise walls away from the edge of the right of way. Placing a noise wall away from the edge of the right of way may be preferred when it:

- Reduces the impact to utilities, large trees, or other obstructions near the right-of-way line.
- Provides room for construction and maintenance activities.
- Provides access for utility companies to maintain their facilities.

Consider placing noise walls off TxDOT right of way. Noise walls are placed within the right of way as a standard practice, but placing a noise wall off TxDOT right of way may be preferred when:

- Large easements exist between the right-of-way line and affected receivers.
- A noise wall within the right of way is not reasonable and feasible.
- The placement provides benefit to adjacent properties.
- A maintenance agreement with a local municipality is in place.
- The placement lessens the impact to utilities in the right of way.
- There is a lack of available space in the right of way.

Spacing

A tiered spacing approach should be considered when placing noise walls near the edge of the right of way. A minimum of 5 feet between the back of the noise wall and the edge of the right of way is needed to accommodate construction and maintenance behind the noise wall. Ten feet is preferred to provide sufficient room for construction. See the appendix for more information on the spacing requirements behind the noise wall. Design features, such as foundation type, can make a difference when placing a noise wall. Spacing is often project specific and can be influenced by particular factors.

Easements

Consider acquiring a temporary construction easement for noise wall construction. When noise walls are placed less than 5 feet from the right-of-way line, there is not enough room to construct the noise walls without accessing adjacent property. See the appendix for more information on spacing from the right-of-way line. The need for the temporary construction

easement should be included in right-of-way acquisition. It is a good practice to assume temporary construction easements will be needed to help construct noise walls when placed near the right-of-way line.

Consider acquiring a permanent easement to help with noise wall spacing. The amount of space required between the noise wall and edge of the right of way, for construction and maintenance activities, may be reduced or omitted if TxDOT acquires a permanent easement adjacent to the right of way.

Retaining Walls



Consider the location of signage and utilities when placing a retaining wall. Considering utilities and signage may seem obvious, but many times the coordination and placement may happen separately or at a different time within the project development process.

Relative to the Right of Way

Place retaining walls between the frontage road and the main lanes instead of next to the right-of-way line. Locating a retaining wall between the frontage road and main lanes allows for a constant grade with adjacent properties. This helps maintain access from driveways and side streets onto the frontage road. This also removes the need to purchase the right of access from adjacent properties. This placement can also help to avoid utility conflicts.

Spacing

For retaining walls near the right-of-way line, a tiered spacing approach should be considered. Five feet from the edge of the right of way is the minimum spacing required and can increase up to 20 feet, depending on the height of the retaining wall. This distance leaves sufficient space to prevent the wall footing from encroaching on adjacent property, leaves space for maintenance, and provides space for temporary bracing during construction. The actual amount of space needed for construction varies based on the retaining wall type, height, and surrounding conditions. The specifics of the retaining wall will determine the type of equipment needed to construct the wall, and space requirements will vary based on equipment needed.

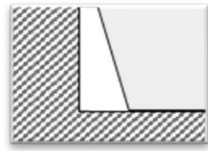
Easements

Consider acquiring a temporary construction easement to assist with retaining wall construction. The temporary easement may be used to house bracing for fill retaining walls. The amount of space required for constructing a retaining wall near the right of

Consider acquiring a temporary construction easement to assist with retaining wall construction.

way may also be reduced. The need for the temporary construction easement should be included in right-of-way acquisition.

Noise Walls and Retaining Walls in the Same Area



When a noise wall and retaining wall are proposed in the same area, design walls with the other type in mind. Noise wall foundations are substantial and can impact retaining walls if not carefully considered.

Noise walls and retaining walls should also be

designed at the same time so that retaining walls may be included in the traffic noise model. This should take place early in the project design phase. Separation between noise walls and retaining walls may be necessary to provide additional space for construction. The design of the two walls together may be complex and not easily constructable.

Utilities

Noise Walls



Have noise walls identified earlier in the project. This will make utility coordination activities easier. The need for a noise wall is typically identified around 60 percent schematic design. But the earlier in design that noise walls are identified, the earlier they can be considered when making other design decisions, including utility relocations and coordination.

Ensure utility coordinators are included in the constructability assessment. The cost of utility relocations may be considered if utility coordinators participate in the feasibility and reasonableness process regarding noise walls.

Consider placing noise walls between the frontage road and main lanes. There are times when placing a noise wall between the frontage road and main lane may be preferred. This may be the case when there is limited access for maintenance and utilities near the right-of-way line.

Consider placing noise walls away from the edge of the right of way. Placing a noise wall away from the edge of the right of way may be preferred when it reduces the impact to utilities or provides access for utility companies to maintain their facilities. Also, since overhead utilities are required to be within 3 feet from the edge of the right of way, shifting the noise wall away can lessen the impact to utilities. See Figure 1 in the appendix for an example noise wall section and more information on spacing regarding utilities and the right of way.

Consider placing noise walls away from the edge of the right of way.

A tiered spacing approach should be considered when placing noise walls near the right of way. A minimum of 5 feet between the back of the noise wall and the edge of the right of way is needed to accommodate work behind the noise wall. An additional 5 feet, for a total of 10 feet, is preferred to provide sufficient room for construction. If additional room is needed to access utility poles or other utility features, then 15 to 20 feet of space may be needed between the back of the noise wall and the right-of-way line. The placement may change when considering utility conflicts, environmental concerns, or safety challenges. See the appendix for more information on spacing from the right-of-way line.

A tiered spacing approach should be considered when placing noise walls near the right of way.

Utility Conflicts

Consider alternative noise wall materials, types, and designs. The more noise wall options available, the better it is for projects since alternative noise wall types have been used to mitigate utility conflicts. Gates and removable panels have also been installed to provide access for utility companies to maintain their facilities. Alternative noise wall foundations may lessen the impact to utilities.

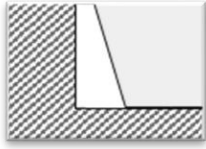
When placing noise walls, consider impacts to utilities. Conflicts between noise walls and utilities are one of the biggest reasons for delay claims when dealing with noise walls. In preparation to perform a noise analysis, provide environmental personnel with utility easement locations, right-of-way maps, and SUE information. This will help inform them where existing utilities are located.

Utility Coordination

Consider installing noise walls early in the construction process. Building the noise wall earlier in construction will allow for coordination with relocating overhead utilities, as well as secure the construction worksite and reduce the number of public complaints due to noise. For relocating overhead utilities, especially electric, it may be helpful to install the noise wall foundation before the overhead utilities relocate. This step will help alleviate the need for overhead electric lines to be deenergized to install the traditional drilled shaft foundation.

When first placing a noise wall, include the design team and utility coordinators. This will afford the noise modeler information on utilities, safety, pedestrian facilities, adjacent property, drainage, and other factors that may not be readily available otherwise. The design team can also consider the placement of the noise wall with respect to other design features.

Retaining Walls



Consider different designs and wall types when placing retaining walls.

Different types of retaining walls may be more appropriate when placed near existing utilities and other design features. Utility impacts should be considered when weighing design alternatives.

Consider the location of utilities when placing a retaining wall. Be sure to consider utility crossings, including overhead lines, when placing retaining walls. Considering utilities and signage may seem obvious, but many times the coordination and placement may happen separately or at a different time within the project development process.

Maintenance

Noise Walls

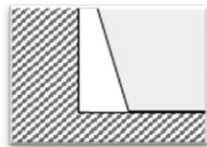


Consider acquiring a permanent easement to help with noise wall spacing.

The amount of space required for maintenance between the noise wall and edge of the right of way may be reduced or omitted if a permanent easement is acquired adjacent to the right of way.

Consider placing noise walls away from the edge of the right of way. Placing a noise wall away from the edge of the right of way may be preferred when it reduces the impact to obstructions near the right-of-way line, provides room for construction and maintenance activities, and provides access for utility companies to maintain their facilities.

Noise and Retaining Walls



When placing noise walls or fill retaining walls near the right of way, consider a tiered spacing approach.

A minimum of 5 feet between the noise wall or retaining wall and the edge of the right of way is needed.

Additionally:

- For noise walls, a total of 10 feet from the back of the noise wall to the right-of-way line is preferred to provide sufficient room for maintenance and construction activities. See Figure 1 in the appendix for more information on spacing requirements.
- For retaining walls, the spacing required may increase up to 20 feet depending on retaining wall height.

Keep in mind that the amount of spacing needed is project specific.

Right of Way

Noise Walls



Consider noise walls during the right-of-way development process. During right-of-way development, it may be helpful to assume that a noise wall will be required for areas where neighborhoods are adjacent to the right of way. If the right-of-way team is informed of the location of noise walls earlier, they will have a greater understanding of how adjacent

landowners are affected and where access to constructed facilities is limited.

Consider placing noise walls away from the edge of the right of way. Placing a noise wall away from the edge of the right of way may be preferred when it reduces the impact to large trees or other obstructions near the right-of-way line or provides room for construction and maintenance activities. Shifting the noise wall away from the edge of the right of way can lessen the impact to utilities in part because overhead utilities are required to be within 3 feet of the edge of the right of way. Figure 1 in the appendix provides an example noise wall section that shows overhead utilities and spacing requirements.

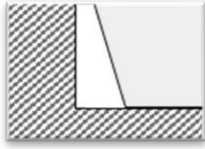
Consider placing noise walls away from the edge of the right of way.

A tiered spacing approach should be considered when placing noise walls near the right of way. A minimum of 5 feet between the back of the noise wall and the edge of the right of way is needed to accommodate work behind the noise wall, including construction and maintenance. Ten feet is preferred to provide sufficient room for construction. See the appendix for more information on the spacing requirements between the back of the noise wall and the right of way. Spacing is often project specific and can be influenced by particular factors including utilities.

Consider placing noise walls between the frontage road and main lanes. Noise walls are usually located near the edge of the right of way. But placing a noise wall between the frontage road and main lane may be preferred when there is limited space between the right-of-way line and the frontage road. This may cause issues related to access for maintenance and utilities near the right-of-way line. This may also cause issues with access to side streets, alleyways, and driveways.

Consider placing noise walls off the right of way. Placing a noise wall off TxDOT right of way may be preferred when a large landscape easement exists between the right-of-way line and receivers or there is a lack of available space in the right of way.

Retaining Walls



Consider right of way when placing retaining walls. Acquiring additional right of way may alleviate the need for a retaining wall. Cost, schedule, availability of sloping, and impact to utilities should be considered when weighing design alternatives.

A tiered spacing approach should be considered when placing fill retaining walls near the right of way. The minimum spacing required is 5 feet from the edge of the right of way and increases, up to 20 feet, depending on the height of the retaining wall. This distance leaves sufficient space to prevent the wall footing from encroaching on adjacent property and leaves space for construction and maintenance.

Easements

Consider acquiring a permanent easement to help with noise wall spacing. The need for the permanent easement can be included in right-of-way acquisition when a noise wall is planned near the edge of the right of way. The amount of space required between the noise wall and edge of the right of way may be omitted if TxDOT acquires a permanent easement adjacent to the right of way.

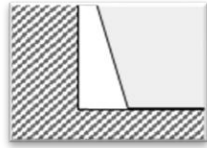
Consider acquiring a temporary construction easement adjacent to the right of way. This easement may be needed for the following reasons:

- For noise walls placed less than 5 feet from the right-of-way line, there is not enough room to construct the noise walls without accessing adjacent property. See the appendix for more information on spacing from the right-of-way line.
- For retaining walls, the easement may be needed to brace fill retaining walls, especially taller walls with longer braces. The amount of space required in the right of way for construction may also be reduced if an easement is acquired.

The need for the temporary construction easement should be included in right-of-way acquisition. In areas where space is limited within the right of way, if a temporary construction easement is not acquired, then the burden to secure a right-of-entry letter from owners to access adjacent property falls to construction personnel. A good practice is to assume temporary construction easements will be needed to help construct noise walls and retaining walls when placed near the right-of-way line. This practice ensures sufficient time to obtain an easement rather than waiting until construction and ensures that the area is considered in the environmental approval.

Other Items

Survey



Collect detailed survey information in locations where noise walls and retaining walls are planned. Districts have experienced issues in the past with inaccuracies in the topographic survey in areas where noise walls and retaining walls are designed. Verification of survey

data helps reduce issues with inaccuracies about the existing ground elevation. More detailed topographic survey information for adjacent areas off TxDOT rights of way would also be helpful.

Geological

Know the location of noise walls and retaining walls early and plan to collect additional geological information. When facing changing soil conditions, it becomes increasingly important to prioritize noise walls and retaining walls early in the design. The geotechnical process and the potential need for additional soil borings may be a lengthy process that requires additional time.

Bike and Pedestrian

Consider bicycles and pedestrians when placing noise walls and retaining walls. Sight and access issues for bicycles and pedestrians are a concern when placing noise walls and retaining walls. Sight issues can be especially tricky at roadway crossings where bike and shared-use paths are separated from the roadway. It is helpful to consider bicycle and pedestrian use early.

CHAPTER 3.

Additional Resources and Information

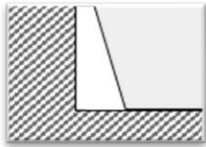


This chapter provides a list of additional resources that may be helpful for project stakeholders. Federal and TxDOT-specific information can help in sequencing and placement, as well as other aspects of the process, when dealing with noise walls and retaining walls. General information includes the following:

This chapter provides a list of additional resources that may be helpful for project stakeholders regarding noise walls and retaining walls

- *Project Development Process Manual*, Chapter 5, Section 8—Retaining/Noise Walls and Miscellaneous Structures. Texas Department of Transportation, Austin, Texas. http://onlinemanuals.txdot.gov/txdotmanuals/pdp/retaining_noise_walls_miscellaneous_structures.htm.
- *Landscape and Aesthetics Design Manual*. Texas Department of Transportation, Austin, Texas. <http://onlinemanuals.txdot.gov/txdotmanuals/lad/lad.pdf>.

Retaining Wall Specific



Resources specific to retaining walls include the following:

- *Geotechnical Manual*. Texas Department of Transportation, Austin, Texas. <http://onlinemanuals.txdot.gov/txdotmanuals/geo/geo.pdf>.
- Retaining Walls. Texas Department of Transportation Bridge Division, Austin, Texas. <https://www.txdot.gov/inside-txdot/division/bridge/specifications/retaining-wall.html>.
- Geotechnical Resources. Texas Department of Transportation Bridge Division, Austin, Texas. <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#geotechnical>.
- Item 423: Retaining Walls. *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges*. Texas Department of Transportation, Austin, Texas. <https://ftp.txdot.gov/pub/txdot-info/cmd/cserve/specs/2014/standard/s423.pdf>.
- Special Specification 4141: Stacked Stone-Block Retaining Wall (Dry). Texas Department of Transportation, Austin, Texas. <https://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/specs/2014/spec/ss4141.pdf>.

The cover image for this chapter is from reference 2.

Noise Wall Specific



Resources specific to noise walls include the following:

- *Highway Traffic Noise: Analysis and Abatement Guidance*. FHWA-HEP-10-025. Federal Highway Administration, Washington, D.C.
http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.
- *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. United States Code of Federal Regulations Title 23 Part 772. <https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=5eb256edde9f1541c7885b8d0cedaf90&mc=true&n=p t23.1.772&r=PART&ty=HTML>.
- *Noise Policy—Roadway Traffic and Construction Noise*. Texas Department of Transportation Environmental Affairs Division, Austin, Texas, 2019. <http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/730-01-pol.pdf>.
- *Guidance—Traffic Noise Policy Implementation*. Texas Department of Transportation Environmental Affairs Division, Austin, Texas. <http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/730-05-gui.pdf>.
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CHAPTER 4.

Glossary



The information for this glossary comes from references 3, 4, and 5.

Cast-in-place—the method of constructing concrete structures using forms, falsework, and bracing at its final locations.

Constructability assessment—must be performed to confirm the location and layout of the proposed noise wall. The assessment must be performed by the engineering or design team and may result in changes to a proposed noise wall location or the determination that a wall is not feasible or reasonable. If adjustments to the preliminary abatement location are proposed, re-modeling may be necessary to confirm that the noise wall is still feasible and reasonable. The assessment must be completed before the proposed noise wall is presented to the benefited receptors. This ensures that what is presented is representative of what will be constructed if the noise wall is approved. These assessments may occur at any point before a noise workshop, including before the environmental decision.

Drilled shafts—reinforced concrete foundation shafts for bridges and retaining walls that are excavated (drilled) and then filled with concrete and reinforcing steel.

Easement—the right to use or control an area of the property of another for designated purposes.

Footing—an enlargement at the lower end of a foundation or column to distribute the load.

Foundation—similar to footing; the portion of a structure (usually below the surface of the ground) that distributes the pressure to the soil or to artificial supports.

Maintenance—includes activities that involve the repair or preservation of an existing facility to prevent that facility's deterioration to an unsafe or irreparable state, or that involve the treatment of an existing facility or its environs to meet acceptable standards of operation or aesthetic quality.

Noise—a sound of any kind especially when loud or unwanted.

Noise barrier—also known as a noise wall, sound wall, or sound barrier; a solid wall or earth berm located between the noise source and receiver location that breaks the line of sight between the receiver and the roadway noise sources. Noise barriers may be constructed out of a variety of materials including concrete, transparent plastic, fiberglass, and composite rubber.

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Retaining wall—a vertical wall used to retain earth. A wall for sustaining the pressure of earth or filling deposited behind it.

A retaining wall is a vertical wall used to retain earth, sustaining the pressure of earth or filling deposited behind it.

Right of entry—agreement from the owner of a tract or parcel of land specifically authorizing the state (in addition to the state, usually including its contractors, assigns, and the owners of any utility involved with the highway project) the right to enter upon the described tract of land for specific purposes as stated in the agreement. Where such an agreement is without consideration (unpaid), such constitutes just a license to go upon the property for the purposes stated in the agreement, and it may be revocable at the will of the person granting the right. Where a more formal agreement is used and payment of more than just nominal consideration is made, such an agreement may be (by its terms) made irrevocable and would constitute more than a license and would likely be legally considered a construction easement.

Right of way—a general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a highway for the construction of the roadway. Right of way is the entire width of land between the public boundaries or property lines of a highway. This may include purchase for drainage.

Right-of-way line—a legally established line that indicates the boundary between the highway facility and adjacent property owners' holdings.

Subsurface utility engineering (SUE)—a nondestructive utility investigation to accurately locate, identify, and map underground utilities. SUE is an interdisciplinary service, involving professional engineers, geologists, and licensed land surveyors. They can provide comprehensive and reliable information in the format of the client's choosing. SUE is a professional service resulting in signed and sealed deliverables.

Utility

1. A utility is a service to the public such as power, telephone, telegraph, water, gas, oil, sewage, drainage, or irrigation.
2. All private and public lines, including electric power transmission, electrical power service, telephone, television coaxial cable, water, gas, petroleum products, chemicals, steam, wastewater, and similar lines. Such utilities may involve underground, surface appurtenances or overhead facilities either singularly or in combination.

Utility strip—an area of land established within a control of access highway, located within the border width and longitudinal to the highway, where utility assignments may be designated.

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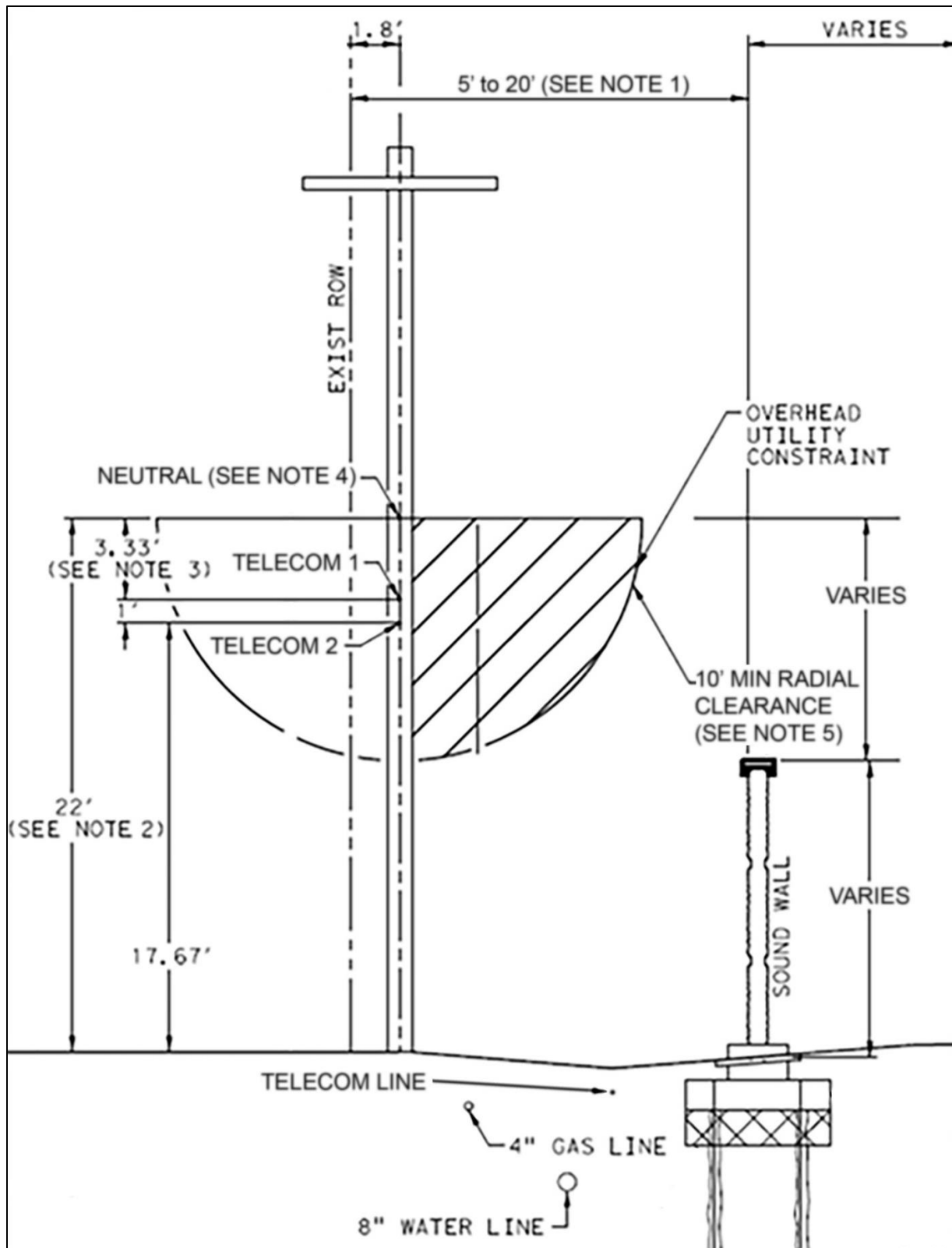
APPENDIX:

Example Noise Wall Section



Noise walls have a variety of designs and requirements. Figure 1 is provided as an example. It may be used as a starting point for minimum requirements for design and construction and is not meant to limit designers and other TxDOT personnel. Typical section and related notes provide a visual representation for the spacing regarding utilities and right of way throughout the guidebook related to noise walls.

Overhead utilities, shown in Figure 1, help provide a visual representation for the required spacing when constructing noise walls near utility poles. Note that telecommunication lines are placed below the electrical company's neutral line (see note 3 and 4). Also, utility poles, while placed near the right-of-way line, will be located within the right of way and can affect the spacing needed for constructing noise walls. The placement of underground utilities will vary within the right of way and their exact placement, or existing and proposed (relocated) utilities should be taken into consideration when placing noise walls (see note 7).



Source: Adapted from Kennedy Consulting, Inc. (2018). *Plans of Proposed State Highway Improvement: CSJ: 2452-03-112*. Design Plans. Texas Department of Transportation. San Antonio, TX.

Figure 1. Example Noise Wall Section with Utility and Right-of-Way Clearance.

Notes:

1. A minimum of 5 feet between the back of the noise wall and the edge of the right of way is needed to accommodate work behind the noise wall, including construction and maintenance. Ten feet is preferred to provide sufficient room for construction. If additional room is needed to access utility poles or other utility features, then 15 to 20 feet of space may be needed between the back of the noise wall and the right-of-way line.

For noise walls placed less than 5 feet from the right-of-way line, there is not enough room to construct the noise walls without accessing adjacent property. Shifting the noise wall away from the edge of the right of way can lessen the impact to utilities in part because overhead utilities are required to be within 3 feet of the edge of the right of way.

2. Minimum vertical clearance from existing ground to the neutral line to be determined.

3. The distance from the neutral line to Telecom 1 line is 3.33 feet, per electrical company standards.

4. Electrical company neutral sag would not be below Telecom 1 line.

5. Minimum clearance based on voltage by 29 CFR § 1926.1408 Table A, minimum clearance distances.

6. Vertical dimensions are given from existing ground at the base of the utility pole.

7. Depths of the 8-inch water line, 4-inch gas line, and telecom line are approximate. The location of utility corridors within the right of way will vary. Please refer to the Utility Accommodation Rules (see Texas Administrative Code) for required clearances.

