

# The Wildlife Fencing Guide

## Amphibians, Reptiles & Small Mammals

*A global handbook for biologists, engineers & contractors working on conservation, utility, construction, road, & linear infrastructure projects.*

VERSION 1.0



# Animex<sup>®</sup>

## **ACKNOWLEDGMENTS**

This document is designed to provide detailed guidance on material choice and installation methods for reptile, amphibian and small mammal fencing. It combines and builds upon information shared in existing best management practice guidelines from across the world and will be updated when new relevant information is published.

We would like to thank all of the people who have shared their research and experiences with wildlife fencing from across the world especially those we have had the pleasure of engaging in conversations and working with from the ANET, IENE, NETWC & ICOET networks. Not forgetting others we have met through The Wildlife Society, Canadian Herpetological Society, Desert Tortoise Council and other general project inquiries. Your openness and enthusiasm is imperative to improve our collective approach to improving wildlife fencing and mitigation practices.

The primary authors of this document are Steve Béga, Tim Harris & Dean Swensson.

We are particularly grateful for the photos and comments from Kari Gunson, Jerry Roe & Travis McCleary along with other photo contributions from Barb Beasley, Carlos Milburn-Rodriguez, Trent Bell, Suzanne Howse, John Mulder, Kari Gunson, Jerry Roe, Mark Backus, Mabyn Armstrong, & Tony Ashton.

Design & Illustrations by Steve Béga

## **SUGGESTED CITATION**

The Wildlife Fencing Guide: Amphibians, Reptiles & Small Mammals. 2021. Version 1  
<https://www.wildlifefencing.com/>

**ISBN:** 978-1-7399628-0-7

**COVER PHOTO:** Northern Leopard Frog (*Lithobates pipiens*) on paved highway.

**Credit:** Dean Swensson

# Introduction.

I began my career as a wildlife biologist in 1998 and formed an ecological consultancy that ensured clients adhered to legislation that protected native UK species of reptiles and amphibians from the impacts of habitat loss and fragmentation.

During this time I installed, monitored and repaired countless fences that were implemented to contain, exclude, or guide these species in the interest of research and conservation.

After realizing that the common fencing methods and materials available to us were not adequately providing the functionality or durability we needed for our unique purposes, I set off on a journey to develop better materials and methods of installation.

Shortly after, Animex Fencing was born.

After 10 years operating solely in Europe we began getting calls from other countries where biologists and contractors expressed the same frustrations and limitations with existing mixed construction fencing materials that we once had years previously.

This led us to investigate the potential applications and adjustments we would need to make to enable our fencing products and installation methods to be useful for other species across the world.

To date we are proud to have worked on numerous projects with various partners targeting multiple species. Every one has taught us valuable lessons that have enabled us to improve our approach and products.

This wildlife fencing guide is the culmination of this work to date and we are excited to share this with you and continue to develop our approach to protecting wildlife and habitats.

As a digital document it enables us to continually update the information presented within and ensure you receive the most accurate guidance when fencing for reptiles, amphibians and small mammals.

If you have any comments or information to add then we would love to hear from you...



A stylized, handwritten signature in black ink, appearing to read 'Dean Swensson'.

**Dean Swensson** CEO  
*Animex International*

# Contents.

PG.6

## SECTION I

<b>Wildlife fencing matters</b> .....	<i>pg.6</i>
<b>Understanding animal behavior</b> .....	<i>pg.7</i>
• Pacing .....	<i>pg.8</i>
• Entanglement .....	<i>pg.10</i>
• Climbing .....	<i>pg.12</i>

PG.14

## SECTION II

<b>Selecting the best fencing</b> .....	<i>pg.14</i>
• Optimal fencing materials .....	<i>pg.16</i>
• Sub-optimal fencing materials .....	<i>pg.20</i>

PG.24

## SECTION III

<b>Standard fencing specifications</b>	
• Getting started .....	<i>Starting on pg.26</i>
• Species overviews .....	<i>Starting on pg.28</i>
<b>AMX 40: Basic material size &amp; features</b> .....	<i>pg.42</i>
• Free-standing .....	<i>Starting on pg.44</i>
• Attached to existing fencing .....	<i>Starting on pg.48</i>
<b>AMX 48: Basic material size &amp; features</b> .....	<i>pg.58</i>
• Free-standing .....	<i>Starting on pg.60</i>
• Attached to existing fencing .....	<i>Starting on pg.64</i>
<b>AMX 60: Basic material size &amp; features</b> .....	<i>pg.74</i>
• Free-standing .....	<i>Starting on pg.76</i>
• Attached to existing fencing .....	<i>Starting on pg.80</i>
<b>Fixing &amp; fastening</b>	
• AMX-T & AMX-P (HDPE) .....	<i>pg.90</i>
• AMX-XP (Preformed metal) .....	<i>pg.92</i>
<b>Specialized fencing specifications</b> .....	<i>pg.94</i>
• Roadside Embankment (AMX 40) .....	<i>pg.96</i>
• Roadside Guiardrial (AMX 40) .....	<i>pg.98</i>

PG.100

## SECTION IV

<b>Bibliography</b> .....	<i>pg.100</i>
---------------------------	---------------



	<b>SALAMANDERS, NEWTS &amp; TOADS</b>	<b>Overview &amp; specifications ..... pg.28</b>
	<b>TORTOISES</b>	<b>Overview &amp; specifications ..... pg.30</b>
	<b>SNAKES</b>	<b>Overview &amp; Specifications ..... pg.32</b>
	<b>TURTLES</b>	<b>Overview &amp; Specifications ..... pg.34</b>
	<b>LIZARDS</b>	<b>Overview &amp; Specifications ..... pg.34</b>
	<b>FROGS</b>	<b>Overview &amp; Specifications ..... pg.38</b>
	<b>SMALL MAMMALS</b>	<b>Overview &amp; Specifications ..... pg.40</b>

**UPCOMING CHAPTERS**

- Shelters
- One-way escapes
- Turnarounds
- Pitfall trap-lines / Fence layouts

# SECTION I



## Wildlife Fencing Matters.

Wildlife exclusion fencing has been used for many years to exclude and direct a multitude of species away from areas designated for construction, roads, utilities and other infrastructure needed to facilitate growing human populations.

Along with many other factors wildlife fencing has been proven to be an effective mitigation tool for long and short-term projects. Unfortunately up until now the ambiguity surrounding what fencing materials and installation methods are most effective has led to millions of dollars being misspent and countless animals ineffectively protected.

To put an end to this we compiled a comprehensive wildlife-fencing handbook that you can trust and utilize on any future projects and usher us into a new era of wildlife protection.

Knowledge of how animals interact with their environment is imperative to the success of any mitigation or management measures and this is especially important when it comes to fencing. Too often fence design and material choice is made based on what is cheap and available rather than selecting solutions that are specifically designed for use with wildlife.

# Understanding animal behavior.

Pacing pg.8

Entanglement pg.10

Climbing pg.12

Scientific studies on the effectiveness of mitigation measures often look at projects on a large impact and landscape scale. These studies frequently assess effectiveness of mitigation by counting animal carcasses before and after installation culminating in overall impact assessments on mortality rate changes.

Very rarely do these studies go further to assess if the choice of fencing materials used could have an even greater influence on mitigation effectiveness by altering animal behavior. The chosen fencing material may put animals at a higher risk or positively improve the frequency of safe crossings or capture rates, based on how the animals interact with the fence.

Growing amounts of anecdotal observations of animals pacing, climbing and becoming stuck in fencing has lead scientists to begin researching what happens when animals come into contact with these barriers to gain a better understanding of what materials and designs are the least harmful and most effective.

It is this research that has informed this handbook and inspired us to create a detailed range of fencing designs that can be confidently applied to any situation.

Although every species of animal has its own unique biological traits and therefore will interact with fences in different ways it is agreed that the following factors are common across all animal groups and considered the highest risk factors when using fencing:

- **Pacing Behaviors** pg.8
- **Entanglement Risk** pg.10
- **Climb-ability** pg.12

A.



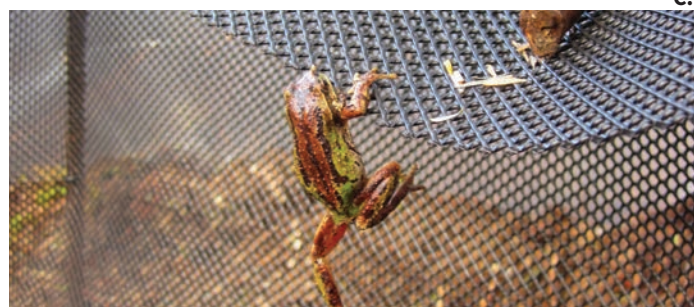
© Carlos Milburn-Rodriguez

B.



© nine12

C.



© Barb Beasley

Image Sources:

A. [https://ansuseye.wordpress.com/2017/05/17/turtle\\_attention/](https://ansuseye.wordpress.com/2017/05/17/turtle_attention/)

B. <https://imgur.com/gallery/Ph8YK>

C. <https://splatfrogunnel.blogspot.com/2014/08/new-fences-to-guide-amphibians-to-tunnel.html>

# Pacing.

Animals pacing along mesh fences are commonly observed in captivity and this behavior has also been recorded for wild reptiles and amphibians when they encounter materials with a high percentage of open area.

The risk this poses to wild animals in comparison to those in captivity is very different. Increased pacing behaviors in the wild can cause animals to overheat and perish as well as unnecessarily expose themselves to predation and even encourage them to interact with fences more frequently in ways which could lead to entanglement or being able to climb over the top.

We also don't truly understand if reptiles and amphibians can see or sense materials such as mesh or hardware cloth due to their composition of thin stands of material and a high percentage of open area. Therefore when a fence is designed to deter or guide animals to a safe location or wildlife crossing it is important to ensure the right fence material and design is chosen to optimize its intended functionality.

Solid fences with a low percentage of open areas have been proven to significantly reduce pacing behaviors of animals and animals have been observed to move much faster along them or move quickly away into the safety of nearby habitat when compared to mesh and wire materials.

## Key Links:

<https://wildlife.org/bad-fences-may-lock-wildlife-in-dangerous-highway-corridors/>

<https://www.researchgate.net/journal/Biological-Conservation-0006-3207>

[https://www.usgs.gov/centers/werc/science/reptile-and-amphibian-road-ecology-0?qt-science\\_center\\_objects](https://www.usgs.gov/centers/werc/science/reptile-and-amphibian-road-ecology-0?qt-science_center_objects)





**Snapping Turtle clawing at metal mesh as it walks along fence line. (1/4in hardware cloth)**

© Carlos Milburn-Rodriguez



**Lightweight plastic mesh with a high percentage of open area**

© Jerry Roe



**Traditional USFWS specified 1in x 2in wire fencing for Mojave Tortoise in USA**

© Dean Swensson



**Carpet python passing through chainlink in Queensland, Australia**

© Tony Aston

# Entanglement.

Nearly all mixed constructional materials such as silt fence, mesh, shade and hardware cloth pose a high risk of entanglement to wildlife.

These products comprise multi-fiber or strands of material that can act as nets inadvertently catching and entrapping sensitive wildlife rather than protecting it. Snakes are at the highest risk of entanglement as material strands often become lodged under scales making it impossible for them to move back and forth safely, and resulting in them becoming stuck and slowly perishing.

The risk factor can vary over time for different materials with materials comprising a high percentage of open areas such as mesh and hardware cloth posing an immediate risk whereas shade cloth and silt fencing will pose an increased risk over time as the material breaks down. In addition many of the cheaper materials used for temporary applications are rarely recovered after a project and are left to pollute the landscape causing further un-known and avoidable damage. Where as the weather resistance of some metal mesh fencing is difficult to predict, as places of manufacture can be hard to confirm.

As previously mentioned in the PACING section we don't truly understand if reptiles and amphibians can see or sense materials with a high percentage of open areas such as mesh or silt fencing. This may be the reason why they have been observed to exert a great amount of effort touching such materials in comparison to solid materials with a lower percentage of open area.

## Key Links:

[https://www.researchgate.net/publication/286280488\\_Plastic\\_netting\\_An\\_entanglement\\_hazard\\_to\\_snakes\\_and\\_other\\_wildlife](https://www.researchgate.net/publication/286280488_Plastic_netting_An_entanglement_hazard_to_snakes_and_other_wildlife)

<http://www.californiaherps.com/info/livingwithherps.html>

[https://mascomariver.files.wordpress.com/2018/08/permit-review-guidance\\_16april2018add.pdf](https://mascomariver.files.wordpress.com/2018/08/permit-review-guidance_16april2018add.pdf)





**Silt fencing obliterated after vegetation clearance along a roadside in Canada**

© Kari Gunson



**Natterjack Toad stuck in metal mesh, UK (hardware cloth)**

© John Mulder



**Painted Turtle caught in chainlink wire in gabion wall, Canada**

© Mabyn Armstrong



**Wire mesh, silt fencing & orange plastic mesh deteriorating on site boundary, USA**

© Jerry Roe

# Climbing.

If animals are able to climb or get over a fence it renders it redundant and must be avoided at all costs.

Amphibians, reptiles and small mammals have the ability to traverse their habitats in intricate ways and this must be seriously considered when designing a fence. Many mammals, frogs, lizards, salamanders and turtles are able to utilize their limbs to climb fence materials whereas snakes commonly distribute their weight to navigate creases or excess facings to get over a barrier.

Solid barriers are much more difficult to climb than multi-strand, woven and mesh style fences for most species as the latter replicate ladders.

The shape of the fence also plays an important part as different species will find it more difficult to traverse an arcing or overhanging fence than a vertical fence without an anti-climb lip.

As well as the material choice and shape, maintenance is also a key factor in the suitability and longevity of a fence. If vegetation is not kept low around a fence animals may use vegetation as a bridge or ladder to scale an otherwise non-climbable fence. It is also a lot easier for vegetation to become entangled in mesh fencing than it is in solid barriers.

## Key Links:

<https://line.17qq.com/articles/nnnplchdv.html>

<https://wildlife.onlinelibrary.wiley.com/doi/full/10.1002/wsb.1168>

<https://splatfrogstunnel.blogspot.com/2014/08/new-fences-to-guide-amphibians-to-tunnel.html>





**Frog climbing plastic mesh**

© Barb Beasley



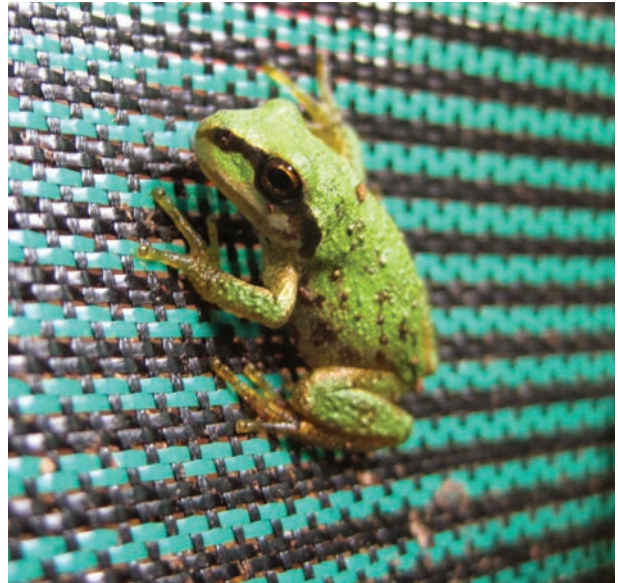
**Snapping turtle climbing wire mesh**

© Carlos Milburn-Rodriguez



**Newt climbing polythene**

© Barb Beasley



**Frog climbing silt fencing**

© Barb Beasley

# SECTION II



© Trent Bell

## Selecting the best fencing.

With growing amounts of scientific research and expanding anecdotal information, it is now possible to determine with a significant amount of clarity the most appropriate materials and products that will provide an informed decision to help you determine the best fencing for your project

Major factors to consider when adopting an animal fencing specification solution will undoubtedly include most, if not all of the following:

- **Effectiveness**
- **Cost**
- **Maintenance**
- **Longevity**



## Effectiveness

Fencing materials are commonly selected based on their availability and price rather than their effectiveness. This poses numerous risks to the sensitive wildlife the barrier is being installed for in the first place and therefore becomes more hazardous than helpful.

Some risk factors that sub-optimal materials create can allow animals to climb, risk entangling as well as encouraging unnatural pacing behaviors. It is therefore important to select fencing materials with a low percentage of open area and avoid anything made from fibrous or mesh materials.

## Maintenance

Overlooking the durability and maintenance requirements of fencing materials is often extremely expensive and unfortunately very common. It is important to understand how much time and money is required to ensure your newly installed fence is effective after the initial outlay.

Fibrous and mesh materials often require a lot of maintenance compared to more solid materials such as plastic rolls or metal sheets.

Vegetation encroachment on mesh fences can be extremely difficult to remove and using weed-whackers often damages the fencing beyond repair.

This is also comparative to areas with heavy snowfall as lightweight fences do not often survive the winter, posing a great risk to hibernating animals which are often quick to move once it thaws. It must also be noted that it is not advised to use non-perforated materials in aquatic environments or areas with expected heavy rain fall to avoid pooling against the barrier, which may lead to scoring under the fence.

## Cost

Project budgets for environmental management or mitigation are always low so it is important to invest sensibly in your wildlife fencing. Although some materials may be cheaper upfront, these fences have incredibly high maintenance costs and are therefore much more expensive overall. It is advised that you consider investing in more durable materials up front as this will create big savings in the long run. Added note... cheaper materials are often unrecoverable and therefore cause greater long-term harm to the environment. Selecting more durable materials will allow you to recover and reuse the material, which may also further reduce landfill or disposal charges.

## Longevity

Understanding the life expectancy of your fencing materials is imperative and can have a great impact on project budgets and the fence's ability to safely exclude or protect wildlife.

Selecting a cheaper material with a short shelf life for long-term projects will inherently incur greater costs for replacement and risk rendering the fencing redundant for unwanted periods.

Comparatively, using overly heavy duty and expensive fences for short-term projects may not be an efficient use of budget and may cause unnecessary habitat disruptions during installation.

**Optimal** pg.14

**Sub-optimal** pg.18

# Optimal. Material Comparison



**AMX-XP**  
**PREFORMED METAL**  
SHEETS



**AMX-PL**  
**RECYCLED PLASTIC LUMBER**  
SECTIONS



**AMX-SP**  
**SCORED PLASTIC (HDPE)**  
THICK ROLLS & SHEETS



**AMX-T**  
**SCORED PLASTIC (HDPE)**  
THIN ROLLS & SHEETS



**AMX-SP & AMX-T**  
**PERFORATED SCORED PLASTIC (HDPE)**  
VARIOUS THICKNESS ROLLS & SHEETS



# SUMMARY

EFFECTIVENESS

COST

LONGEVITY

MAINTENANCE

- Extremely durable
- Attach to existing barriers
- Low maintenance
- Low percentage of open area

**HIGH**

**HIGH**

**50+ YEARS**

**LOW**

- Extremely durable
- Attach to existing barriers
- Low maintenance
- Low percentage of open area

**HIGH**

**HIGH**

**50+ YEARS**

**LOW**

- Extremely durable
- Attach to existing barriers
- Low maintenance
- Low percentage of open area

**HIGH**

**MID**

**15 YEARS**

**LOW**

- Extremely durable
- Attach to existing barriers
- Low maintenance
- Low percentage of open area

**HIGH**

**LOW**

**5 YEARS**

**LOW**

- Extremely durable
- Attach to existing barriers
- Low maintenance
- Low percentage of open area

**HIGH**

**LOW**

**15 YEARS**

**LOW**

# Optimal fencing examples.



**AMX-T**  
**Scored plastic (HDPE)**  
*Temporary Desert Tortoise, Arizona*



**AMX-SP & AMX-T**  
**Scored perforated plastic (HDPE)**  
*Caltrans D7 Innovation Fair, California*



**AMX-XP**  
**Pre-formed metal**  
*Various species, UK*



**AMX-XP**  
**Pre-formed metal**  
*Multiple species, Europe*





**AMX-SP**  
**Scored plastic (HDPE)**  
*Attached to existing "Garrison" fencing, California*



**AMX-PL**  
**Recycled plastic lumber**  
*Retaining wall,, Europe*

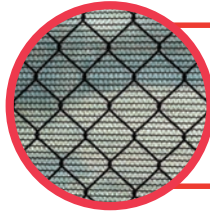


**AMX-SP**  
**Scored plastic (HDPE)**  
*Attached to guardrail, Ontario*



**AMX-T**  
**Scored plastic (HDPE)**  
*Temporary Salamander, California*

# Sub-Optimal. Material Comparison



**SHADE CLOTH / WINDBREAK / WOVEN PLASTIC**  
SUN COVERAGE - WIND CONTROL - VISUAL SCREENING



**PLASTIC MESH**  
FISH CONTAINMENT - ANIMAL CONTROL - POULTRY NETTING



**SILT FENCING / EROSION CONTROL**  
WOVEN POLYTHENE



**HARDWARE CLOTH / METAL MESH / CHAIN-LINK**  
GENERAL FENCING PURPOSES



**SNOW FENCING / WARNING BARRIER**  
SNOW DRIFT - HUMAN SAFETY - TEMPORARY FENCING



**LIGHT WEIGHT POLYTHENE**  
AGRICULTURE - ANIMAL CONTROL



# SUMMARY

EFFECTIVENESS

\*COST

LONGEVITY

MAINTENANCE

- Torn & ripped easily
- Animal entanglement
- High maintenance
- Climbable

LOW

LOW

< 1YEAR

HIGH

- Torn & ripped easily
- Animal entanglement
- High maintenance
- Climbable

LOW

LOW

< 1YEAR

HIGH

- Torn & ripped easily
- Animal entanglement
- High maintenance
- Climbable

LOW

LOW

< 1YEAR

HIGH

- Animal entanglement
- Corrosion risk
- Climbable

LOW

MID

10 YEARS

HIGH

- Torn & ripped easily
- Animal entanglement
- High maintenance
- Climbable

LOW

LOW

< 1YEAR

HIGH

- High maintenance
- Climbable
- Torn & ripped easily

LOW

LOW

< 1YEAR

HIGH

# Sub-optimal fencing examples.



**Polythene & wooden posts**  
*Various species, UK*



**Plastic mesh**  
*Various species, California*

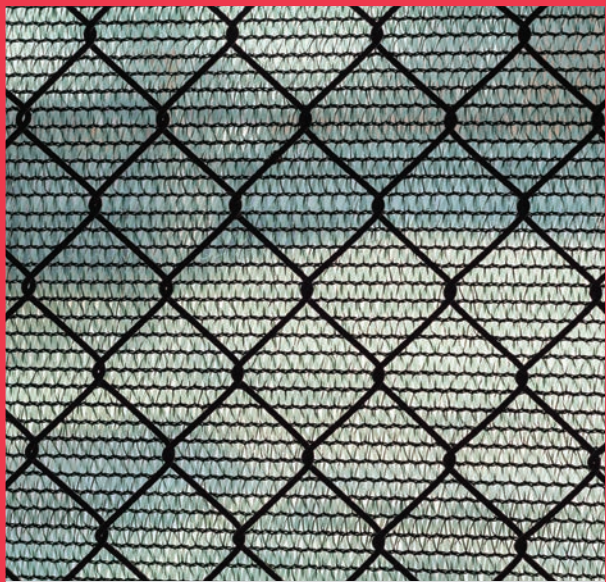


**Wire reinforced silt fencing**  
*Various species, USA*



**Orange safety barrier / Snow fencing**  
*Various species, Ontario*





**Shade cloth covering chain-link**  
*Various species, California*



**Chain-link fencing**  
*Various species, Ontario*



**Hardware cloth / Metal mesh**  
*Various species, Ontario*



**Orange plastic mesh**  
*Various species, California*



# SECTION III

**Standard**

# Fencing Specifications.

**Getting Started** pg.26

**Salamanders, Newts & Toads** pg.28

**Tortoises** pg.30

**Snakes** pg.32

**Turtles** pg.34

**Lizards** pg.36

**Frogs** pg.38

**Small Mammals** pg.40

# Getting Started.

What makes a fence for small animals so unique?

This section provides a selection of detailed specifications that can be copied and included in project documentation such as tenders, reports and on-site training flyers.

These specifications have been designed to be used with the optimal materials identified in **Optimal Fencing Materials** *pg.15*

Each specification refers to a code made up of “**AMX**” which stands for “**Animal Exclusion**” and a number including “**40, 48 or 60**” which refers to the materials height before being installed and having any top or bottom lips folded.

**SALAMANDERS & NEWTS : AMX40** *pg.26*

**TOADS : AMX40** *pg.26*

**TORTOISES : AMX40** *pg.26*

**SNAKES : AMX40** *pg.26* **AMX60 (LARGE)** *pg.26*

**TURTLES : AMX40** *pg.26* **AMX48 (LARGE)** *pg.26*

**LIZARDS : AMX40** *pg.26* **AMX48 (LARGE)** *pg.26*

**FROGS : AMX48** *pg.26* **AMX60 (LARGE)** *pg.26*

**SMALL MAMMALS : AMX48** *pg.26* **AMX60 (LARGE)** *pg.26*

It is also important to understand that although you may be considering a fence for a particular species, the chances are that there are many other species around that will be impacted by the fencing. All the specifications in this document consider multiple species applications but if you are targeting multiple species specifically you should choose the tallest of the recommended fences.

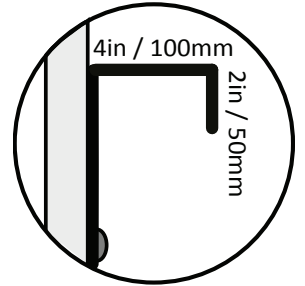
**Example:** Salamander = **AMX40** + Large Lizard = **AMX48**  
Project Needs = **AMX48**



Before looking at the detailed drawings it is important to understand some key aspects of wildlife fencing for reptiles, amphibians and small mammals that make them different from other fences and are key to making sure they are effective.

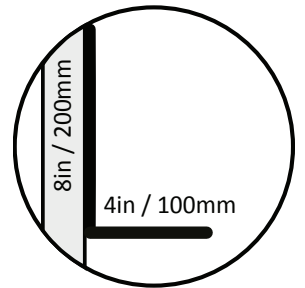
### Top Lip Design

Research shows that including a top “anti-climb lip” to fences increases their effectiveness for particular species. Although there is a common preference for using an “L” shaped lip, some research demonstrates that an upside down “U” shape lip may be more beneficial. Based on this information all drawings in this section will include a standard “U” shaped top lip comprising a **4in (10cm) top section with a 2in (5cm) downward element (6in / 150mm total)**. The exact size of this can be adapted if you feel it is appropriate for your project.



### Below Ground Depth & Designs

There is a growing concern that the shallowness of fences dug into the earth contributes to fences being less effective. We have standardised all drawings to include a depth of **8in (20cm) with a 4in (10cm) bottom lip** folded towards the direction animals are expected to encounter the fence. This average depth and bottom lip can be adapted if you feel it is appropriate for your project but should be done with caution. Contractors should be held accountable for trying to decrease trench depth and must ensure back fill is compacted appropriately. A shallow trench and lumpy back fill can allow animals to easily burrow under the fence and enter unwanted areas.



### Shelters

In some climates ambient temperature changes may occur along a fence line. More research needs to be done to explore what effect this may have on animals but for good practice shelters should be placed periodically along a fence to provide unexposed areas for refuge. Our standard recommendations state 1 shelter should be placed every 30ft / 100m. The exact spacing and size of the shelters can be adapted if you feel it is appropriate for your project.

### Joining Sections

It is surprising how small gaps between overlapped fencing materials can allow for animals to get through. It is extremely important to make sure when connecting sections of fencing either to each other or to other structures such as culverts, or crossings etc that every effort is taken to ensure no gaps or openings are present that an animal could get through or become entangled in.

### Posts

Support post types have not been specified as these can vary but some common ones are T-posts & various types of wooden posts (square, round, half round).

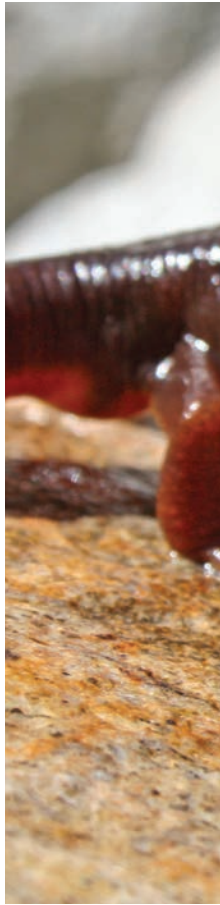


# Salamanders, Newts & Toads

It was estimated in 1998 that 1 million vertebrates were killed every day on roads in the United States, a high proportion of them being amphibians, frogs, toads, and salamanders. Given the increase in traffic volumes since then, this figure – when replicated globally – shows what a serious problem road-kill is. And additional deaths occur at unfenced development sites and railroads. For salamanders, most deaths come during their migration between breeding sites (they require an aquatic environment in which to breed) and terrestrial feeding or hibernation sites.

Salamanders and newts exhibit site fidelity, which means they return to the same vernal pool each spring to breed, very often the pool where they were born. In many parts of the world that means having to cross roads to get there – and they're not good at avoiding traffic. In one Canadian study, biologists found that there had been more than 30,000 amphibian deaths in four years on a 3-kilometre stretch of road. Other researchers found that in western Massachusetts, road-kill rates were high enough to lead to localized extinctions of Spotted Salamanders (*Ambystoma maculatum*) in 25 years. Additionally, any construction site is also a potential death-trap for amphibians, hence the need for effective exclusion fencing.

It is the responsibility of transport planning engineers to reduce the ecological impact roads have and use mitigation measures as tools in ecological conservation. Fencing, along with other mitigation measures, such as tunnels, has been shown to reduce road-kill dramatically at key migration points without disrupting the animals' life cycle. However, it has to be the right kind of fencing or salamanders will find a way through it, rendering it a waste of money.



# Specifications:

## SALAMANDERS NEWTS & TOADS: **AMX 40**

**BASIC MATERIAL SIZE & FEATURES** ..... pg. 42



### Free-standing

*Suitable for temporary & permanent*

**AMX 40 : BELOW GROUND** ..... pg. 44

**AMX 40 : ABOVE GROUND** ..... pg. 46

### Attached

*Suitable for temporary & permanent*

**AMX 40 : GARRISON** ..... pg. 48

**AMX 40 : CHAIN-LINK** ..... pg. 50

**AMX 40 : LIVE STOCK** ..... pg. 52

**AMX 40 : SECURITY BARRIER** ..... pg. 54

**AMX 40 : LARGE WILDLIFE** ..... pg. 56

### Key Species:

- California Tiger Salamander
- Great Crested Newt
- Spotted Salamander
- Jefferson's Salamander
- Arroyo Toad
- Fowler's toad

### Fixing & Fastening

**AMX-T / AMX-SP : SCORED PLASTIC** ..... pg. 90

**AMX-XP : PREFORMED METAL** ..... pg. 92





# Tortoises

Threatened Mojave Desert Tortoises (*Gopherus agassizii*) and other *Gopherus* species face numerous threats, not least from collisions with vehicles as they attempt to cross highways traversing their territories and entrapment in trenches, pipework, and machinery on construction sites. Also, with the increase in solar power installations in the very desert habitats that are used by the tortoises, fencing is required to keep the animals out. An additional problem is that although exclusion fencing can successfully keep tortoises off construction sites and roads, some individuals have difficulties adjusting to new barriers and their body temperature rises – sometimes fatally – as they pace up and down the fencing in hot weather.

Fencing, along with other mitigation measures, such as underpasses, has been shown to reduce mortality without disrupting the animals' life cycle too much, but it has to be the right kind of fencing, installed with consideration for the animals' direction of movement. Otherwise, tortoises may be able to get through or over it – or they may perish trying to find a way through.

Evidence provided by biologists and contractors in Nevada revealed that previously specified mesh fencing designed to exclude Mohave Desert Tortoises had been found to corrode within a few years of installation and posed risks to a variety of animals. Additionally, installation methods often damaged large areas of surrounding habitat.

Fencing can also be used to aid population assessment before the development of new construction sites.



# Specifications:

## TORTOISES: **AMX 40**

**BASIC MATERIAL SIZE & FEATURES** ..... pg. 42



### **Free-standing**

*Suitable for temporary & permanent*

**AMX 40 : BELOW GROUND** ..... pg. 44

**AMX 40 : ABOVE GROUND** ..... pg. 46

### **Attached**

*Suitable for temporary & permanent*

**AMX 40 : GARRISON** ..... pg. 48

**AMX 40 : CHAIN-LINK** ..... pg. 50

**AMX 40 : LIVE STOCK** ..... pg. 52

**AMX 40 : SECURITY BARRIER** ..... pg. 54

**AMX 40 : LARGE WILDLIFE** ..... pg. 56

### **Key Species:**

- Desert Tortoise
- Gopher Tortoise
- Hermann's Tortoise
- Texas Tortoise
- Greek Tortoise

### **Fixing & Fastening**

**AMX-T / AMX-SP : SCORED PLASTIC** ..... pg. 90

**AMX-XP : PREFORMED METAL** ..... pg. 92



# Snakes

Roads have been described as ecological traps for snakes. Since snakes are ectotherms, they need to obtain heat from their environment, so they are often attracted to the heat-retaining surfaces of highways. This increases the chances of them being killed by passing vehicles. When commuting snakes cross a road, some species become immobile in response to oncoming traffic, further increasing their chances of being hit. Additionally, snakes are potentially at risk of becoming trapped in foundation trenches, pipework, or machinery on poorly fenced construction sites.

Wandering snakes are more susceptible than more sedentary species. Research has shown that gopher snakes, for example, suffer higher rates of road-kill than rattlesnakes. This is particularly true during two periods of the year: in spring or summer – depending on the species – adult males are more prone to wandering as they seek out females to mate with; in fall, juveniles often disperse from their natal site. In spring, snakes are most active during peak vehicle commuting periods, while in summer activity is restricted to the coolest parts of the day (earlier and later), when traffic volumes are less. Poorly fenced construction sites also hold many hazards for wandering snakes, especially since these often provide attractive locations for females to nest.

It is the responsibility of planning engineers to reduce the ecological impact of roads and construction sites and use mitigation measures as tools in ecological conservation. The right kind of exclusion fencing, particularly if installed well and used in conjunction with mitigation features such as eco-passages, can reduce snake road-kill and construction sites mortality dramatically. Construction sites are potential death-traps for snakes, and the presence of venomous species is clearly unwelcome where workers are engaged in construction – hence the need for effective exclusion fencing.

Fencing can also be used to aid population assessment before the development of new construction sites.





# Specifications:



## Key Species:

- San Fransisco Garter Snake
- Northern Pacific Rattlesnake
- Massasauga Rattlesnake
- Common European Adder
- Alameda Whipsnake

## SMALL SNAKES: **AMX 40**

**AMX 40** : BASIC MATERIAL SIZE & FEATURES ..... pg. 42

### Free-standing

*Suitable for temporary & permanent*

**AMX 40** : BELOW GROUND ..... pg. 44

**AMX 40** : ABOVE GROUND ..... pg. 46

### Attached

*Suitable for temporary & permanent*

**AMX 40** : VARIOUS TYPES ..... starting on pg. 48

## LARGE SNAKES: **AMX 60**

**AMX 48** : BASIC MATERIAL SIZE & FEATURES ..... pg. 74

### Free-standing

*Suitable for temporary & permanent*

**AMX 60** : BELOW GROUND ..... pg. 76

**AMX 60** : ABOVE GROUND ..... pg. 78

### Attached

*Suitable for temporary & permanent*

**AMX 60** : VARIOUS TYPES ..... starting on pg. 80

## Fixing & Fastening

**AMX-T / AMX-SP** : SCORED PLASTIC ..... pg. 90

**AMX-XP** : PREFORMED METAL ..... pg. 92



# Turtles

Roads and construction sites are hazardous locations for turtles. While their hardened shell (with a bony carapace above and a plastron below) is sufficient defence against most natural predators, it is no protection from passing motor vehicles or earth-moving equipment. Additionally, on poorly fenced construction sites they are risk of becoming trapped or injured in trenches, pipework, and machinery.

It is not uncommon to see freshwater turtles alongside highways and tracks in spring, summer, and fall. They commute across roads and construction sites as they search for food, or for mating partners, and as they move from pool to pool. Being ectotherms (“cold-blooded”), they are often attracted to the warmth of road surfaces. There, they will stop and retract into their shell in response to traffic. If commuting across a highway, they are usually slow-moving.

In the nesting season, female turtles are especially vulnerable, since they often dig into and lay their eggs in banks of gravel or sand on construction sites, highway shoulders, or gravel tracks. This is particularly true of sites near to ditches or wetlands. An additional problem is that breeding pools may be in-filled in large developments, so the animals will consciously be trying to locate them in the midst of construction work. If new ponds have been created as part of mitigation measures, fencing can be used not only to keep the turtles off site, but to direct them towards the new pools.

The time of year when this is a potential problem varies according to location. In Canada, for example, nesting activity begins at the start of April and extends through to early October, but in the southern United States turtles are active all year round. Additionally, gravelly or sandy substrates on development sites may be attractive to female turtles during the nesting season. According to the species, the eggs take up to 120 days to hatch. When the tiny young hatch, they dig to the surface and then often migrate to a nearby water body. Having a soft carapace, young turtles are even more vulnerable to crushing than are the adults. Construction machinery is every bit as much a threat as is passing traffic on a highway.

Fencing can also be used to aid population assessment before the development of new construction sites.



# Specifications:



## Key Species:

- Western Pond Turtle
- Snapping Turtle
- Painted Turtle
- Box Turtle
- Blandings Turtle

## SMALL TURTLES: **AMX 40**

**AMX 40** : BASIC MATERIAL SIZE & FEATURES ..... pg. 42.

### Free-standing

*Suitable for temporary & permanent*

**AMX 40** : BELOW GROUND ..... pg. 44

**AMX 40** : ABOVE GROUND ..... pg. 46

### Attached

*Suitable for temporary & permanent*

**AMX 40** : VARIOUS TYPES ..... starting on pg. 48

## LARGE TURTLES: **AMX 48**

**AMX 48** : BASIC MATERIAL SIZE & FEATURES ..... pg. 58

### Free-standing

*Suitable for temporary & permanent*

**AMX 48** : BELOW GROUND ..... pg. 60

**AMX 48** : ABOVE GROUND ..... pg. 62

### Attached

*Suitable for temporary & permanent*

**AMX 48** : VARIOUS TYPES ..... starting on pg. 64

## Fixing & Fastening

**AMX-T / AMX-SP** : SCORED PLASTIC ..... pg. 90

**AMX-XP** : PREFORMED METAL ..... pg. 92





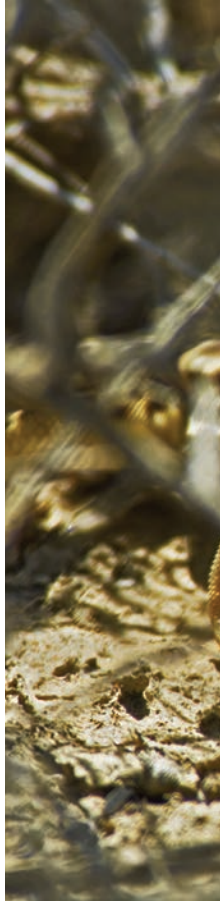
# Lizards

Lizard species are potentially at risk of becoming trapped in foundation trenches, pipework, or machinery on poorly fenced construction sites. Additionally, researchers in the United States have ranked 18% of lizard species at high or very high risk of becoming road-kill on highways. Lizards are susceptible to crushing by road traffic or earth-moving equipment because they are slow moving, do not avoid roads, and are simply too small for drivers to see and avoid. Since paved roads and surfaced areas on development sites typically absorb and retain more heat than the surrounding environment, lizards – like other reptiles – are often attracted to them for thermo-regulation, making their occurrence on these surfaces more frequent than their population would suggest.

The US researchers found that in California a few wide-ranging species are especially vulnerable to road-kill, including Flat-tailed horned lizard (*Phrynosoma mcallii*) and leopard lizards (genus *Gambelia*). For the former, this is particularly true because of their tendency to remain motionless while being approached by a vehicle.

It is the responsibility of planning engineers to reduce the ecological impact construction sites and roads have, and to use mitigation measures as tools in ecological conservation. Fencing, along with other mitigation measures, such as tunnels, has been shown to reduce construction site deaths and road-kill without disrupting the animals' life cycle, but it has to be the right kind of fencing or lizards will find a way through it or climb over it.

Fencing can also be used to aid population assessment before the development of new construction sites.



# Specifications:



## Key Species:

- Blunt-nosed Leopard Lizard
- Viviparous Lizard
- Texas Horned Lizard
- Dunes Sagebrush lizard
- Desert Spiny Lizard

## SMALL LIZARDS: **AMX 40**

**AMX 40** : BASIC MATERIAL SIZE & FEATURES ..... pg. 42

### Free-standing

*Suitable for temporary & permanent*

**AMX 40** : BELOW GROUND ..... pg. 44

**AMX 40** : ABOVE GROUND ..... pg. 46

### Attached

*Suitable for temporary & permanent*

**AMX 40** : VARIOUS TYPES ..... starting on pg. 48

## LARGE LIZARDS: **AMX 48**

**AMX 48** : BASIC MATERIAL SIZE & FEATURES ..... pg. 58

### Free-standing

*Suitable for temporary & permanent*

**AMX 48** : BELOW GROUND ..... pg. 60

**AMX 48** : ABOVE GROUND ..... pg. 62

### Attached

*Suitable for temporary & permanent*

**AMX 48** : VARIOUS TYPES ..... starting on pg. 64

## Fixing & Fastening

**AMX-T / AMX-SP** : SCORED PLASTIC ..... pg. 90

**AMX-XP** : PREFORMED METAL ..... pg. 92

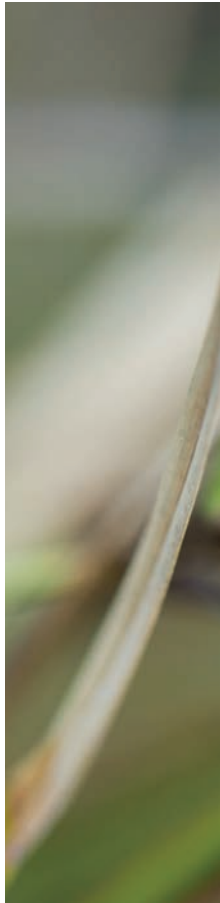


# Frogs

The life cycle of frogs dictates that females lay their eggs in water. Some species live most of their lives in and around water and are relatively sedentary. Terrestrial frogs, however, live most of the time in other environments, such as forest, but still need to visit water to breed. They are more mobile than their aquatic counterparts and are prone to movements at the start and end of the breeding season. Therein lies a problem for conservationists. In spring, adults make their way to a favoured pool, later returning to the environment where they spend the rest of the year. Juveniles also move away from their natal pool to suitable terrestrial habitat; tens of thousands of froglets may migrate from a single pool in late summer.

If there is an artificial obstruction between the two environments – a construction site or a new road, for example – mortality will be greatly increased. Every year there will be two adult migrations and one juvenile migration across it – with resultant development site deaths and road-kill. New developments fragment habitats and obstruct migration routes. They often also involve the removal and relocation of breeding ponds; fencing can be used both to guide them away from development sites and towards newly constructed breeding ponds. Fencing can also be used to aid population assessment prior to any development.

It is the responsibility of planning engineers to reduce the ecological impact that construction sites and roads have, and to use mitigation measures as tools in ecological conservation. Fencing, along with other mitigation measures, such as tunnels, has been shown to reduce deaths on construction sites and road-kill – without disrupting the animals' life cycle. But it has to be the right kind of fencing or frogs will climb over it, find their way through it or become entangled in it.





# Specifications:



## Key Species:

- California Red-legged Frog
- European Pool Frog
- Pacific Tree Frog
- Northern Leopard Frog
- Growling Grass Frog

## SMALL FROGS: **AMX 40**

**AMX 40** : BASIC MATERIAL SIZE & FEATURES ..... pg. 428

### **Free-standing**

*Suitable for temporary & permanent*

**AMX 40** : BELOW GROUND ..... pg. 44

**AMX 40** : ABOVE GROUND ..... pg. 46

### **Attached**

*Suitable for temporary & permanent*

**AMX 40** : VARIOUS TYPES ..... starting on pg. 48

## LARGE FROGS: **AMX 60**

**AMX 48** : BASIC MATERIAL SIZE & FEATURES ..... pg. 74

### **Free-standing**

*Suitable for temporary & permanent*

**AMX 60** : BELOW GROUND ..... pg. 76

**AMX 60** : ABOVE GROUND ..... pg. 78

### **Attached**

*Suitable for temporary & permanent*

**AMX 60** : VARIOUS TYPES ..... starting on pg. 80

## **Fixing & Fastening**

**AMX-T / AMX-SP** : SCORED PLASTIC ..... pg. 90

**AMX-XP** : PREFORMED METAL ..... pg. 92

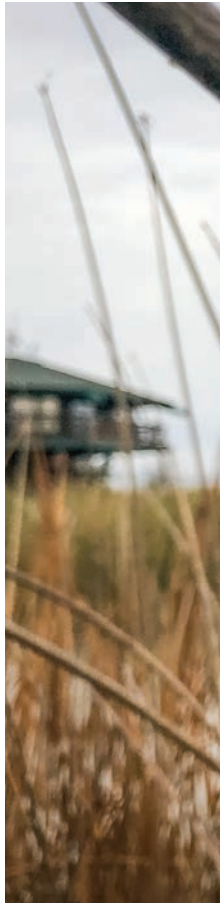


# Small Mammals

Small mammals wander in search of food, when looking for mates, as they disperse after the breeding season, and when seeking hibernation sites. Mortality is high on roads, railroads, and construction sites. In 1993, for example, 25 schools in New England participated in a road-kill study which recorded 1,923 animal deaths, of which 81% were mammals. If the estimate of 1 million animals killed daily on American roads is roughly accurate, several hundred thousand of these will be mammals. The additional number of those killed on construction sites has not been quantified, but machinery, heavy plant, trenches, and pipework are all major hazards for small mammals, which may become trapped or injured, or be killed.

It is the responsibility of planning engineers to reduce the ecological impact construction sites and roads have and employ mitigation measures as tools in ecological conservation. Fencing, along with other mitigation measures such as tunnels, has been shown to reduce mortality without disrupting the animals' life cycle, but it has to be the right kind of fencing or small mammals will climb over it or find their way through it.

Additionally, there are many situations where farmers or horticulturists may wish to exclude mammals from their crops, hence the need for effective exclusion fencing. Fencing can also be used to aid population assessment before the development of new construction sites.



# Specifications:

## SMALL MAMMALS: **AMX 40**

**AMX 40** : BASIC MATERIAL SIZE & FEATURES ..... pg. 428

### **Free-standing**

*Suitable for temporary & permanent*

**AMX 40** : BELOW GROUND ..... pg. 44

**AMX 40** : ABOVE GROUND ..... pg. 46

### **Attached**

*Suitable for temporary & permanent*

**AMX 40** : VARIOUS TYPES ..... starting on pg. 48

## LARGER MAMMALS: **AMX 60**

**AMX 48** : BASIC MATERIAL SIZE & FEATURES ..... pg. 74

### **Free-standing**

*Suitable for temporary & permanent*

**AMX 60** : BELOW GROUND ..... pg. 76

**AMX 60** : ABOVE GROUND ..... pg. 78

### **Attached**

*Suitable for temporary & permanent*

**AMX 60** : VARIOUS TYPES ..... starting on pg. 80

## **Fixing & Fastening**

**AMX-T / AMX-SP** : SCORED PLASTIC ..... pg. 90

**AMX-XP** : PREFORMED METAL ..... pg. 92



### **Key Species:**

- Salt Marsh Harvest Mouse
- Kangaroo Rat Spp.
- Mohave Ground Squirrel
- European Watervole
- San Joaquin Kit Fox



# ● AMX 40

## Basic Material Size & Features

The length of each **AMX 40** section will vary depending on the material choice.

**AMX 40** dimensions based on popular optimal fencing materials (pg16):

### **SCORED PLASTIC** - PERFORATED & NON-PERFORATED

#### *Temporary Applications (AMX-T)*

Thickness: 0.04in / 1mm

Length: 75ft / 22m

Weight: 50lbs / 23kg

#### *Semi-Permanent Applications (AMX-SP)*

Thickness: 0.08in / 2mm

Length: 35ft / 10m

Weight: 48lbs / 22kg

### **PREFORMED METAL**- PERFORATED & NON-PERFORATED

#### *Permanent Applications (AMX-XP)*

Thickness: 0.08in / 2mm

Length: 8ft / 2.4m

Weight: 85lbs / 38kg

**AMX 40 INSTALLED ABOVE GROUND HEIGHT: 22in / 550mm**

#### **Notes:**

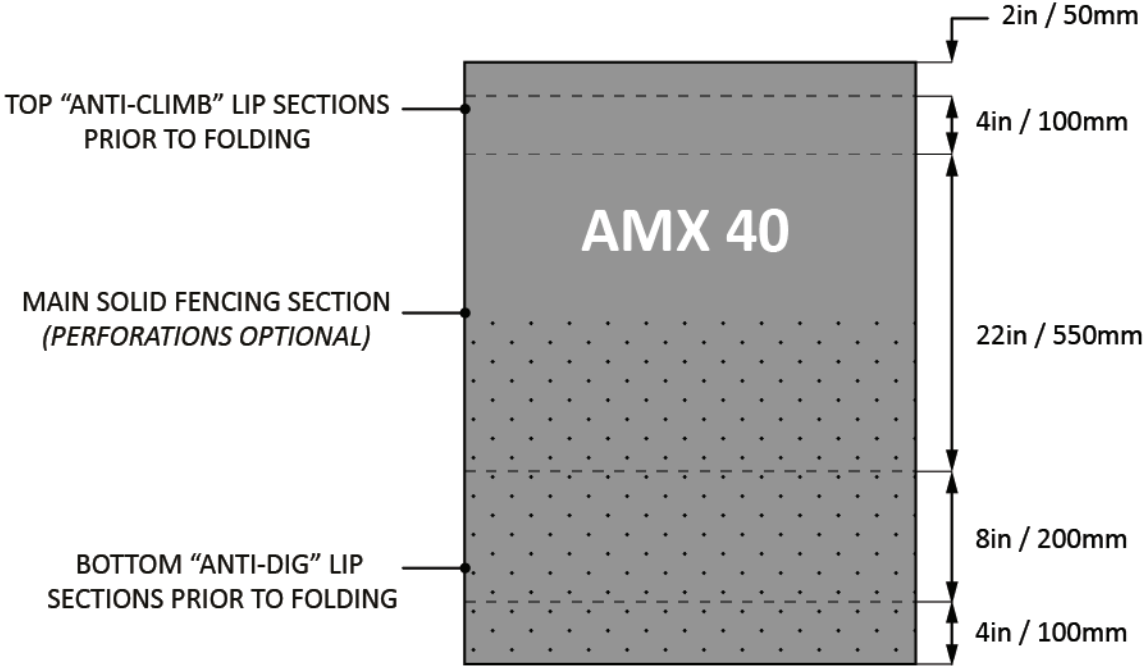
These dimensions are based on maximising the amount of material that can be shipped economically and manoeuvred on site in line with common health and safety guidelines.

Material may be shipped in sheets or rolls depending on their length.

Customised options for alternative **AMX40** barrier options are available from Animex® Fencing suppliers upon request. Other traditional and existing fencing materials including posts and wire etc can be obtained from local contractors.

**NOTES:**

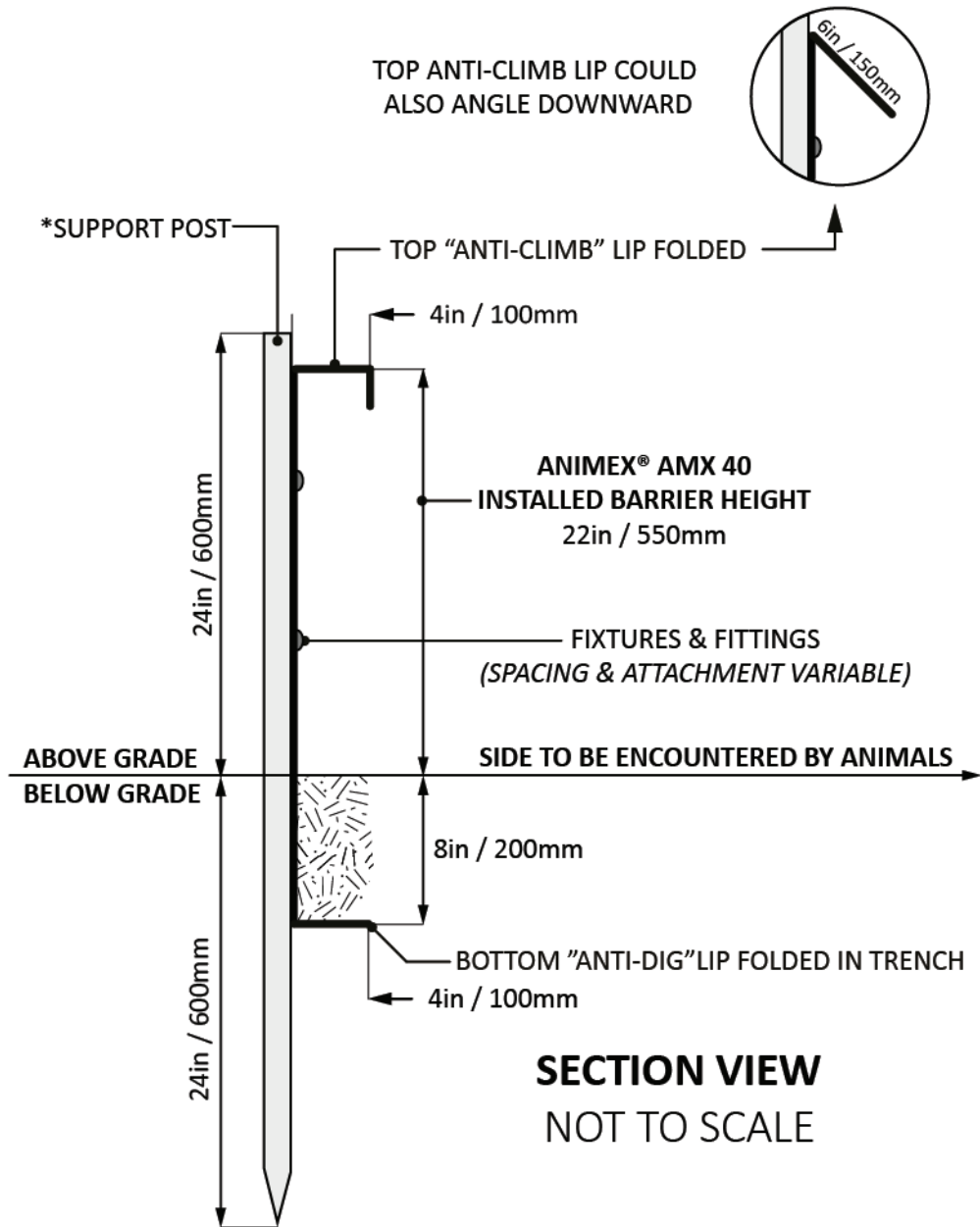
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 40

## Free-standing Below Ground

AMX 40



**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

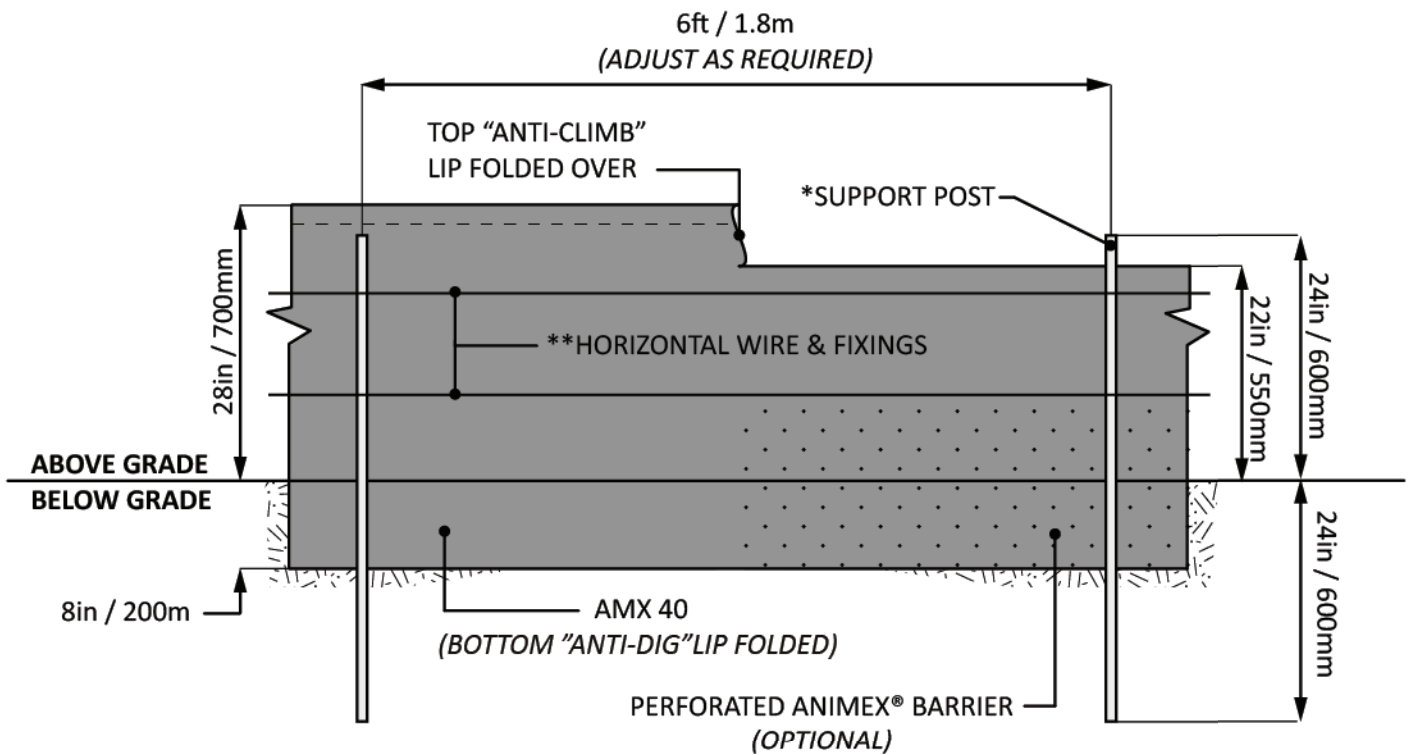
**AMX 40**  
Free-standing Below Ground

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES



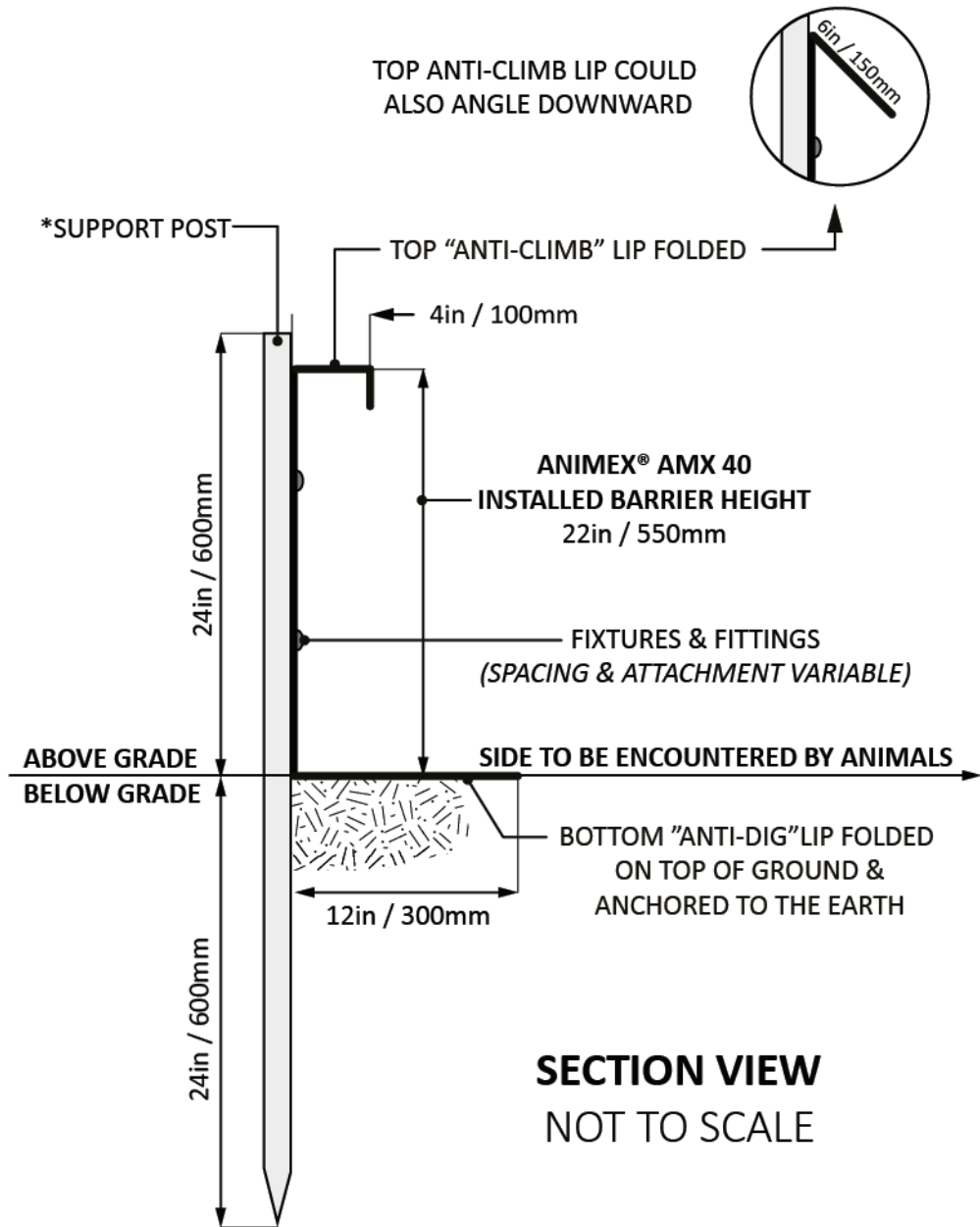
**ELEVATION VIEW**  
NOT TO SCALE



# ● AMX 40

## Free-standing Above Ground

AMX 40



**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**AMX 40**  
Free-standing Above Ground

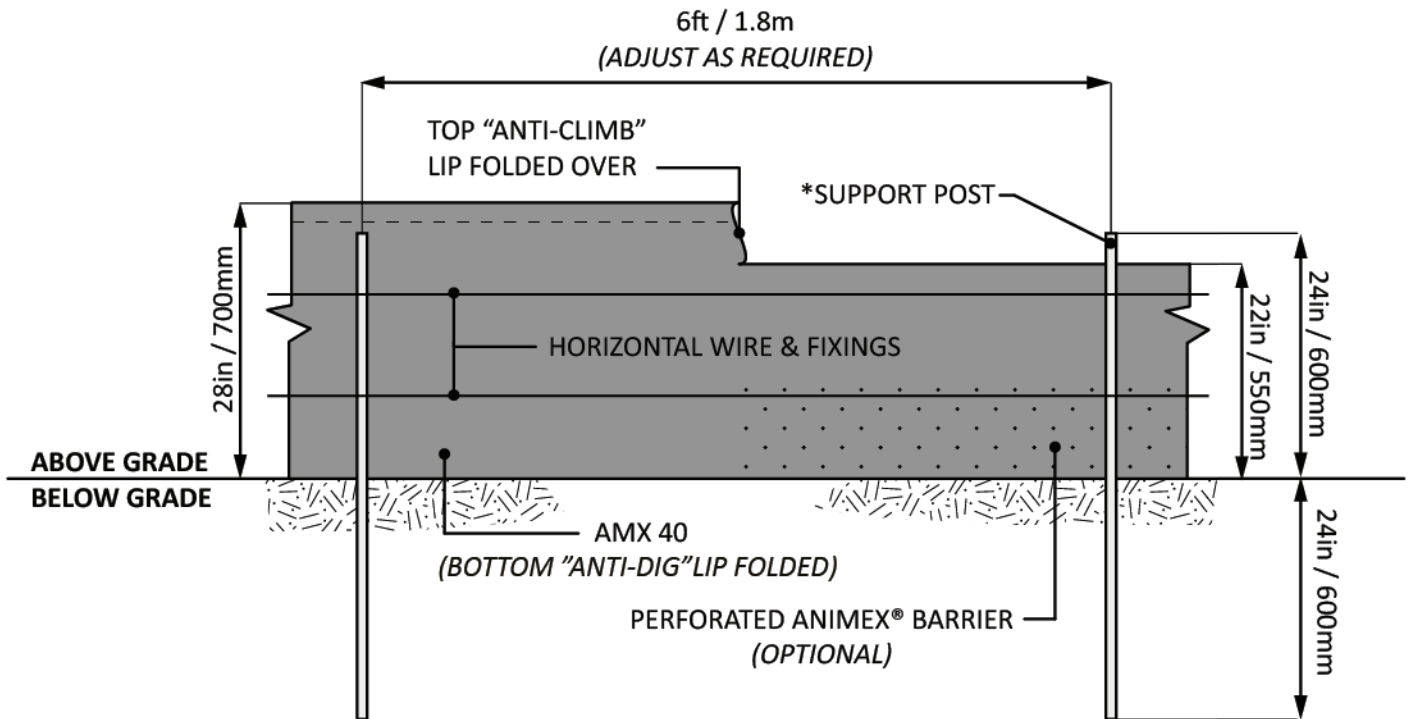
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**APPLY THIS ABOVE GROUND METHOD  
WHEN ATTACHING TO EXISTING  
FENCE TYPES AS WELL**

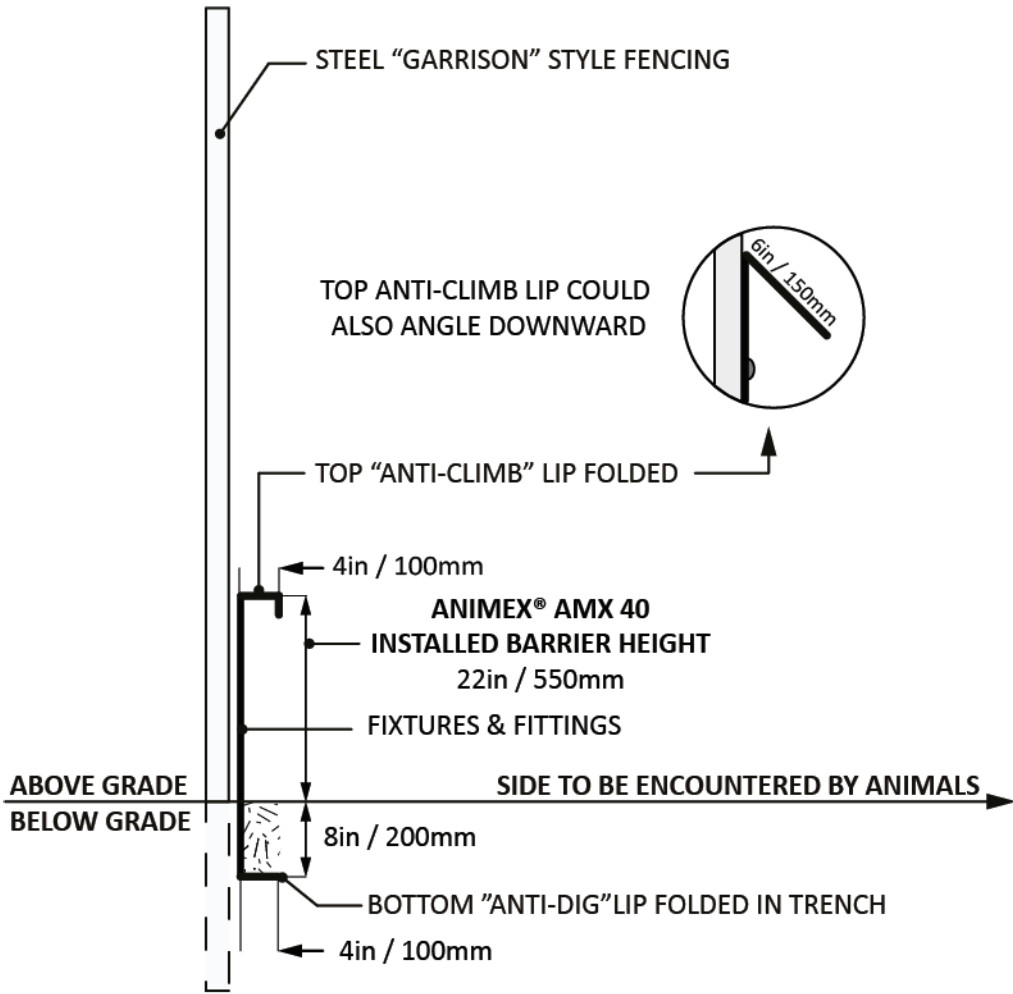
\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES



**ELEVATION VIEW**  
NOT TO SCALE

# ● AMX 40 Attached Garrison



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

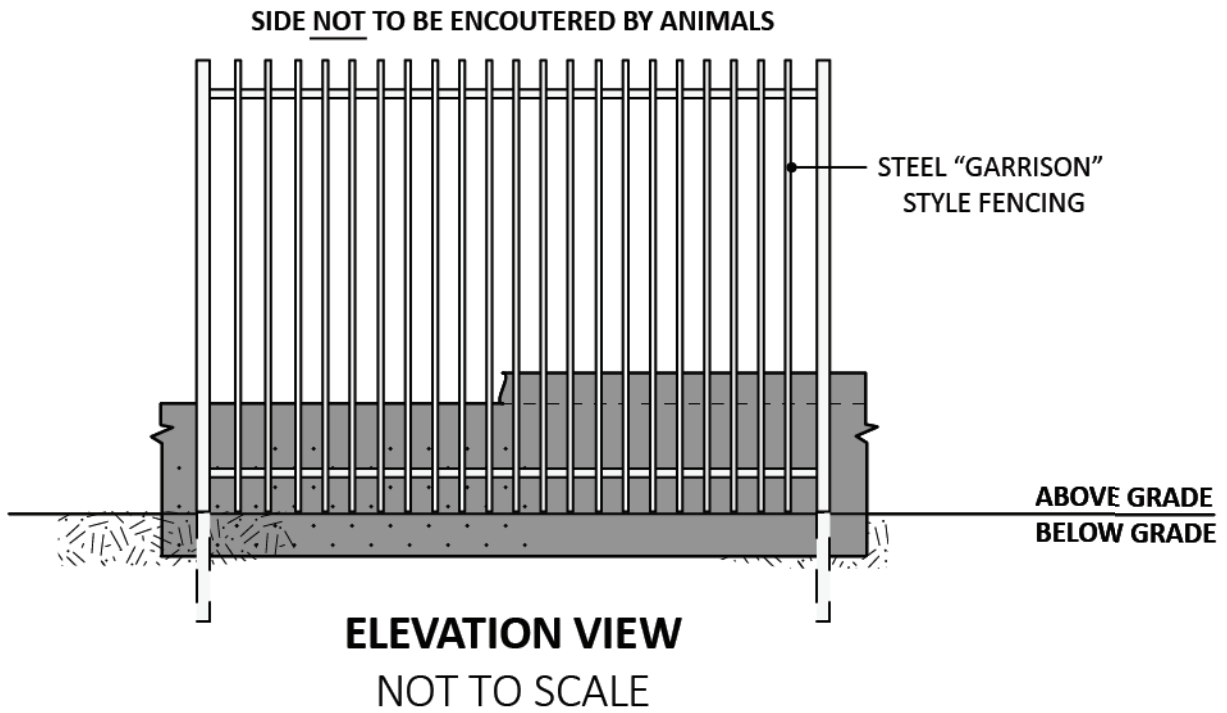
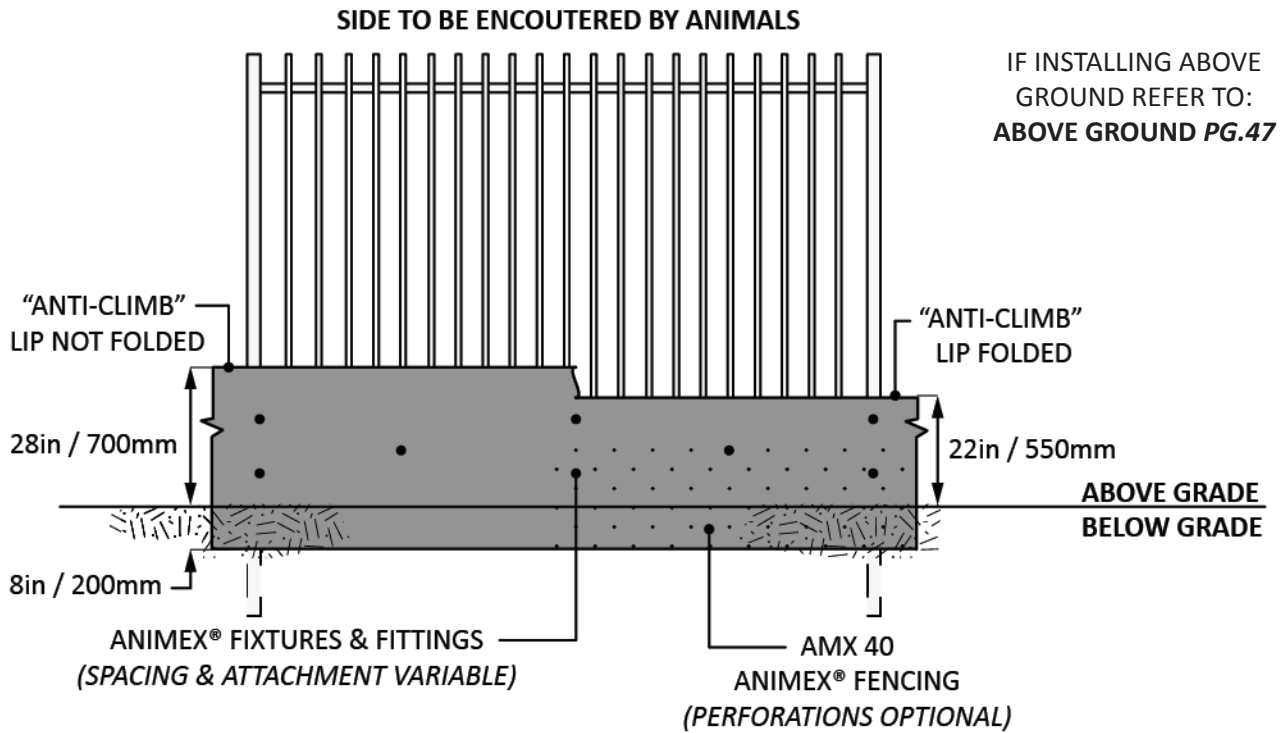
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 40

**AMX 40**  
Attached Garrison

**NOTES:**

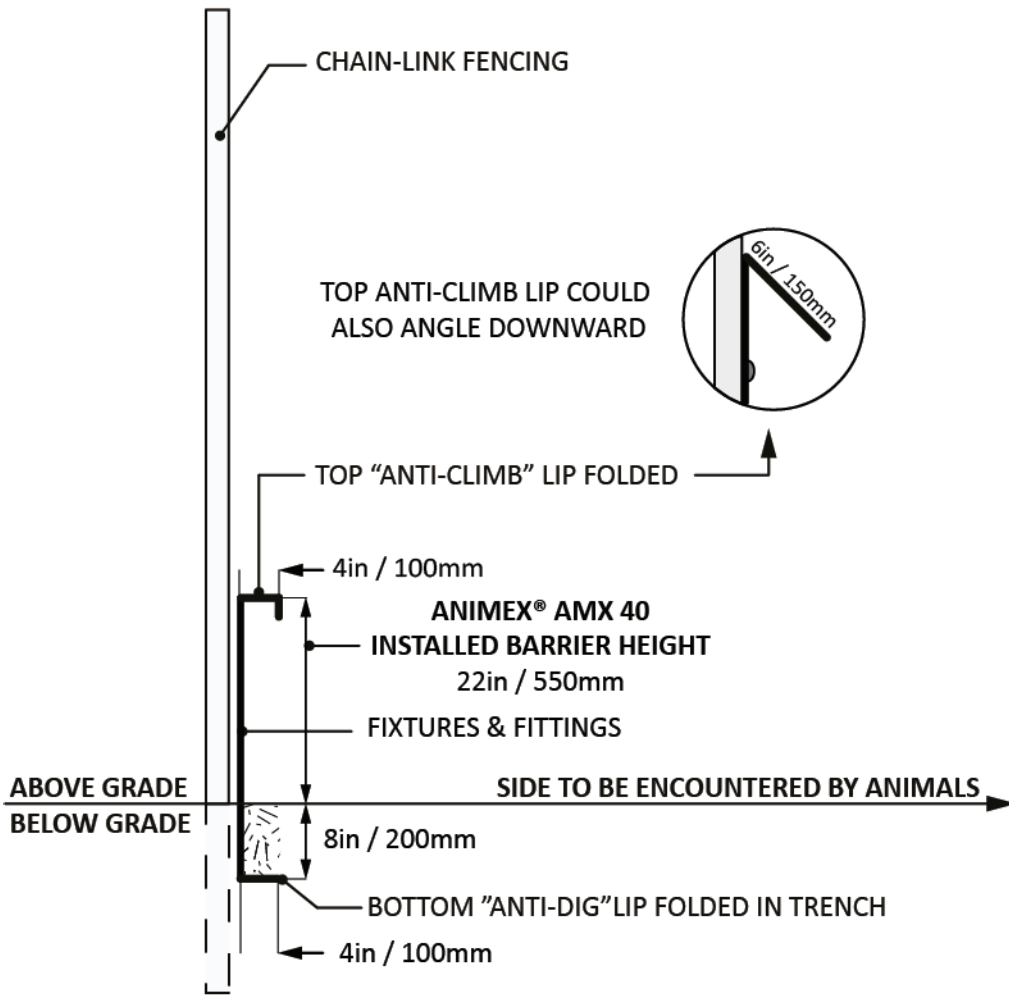
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.





# ● AMX 40

## Attached Chain-link



### SECTION VIEW NOT TO SCALE

**NOTES:**

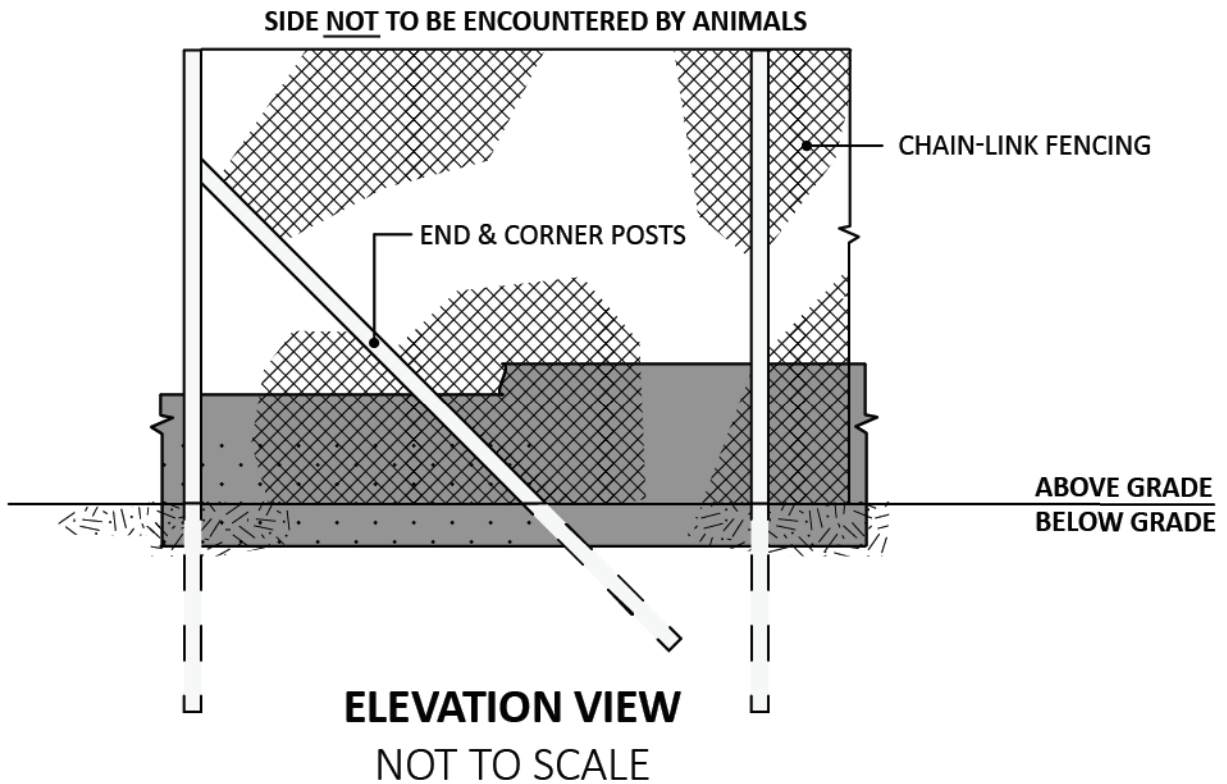
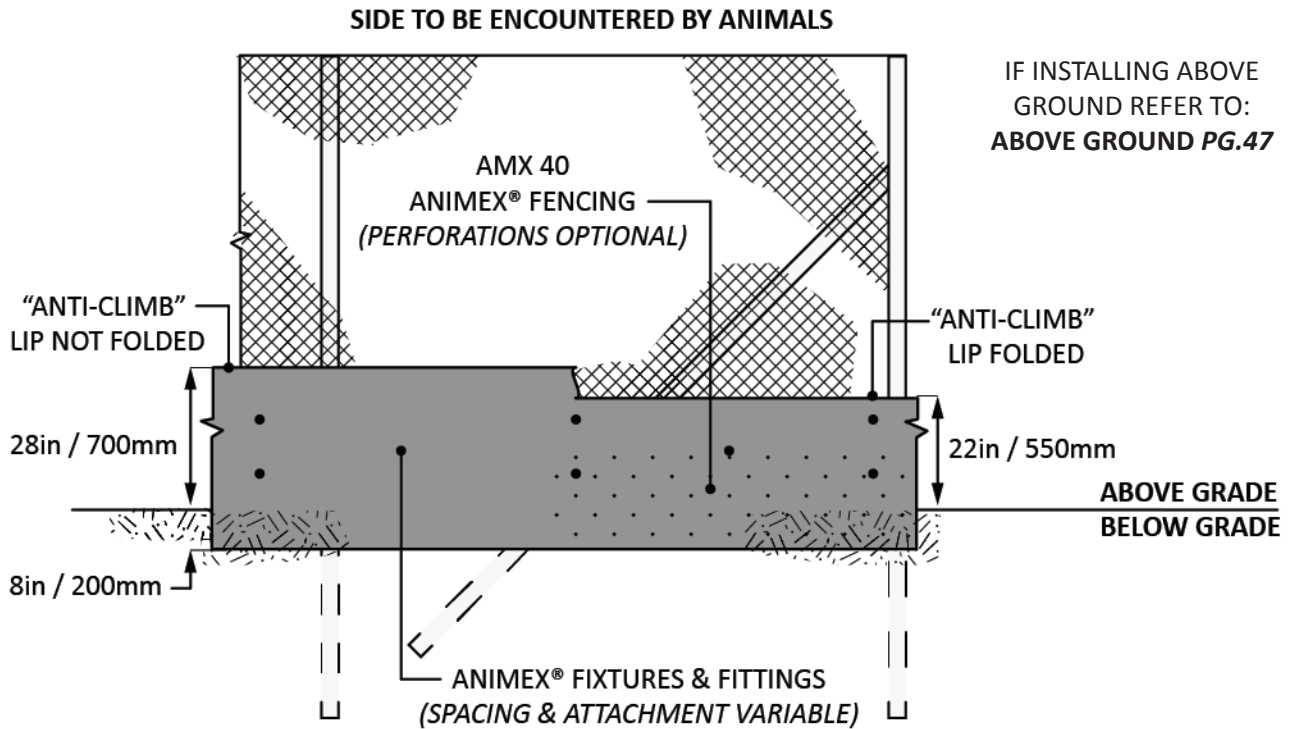
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 40

**AMX 40**  
Attached Chain-link

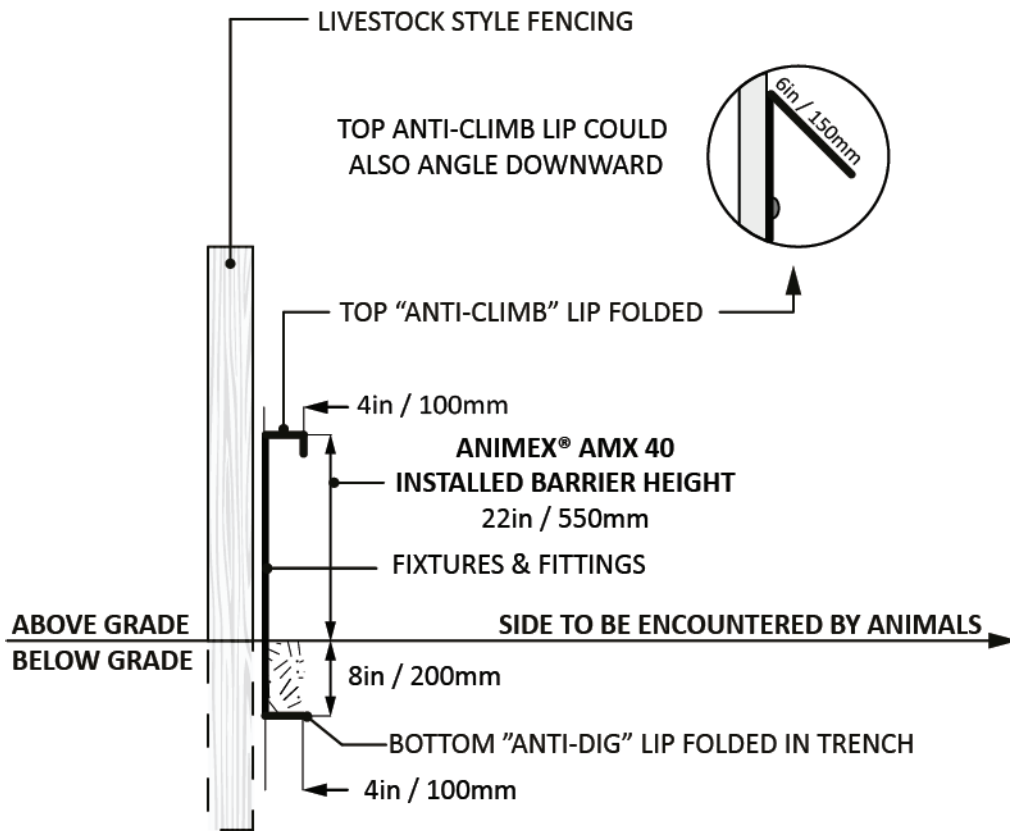
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 40

## Attached Livestock



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

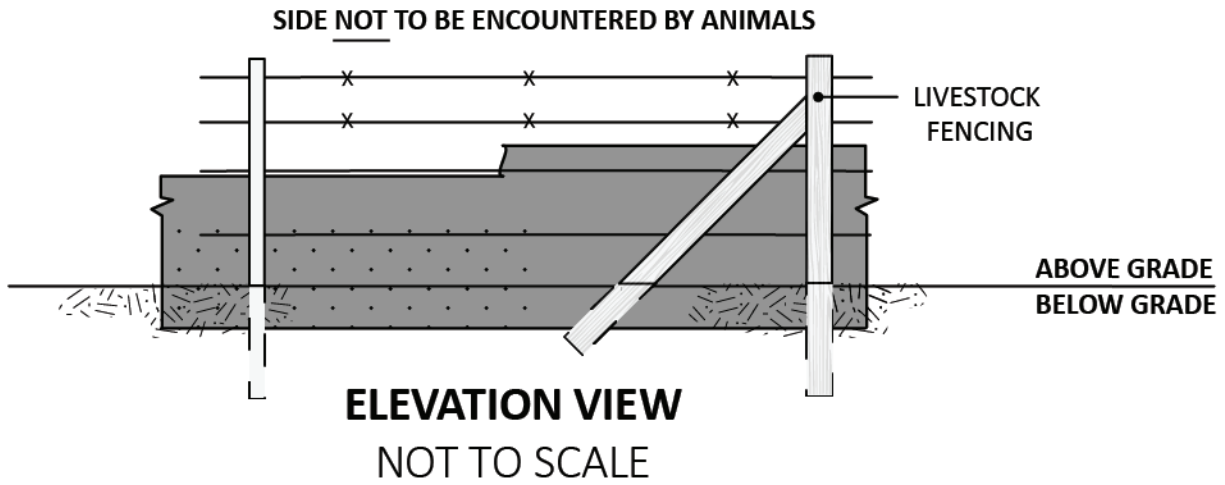
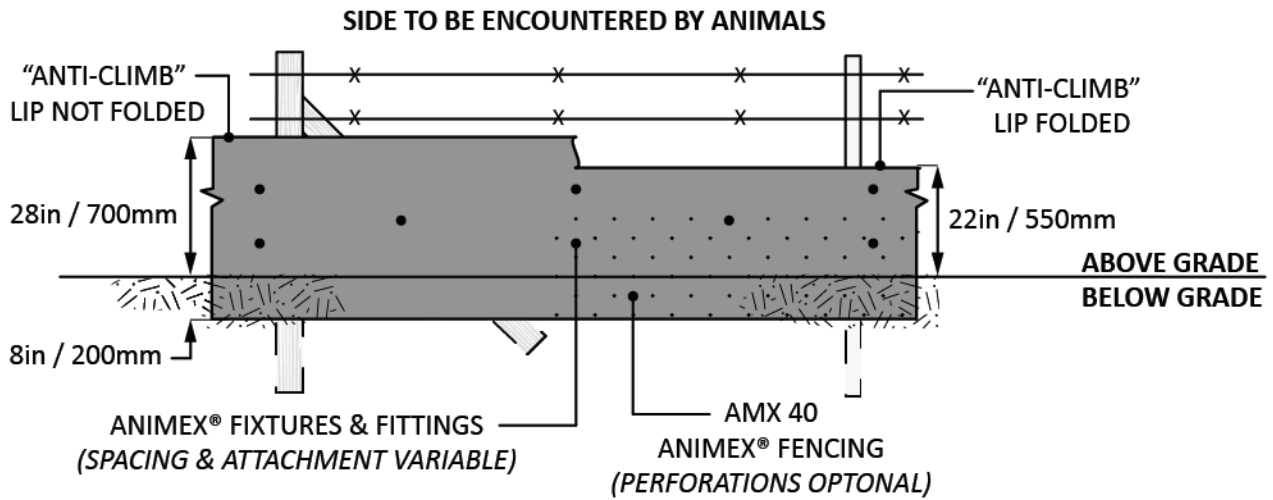
AMX 40

**AMX 40**  
Attached Livestock

**NOTES:**

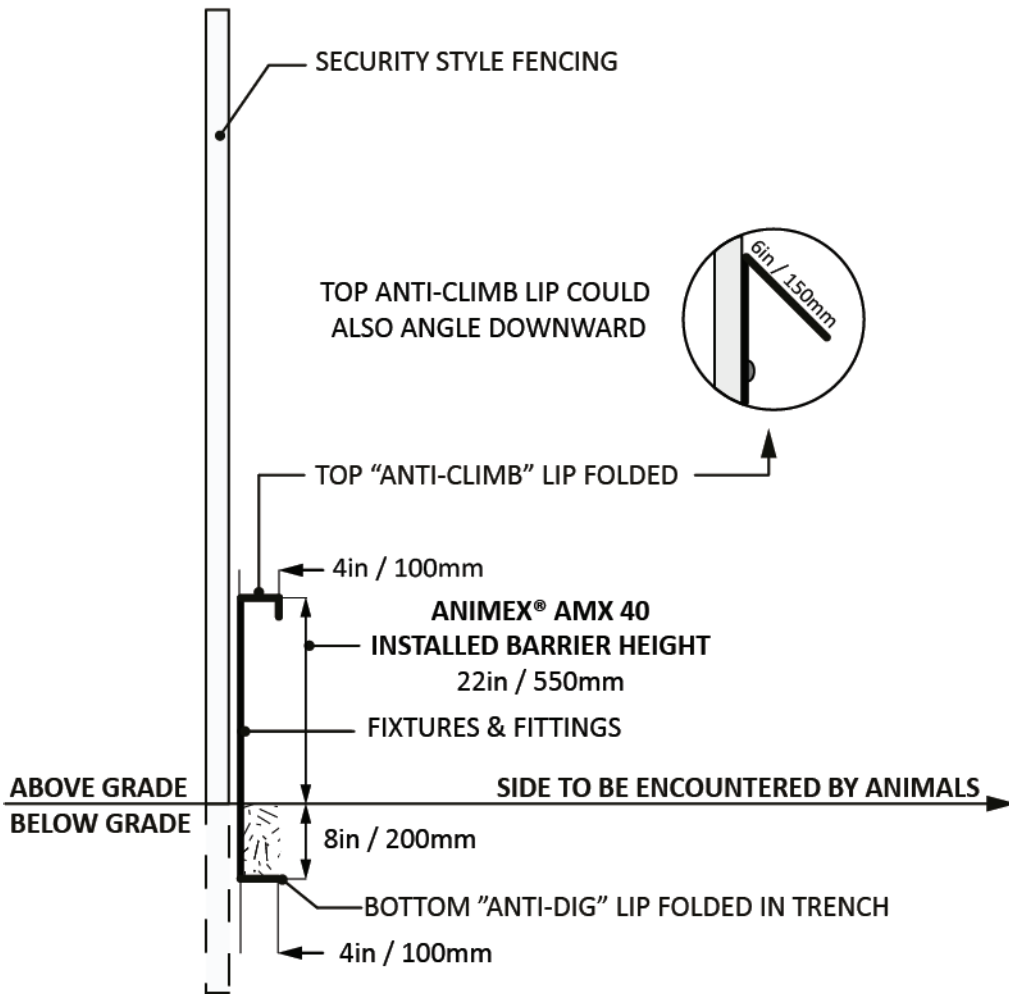
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

IF INSTALLING ABOVE GROUND REFER TO:  
**ABOVE GROUND PG.47**





# ● AMX 40 Attached Security



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

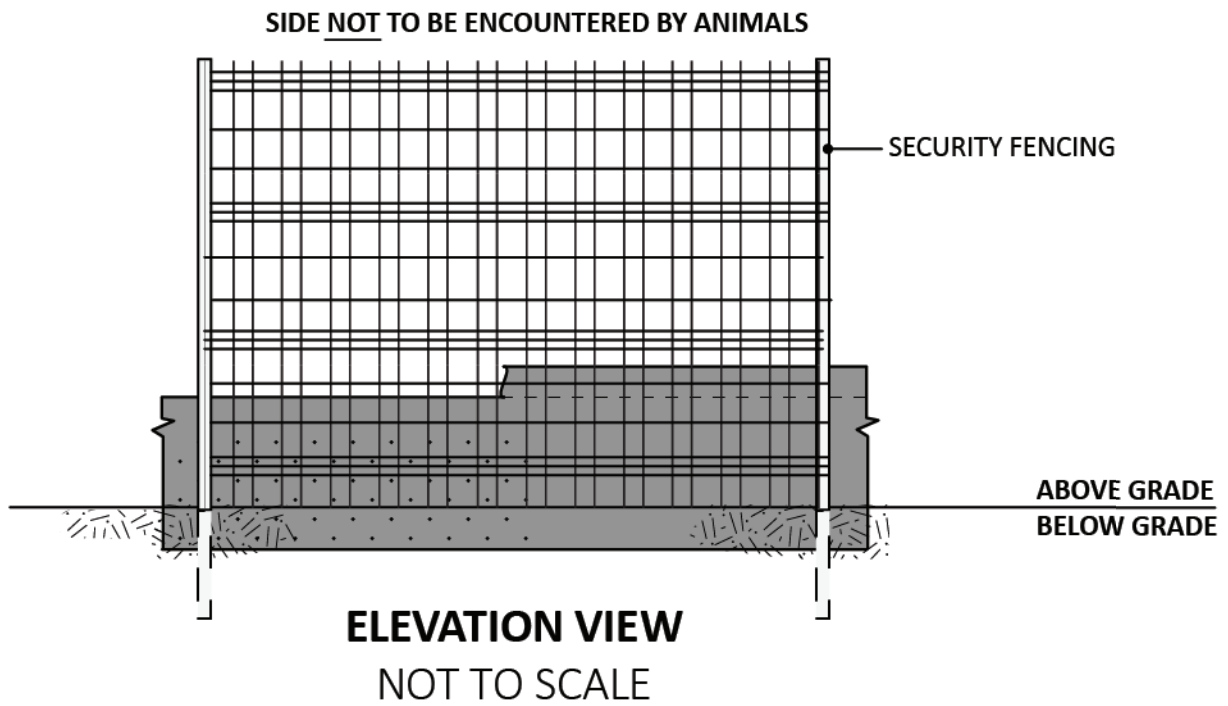
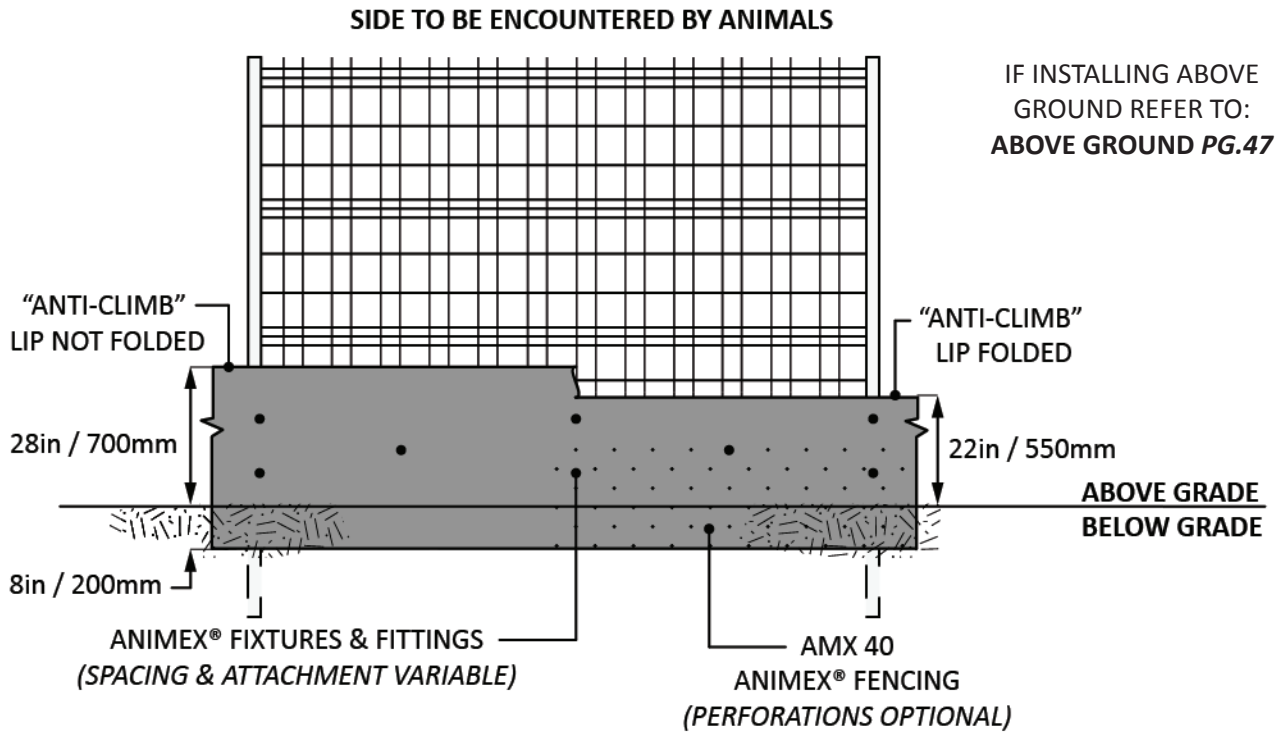
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 40

**AMX 40**  
Attached Security

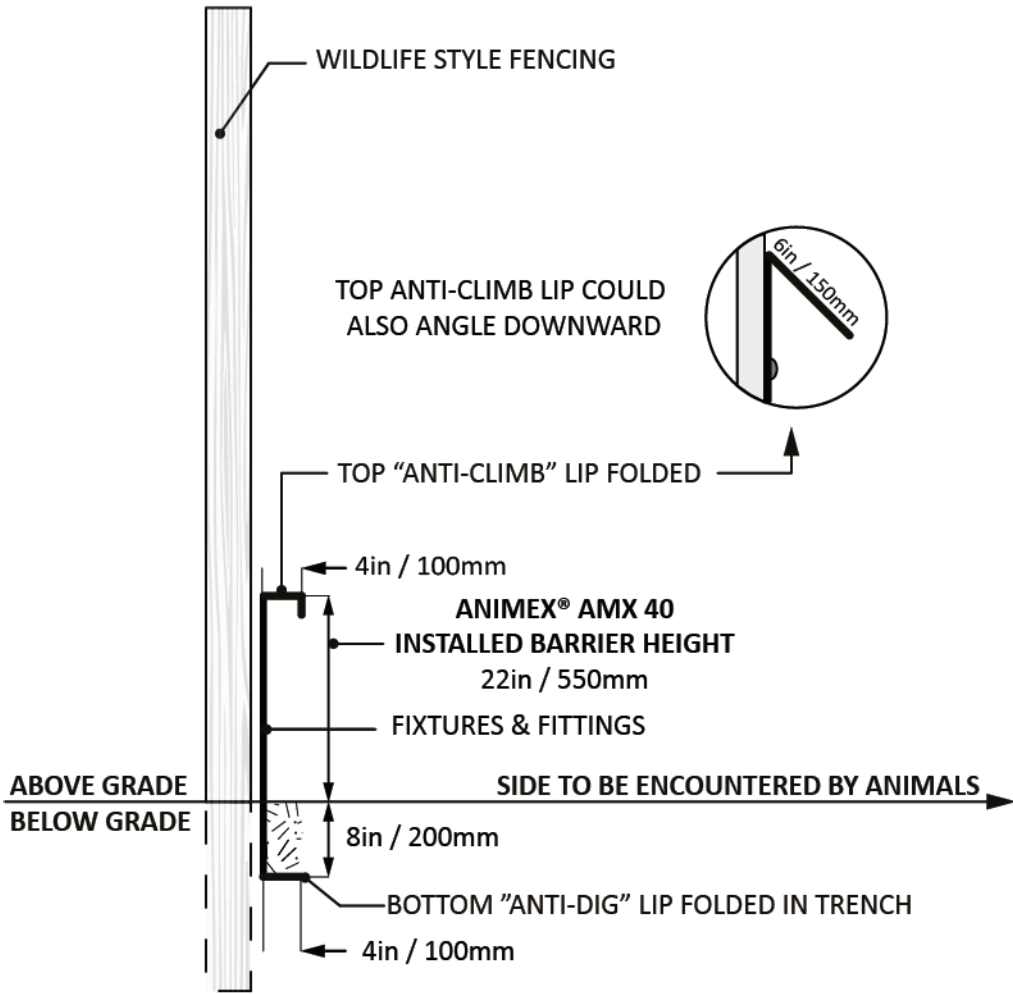
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 40

## Attached Large Wildlife



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

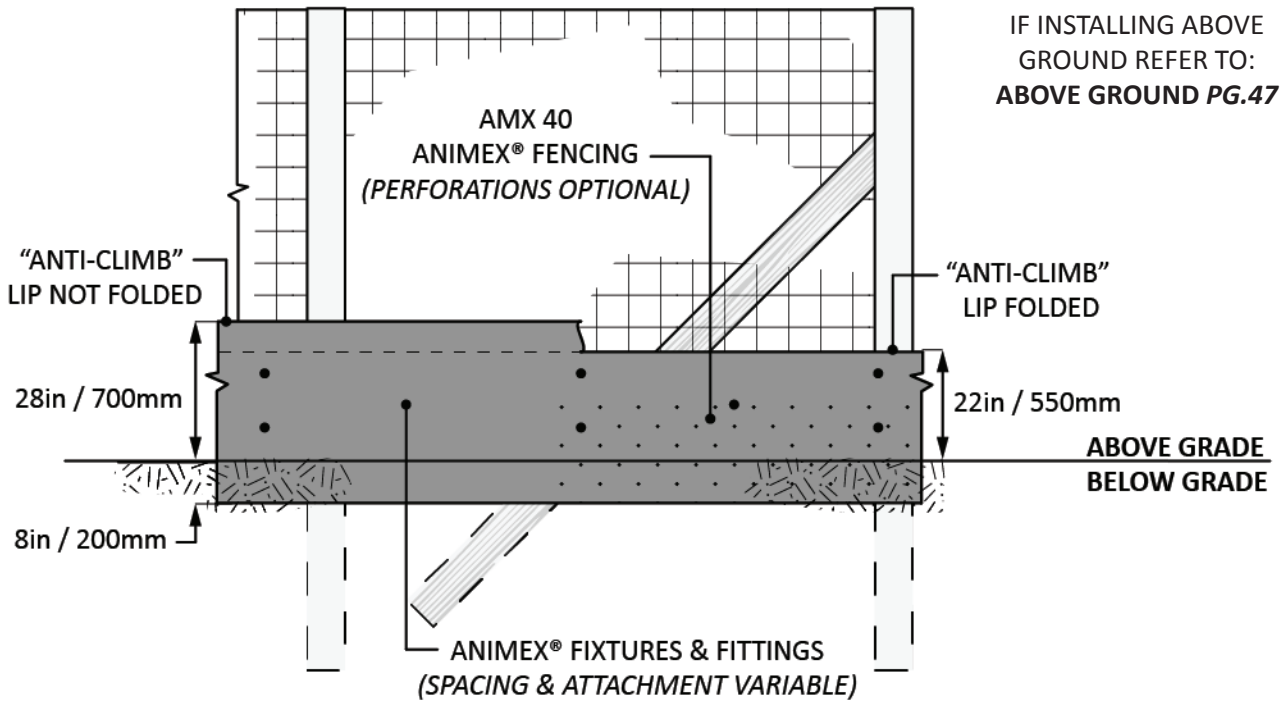
AMX 40

**AMX 40**  
Attached Security

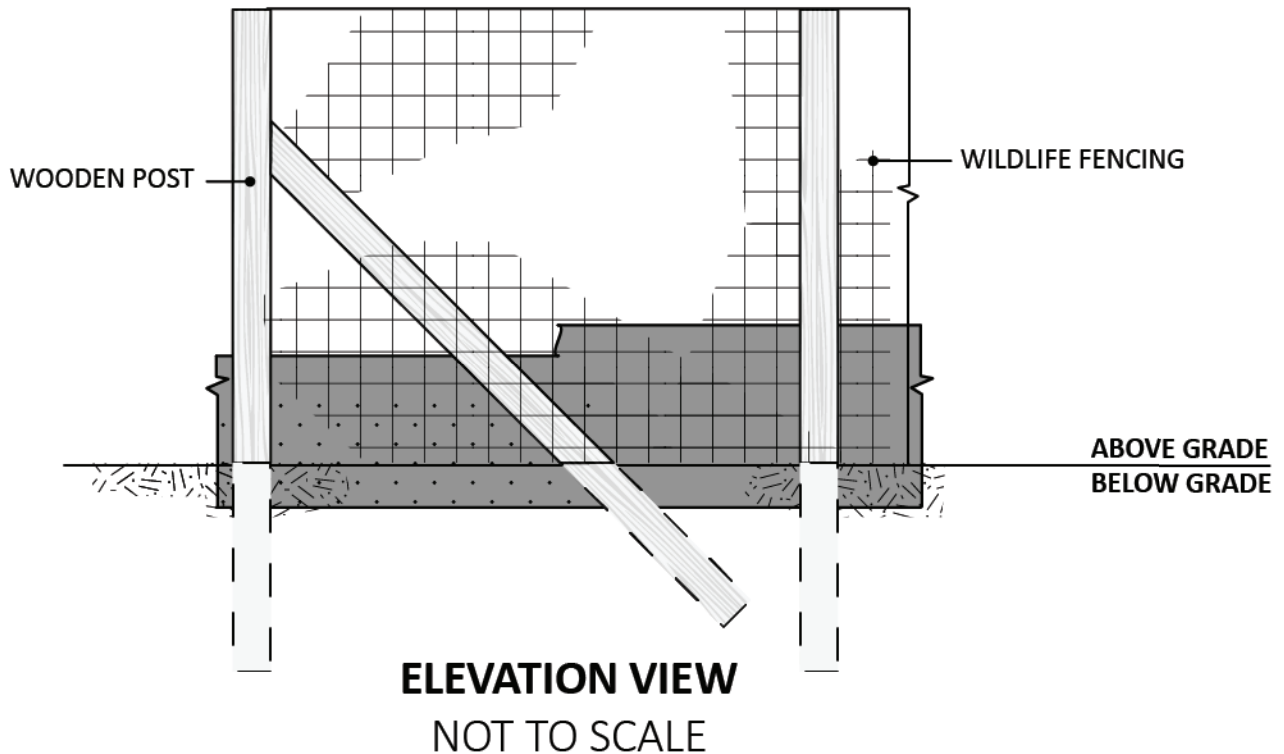
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**





# ● AMX 48

## Basic Material Size & Features

The length of each **AMX 48** section will vary depending on the material choice.

**AMX 48** dimensions based on popular optimal fencing materials (pg14):

### **SCORED PLASTIC** - PERFORATED & NON-PERFORATED

#### *Temporary Applications (AMX-T)*

Thickness: 0.04in / 1mm

Length: 60ft / 18.2m

Weight: 50lbs / 23kg

#### *Semi-Permanent Applications (AMX-SP)*

Thickness: 0.08in / 2mm

Length: 30ft / 9m

Weight: 48lbs / 23kg

### **PREFORMED METAL**- PERFORATED & NON-PERFORATED

#### *Permanent Applications (AMX-XP)*

Thickness: 0.08in / 2mm

Length: 8ft / 2.4m

Weight: 99lbs / 45kg

### **AMX 48 INSTALLED ABOVE GROUND HEIGHT: 30in / 750mm**

#### **Notes:**

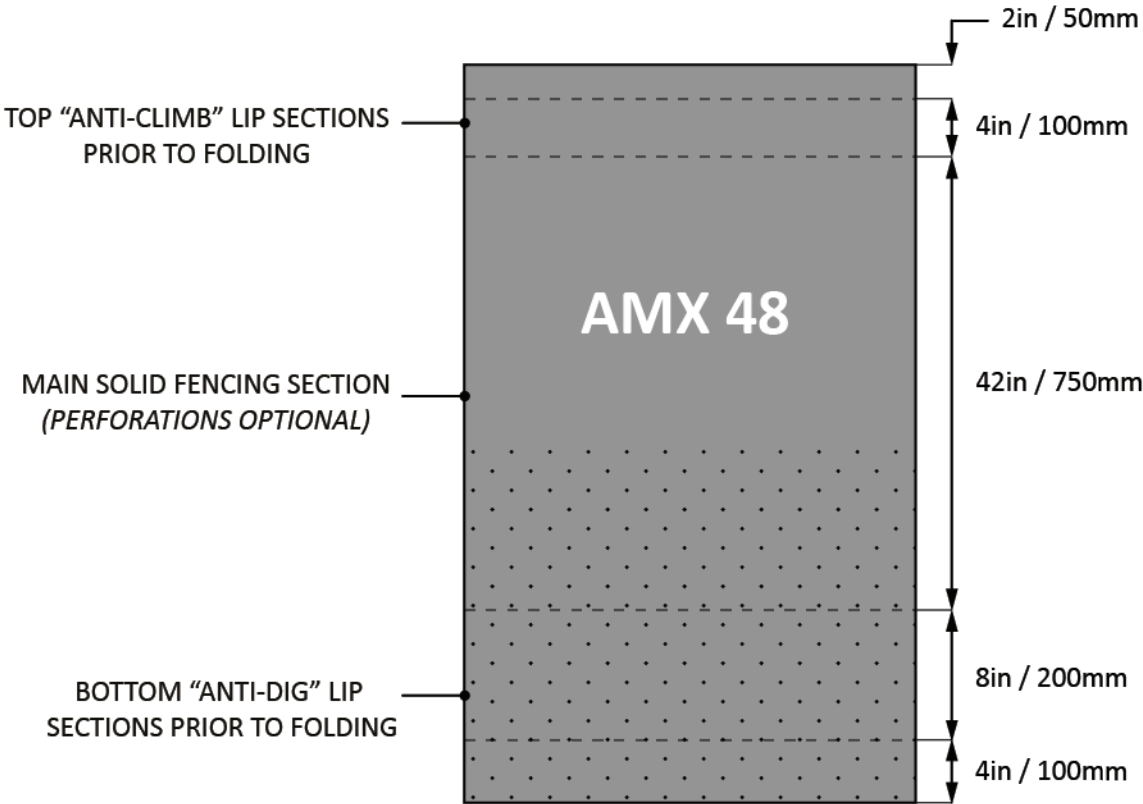
These dimensions are based on maximising the amount of material that can be shipped economically and manoeuvred on site in line with common health and safety guidelines.

Material may be shipped in sheets or rolls depending on their length.

Customised options for alternative **AMX48** barrier options are available from Animex® Fencing suppliers upon request. Other traditional and existing fencing materials including posts and wire etc can be obtained from local contractors.

**NOTES:**

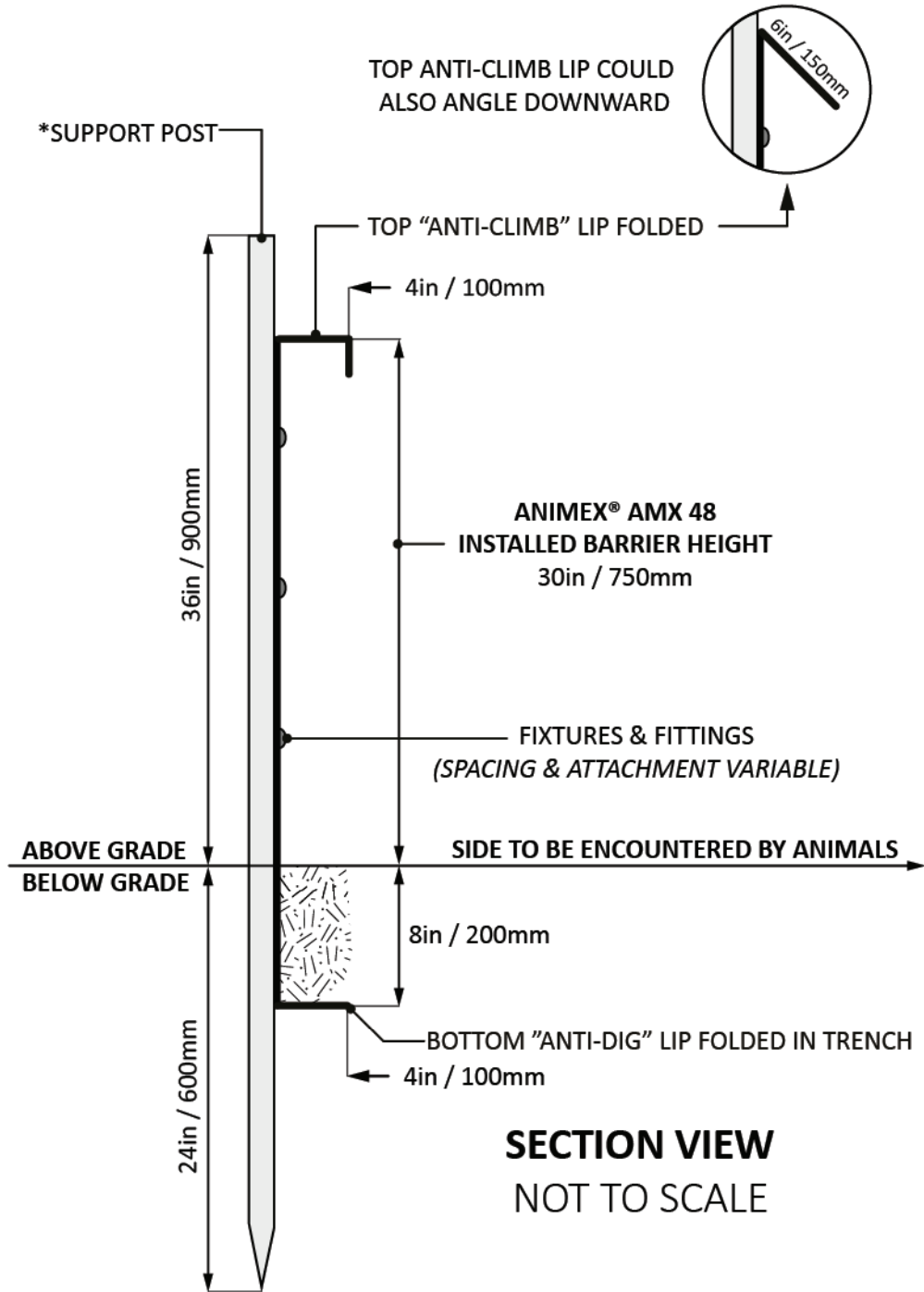
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 48

## Free-standing Below Ground

AMX 48



**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

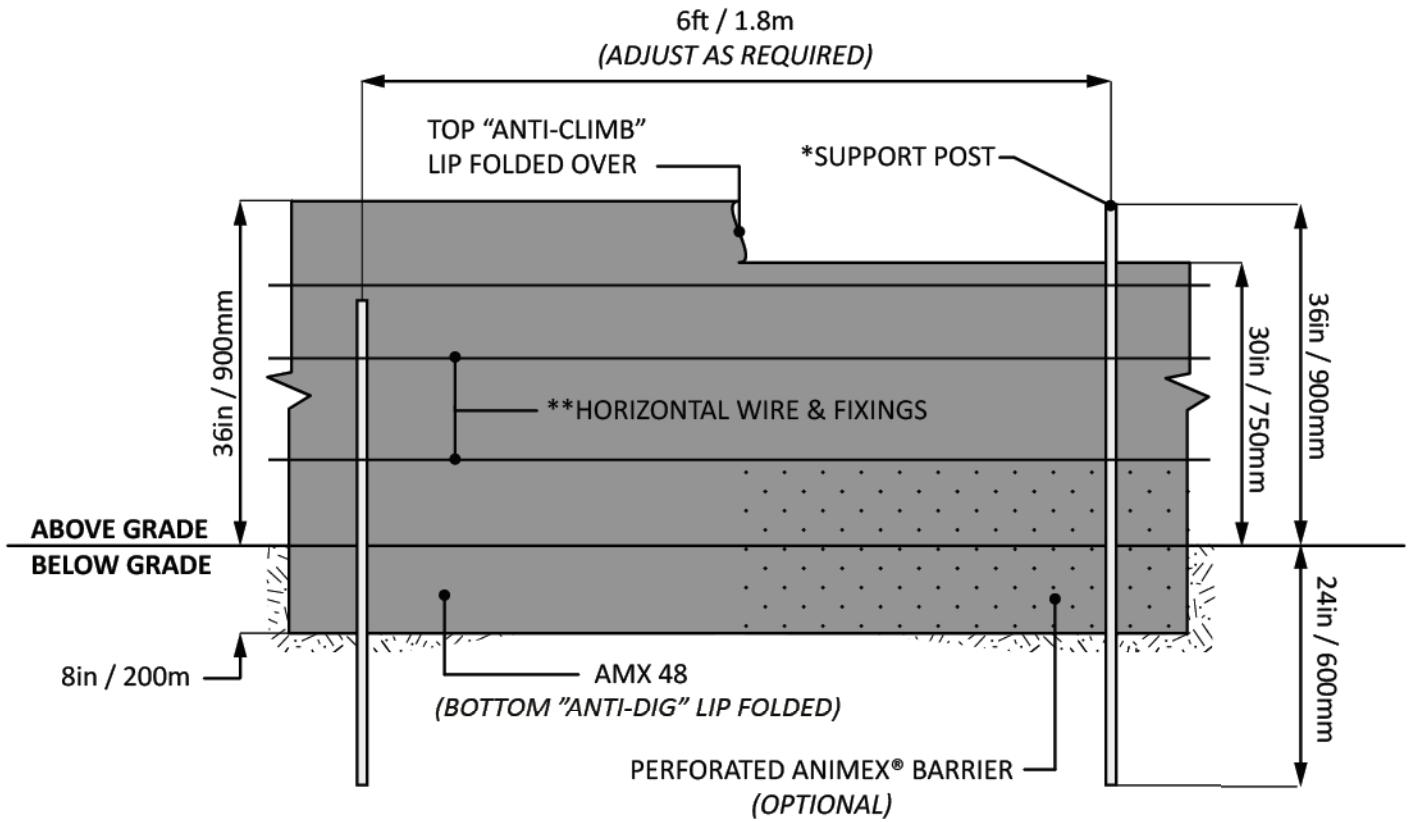
**AMX 48**  
Free-standing Below Ground

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES



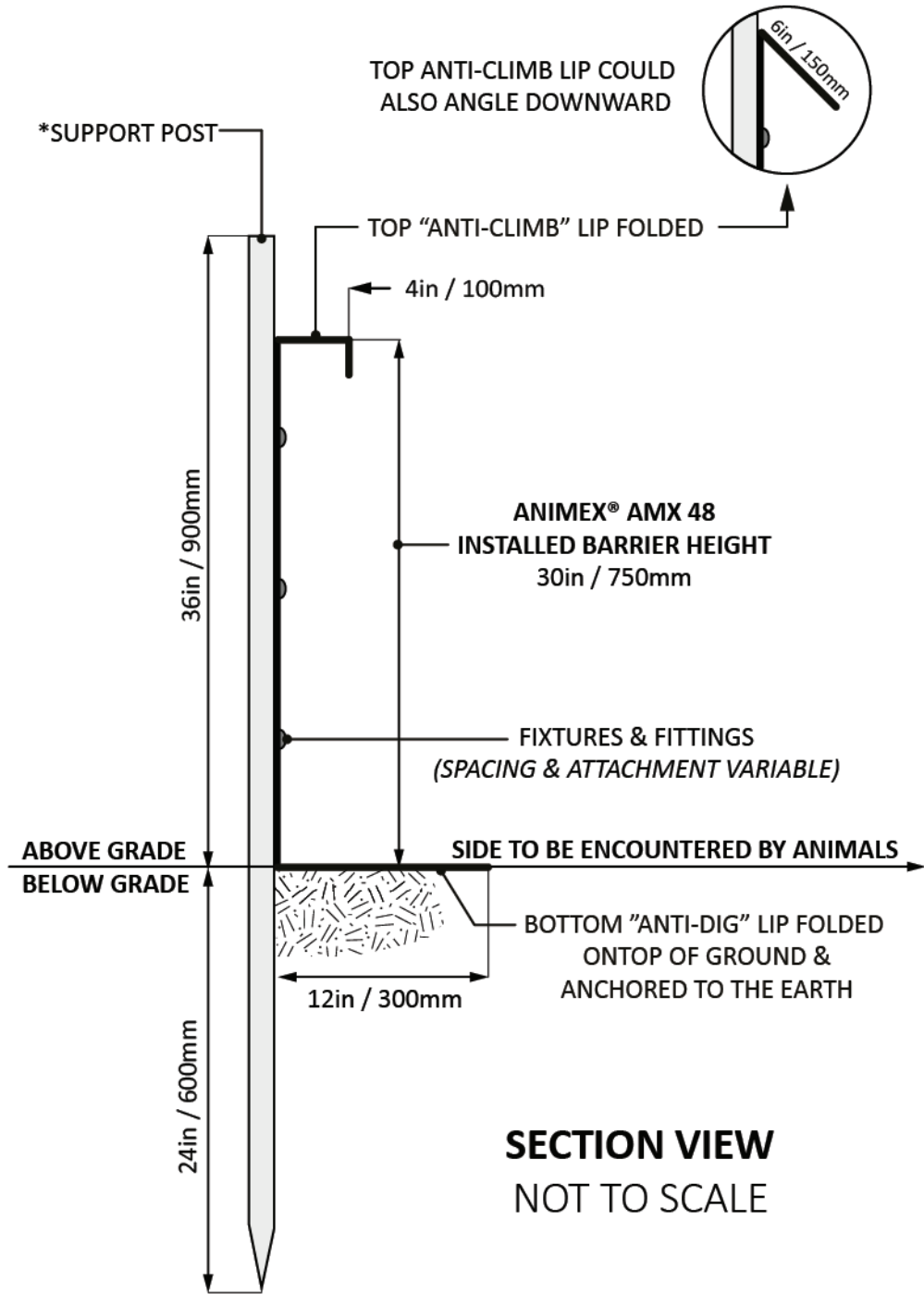
**ELEVATION VIEW**  
NOT TO SCALE



# ● AMX 48

## Free-standing Above Ground

AMX 48



### SECTION VIEW NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**AMX 48**  
Free-standing Above Ground

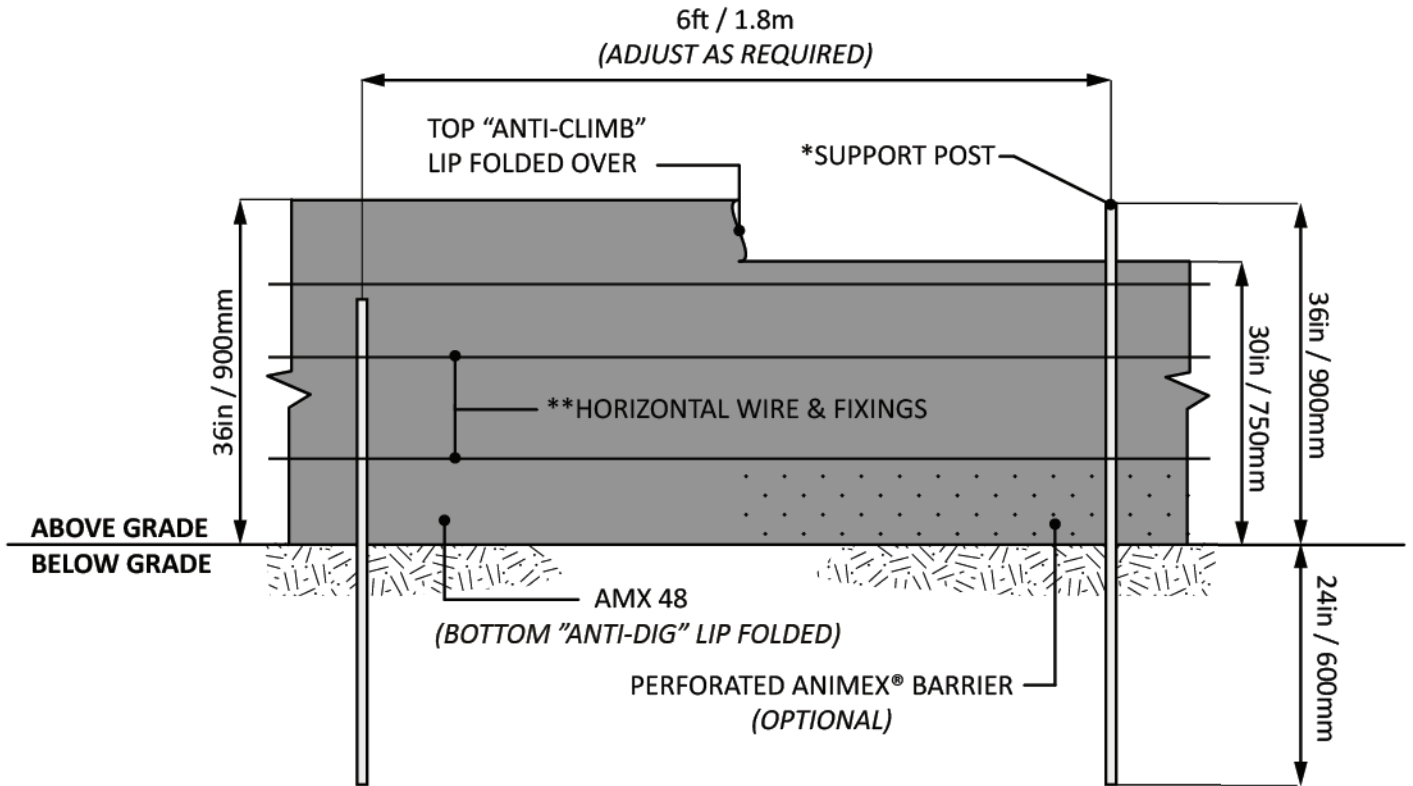
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**APPLY THIS ABOVE GROUND METHOD  
WHEN ATTACHING TO EXISTING  
FENCE TYPES AS WELL**

\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

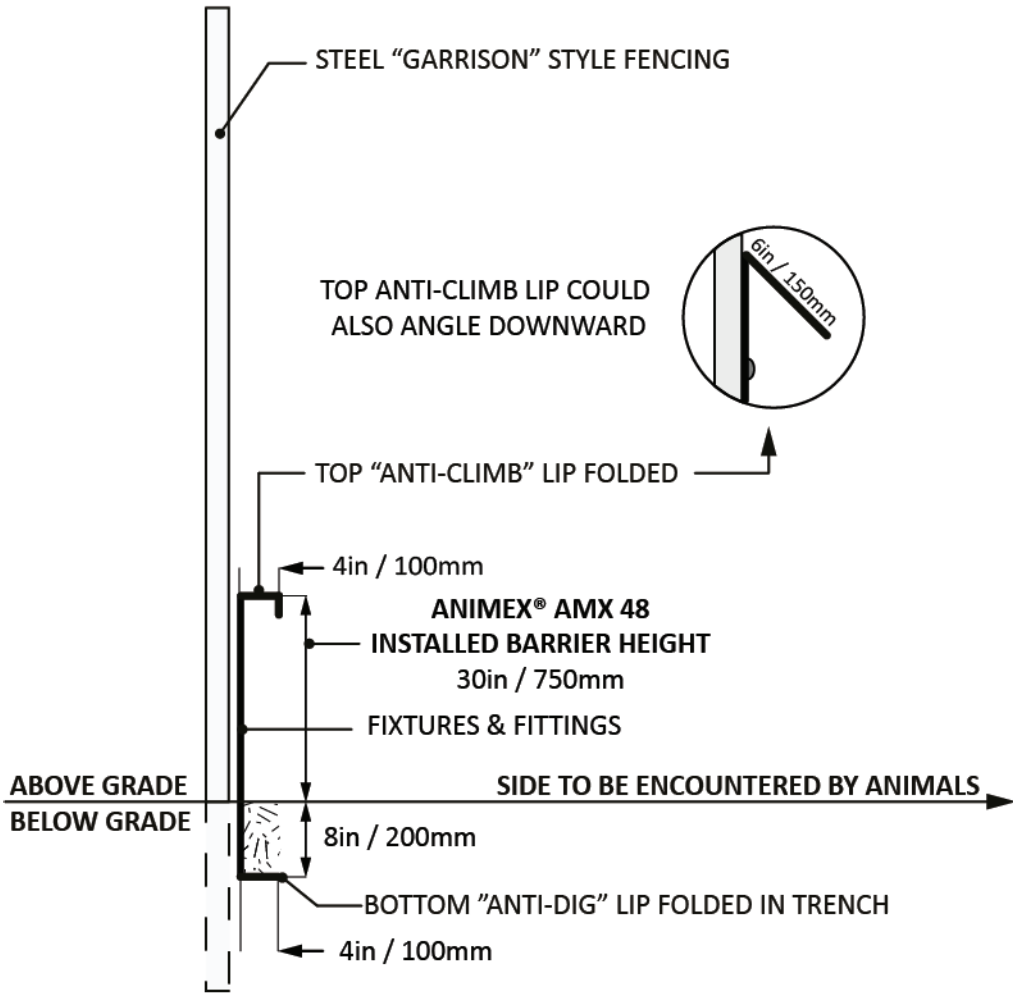
\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES



**ELEVATION VIEW**  
NOT TO SCALE

# ● AMX 48

## Attached Garrison



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

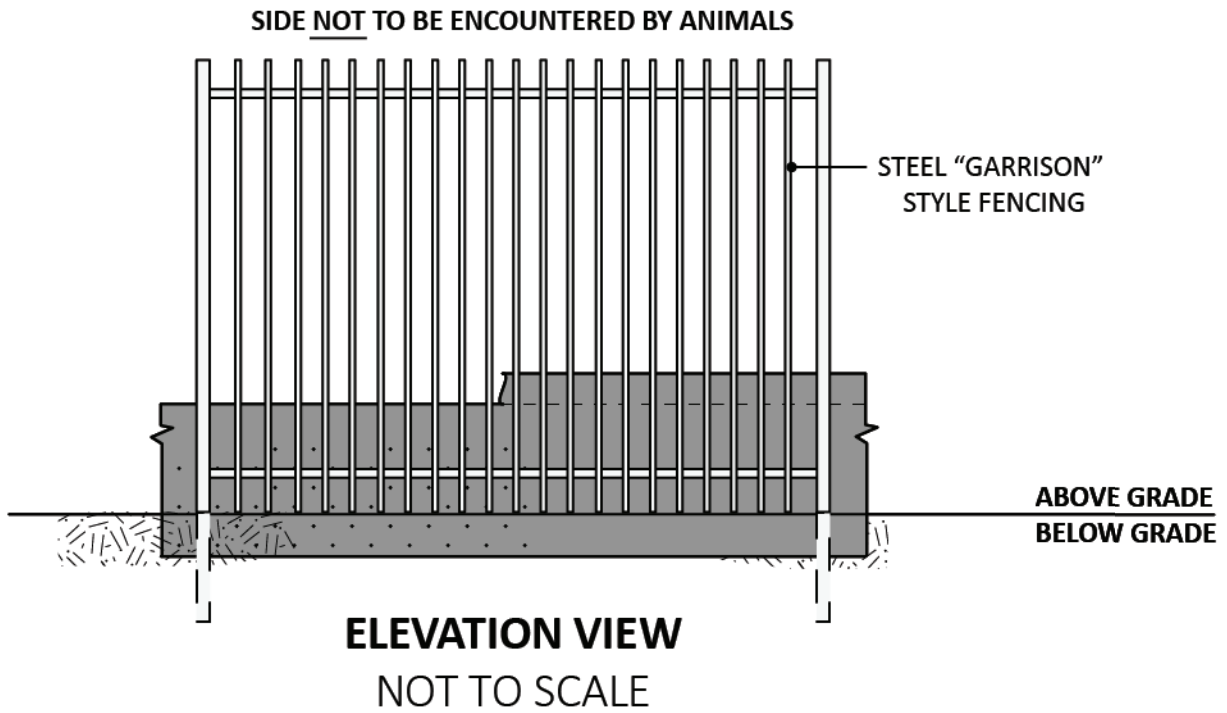
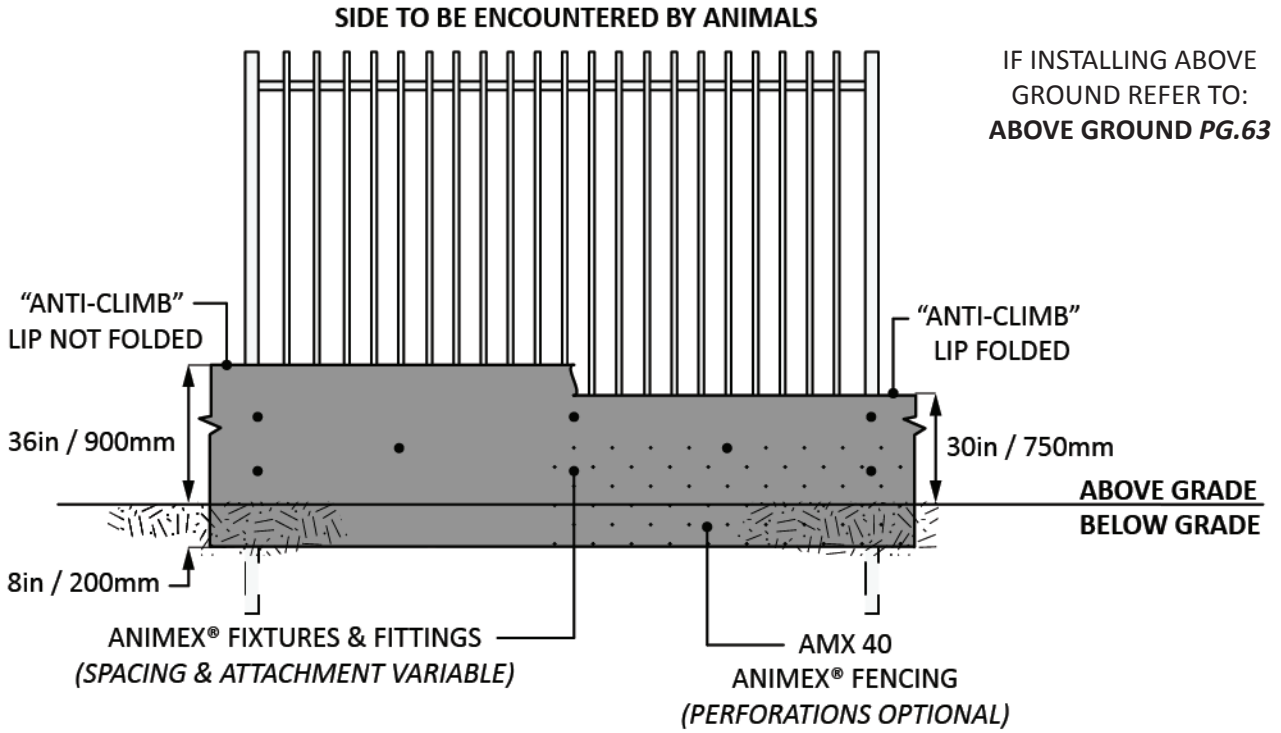
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 48

**AMX 48**  
Attached Garrison

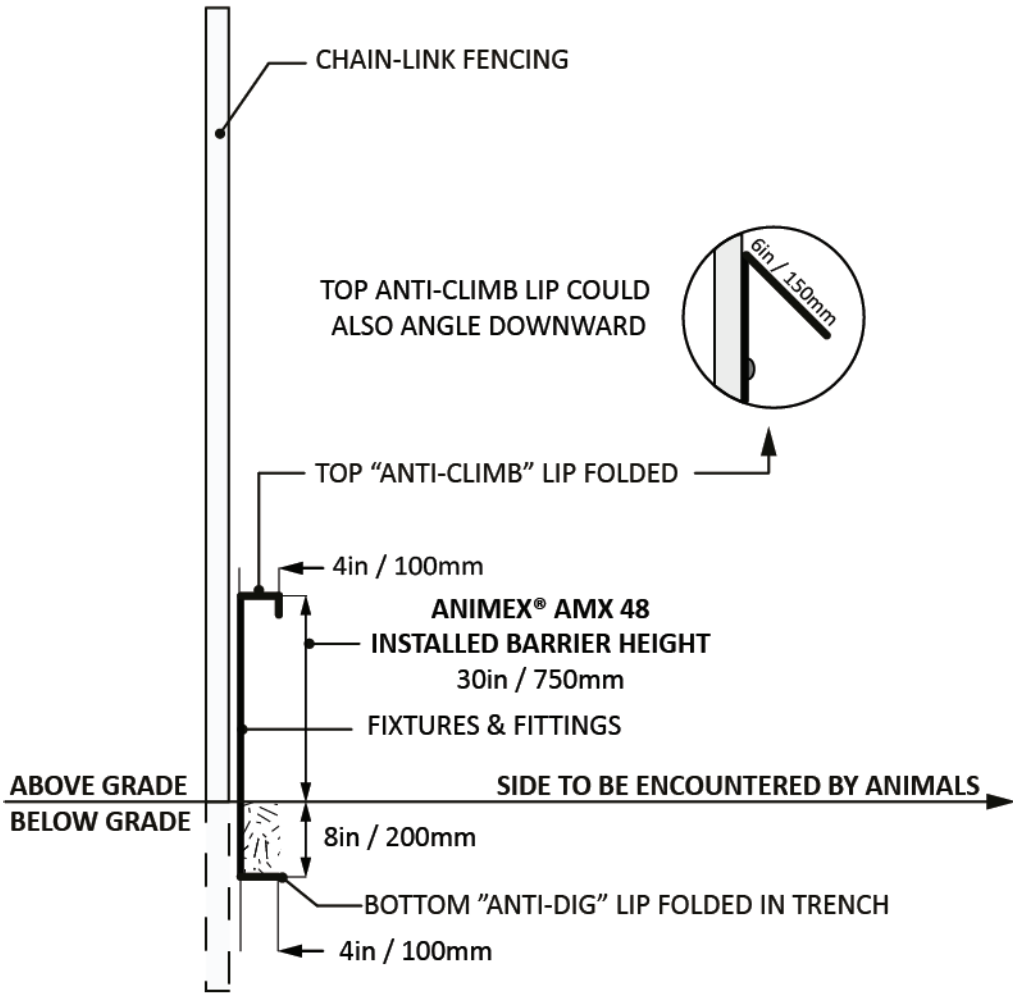
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 48

## Attached Chain-link



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 48

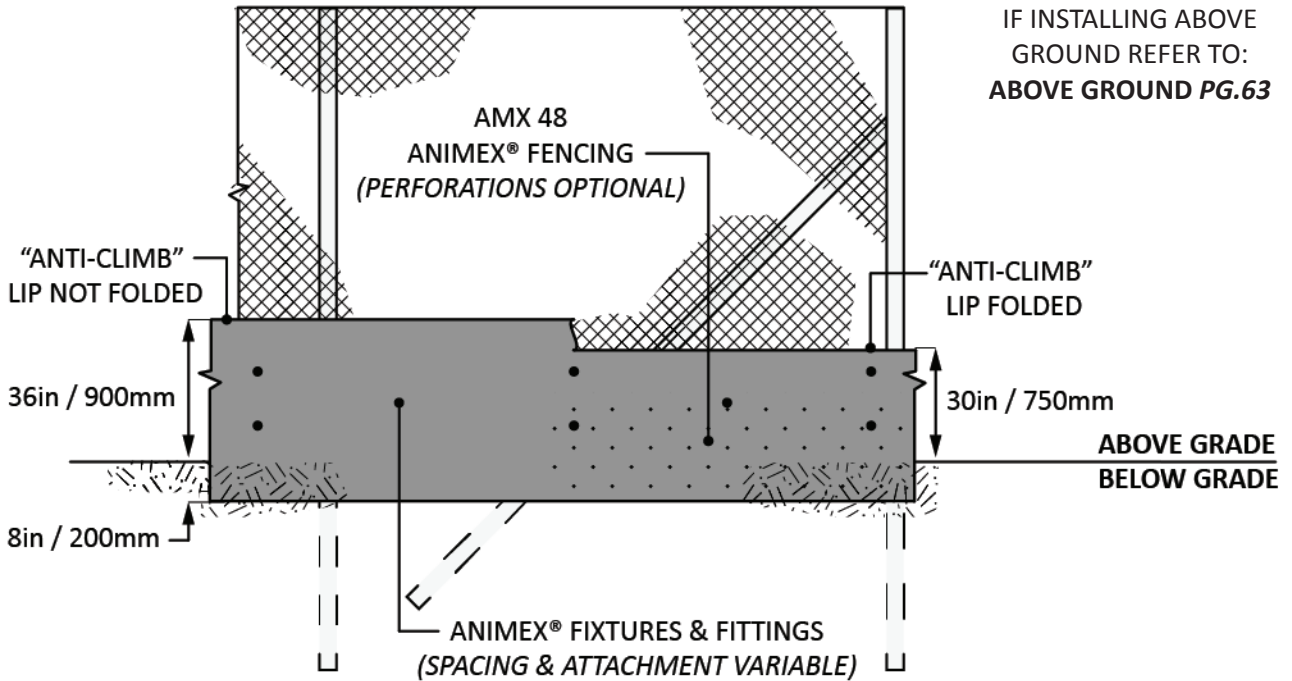
**AMX 48**  
Attached Chain-link



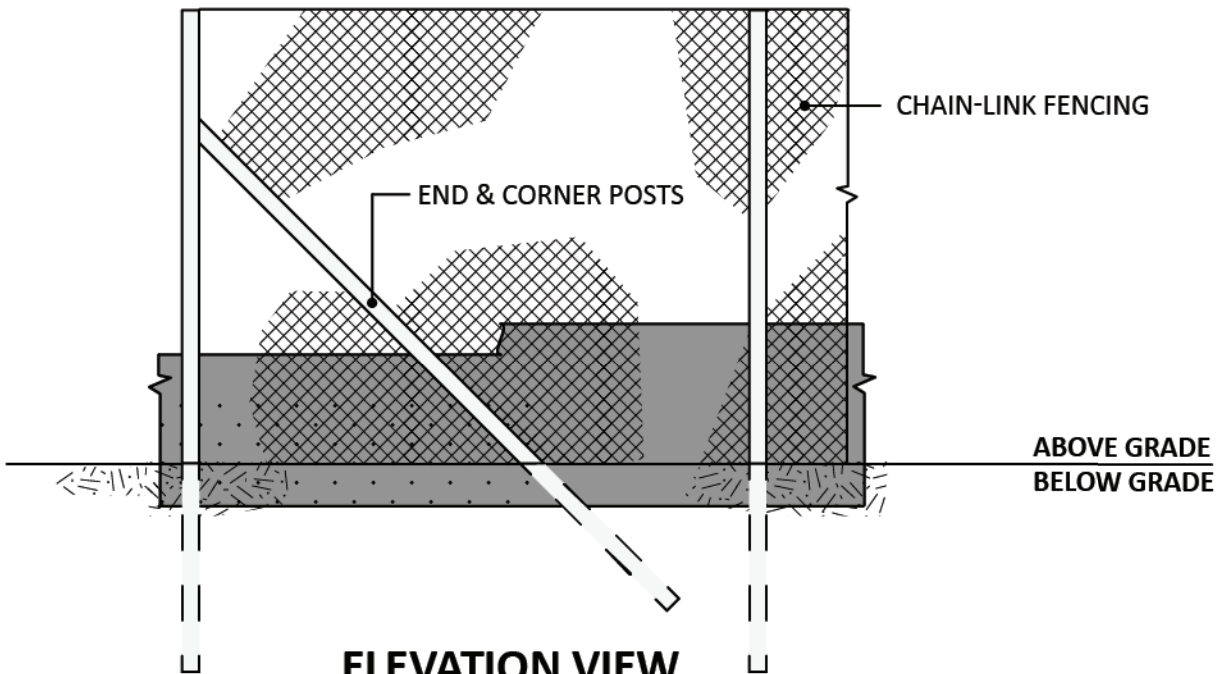
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



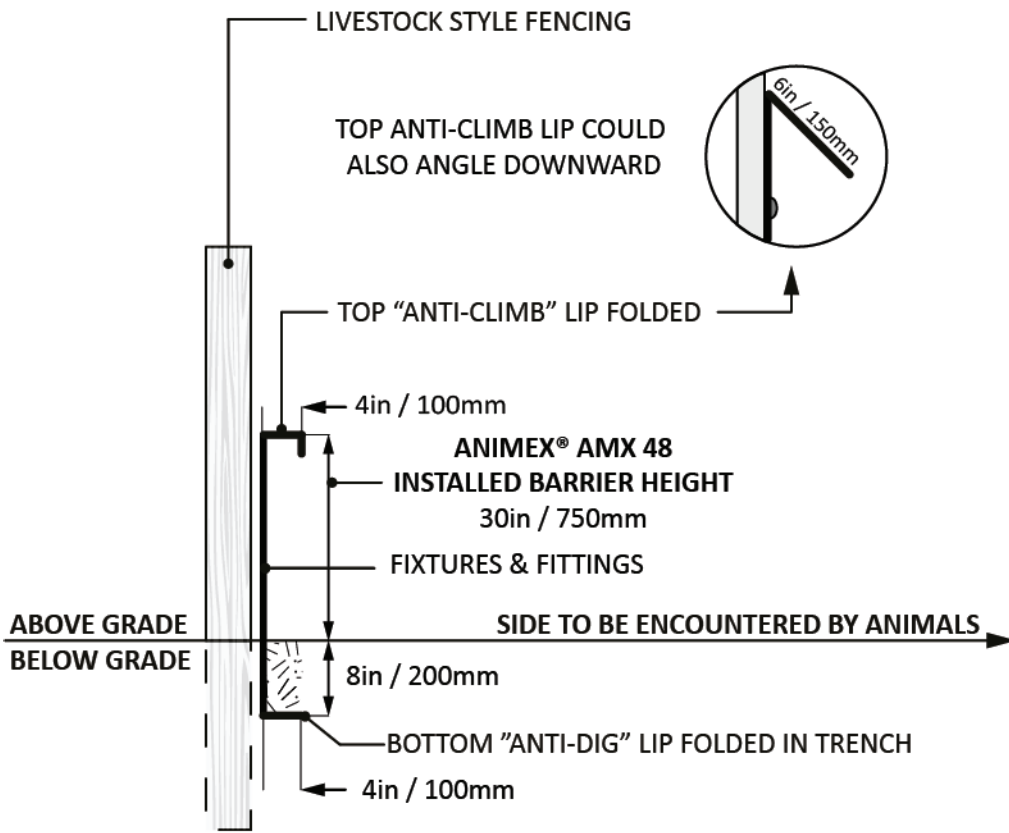
**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**



**ELEVATION VIEW**  
NOT TO SCALE

# ● AMX 48

## Attached Live Stock



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

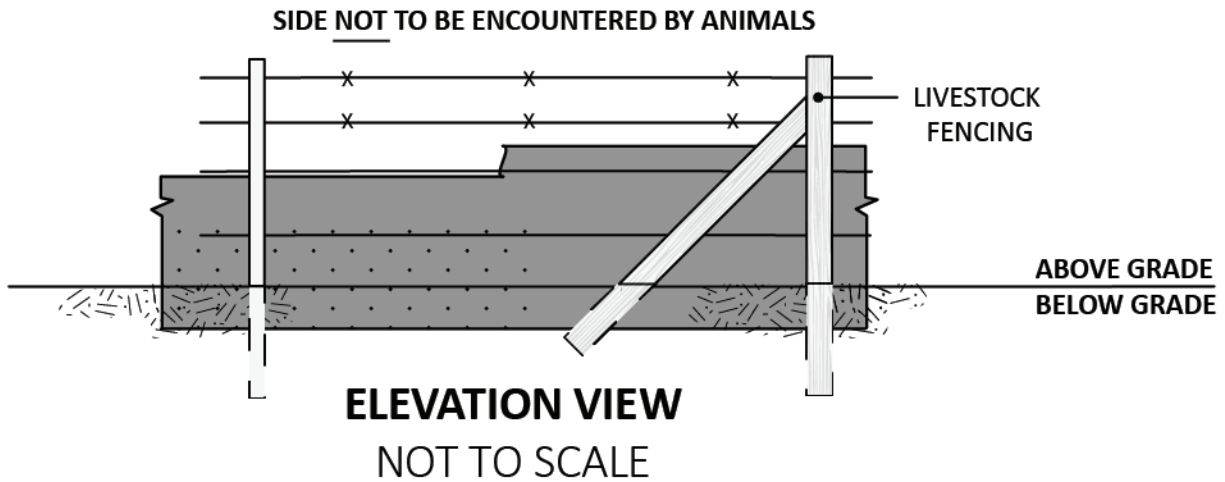
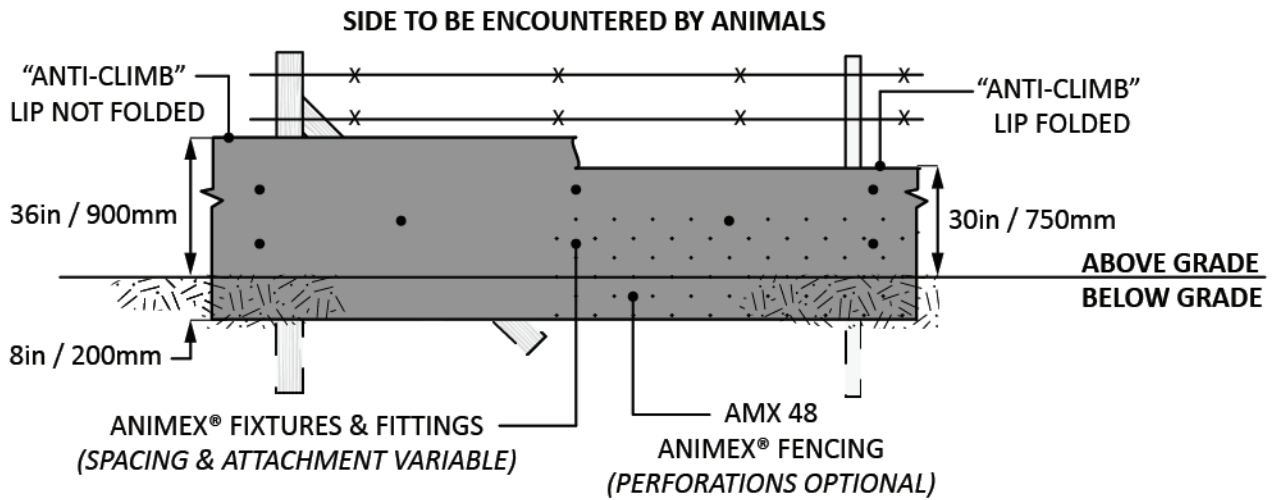
AMX 48

**AMX 48**  
Attached Livestock

**NOTES:**

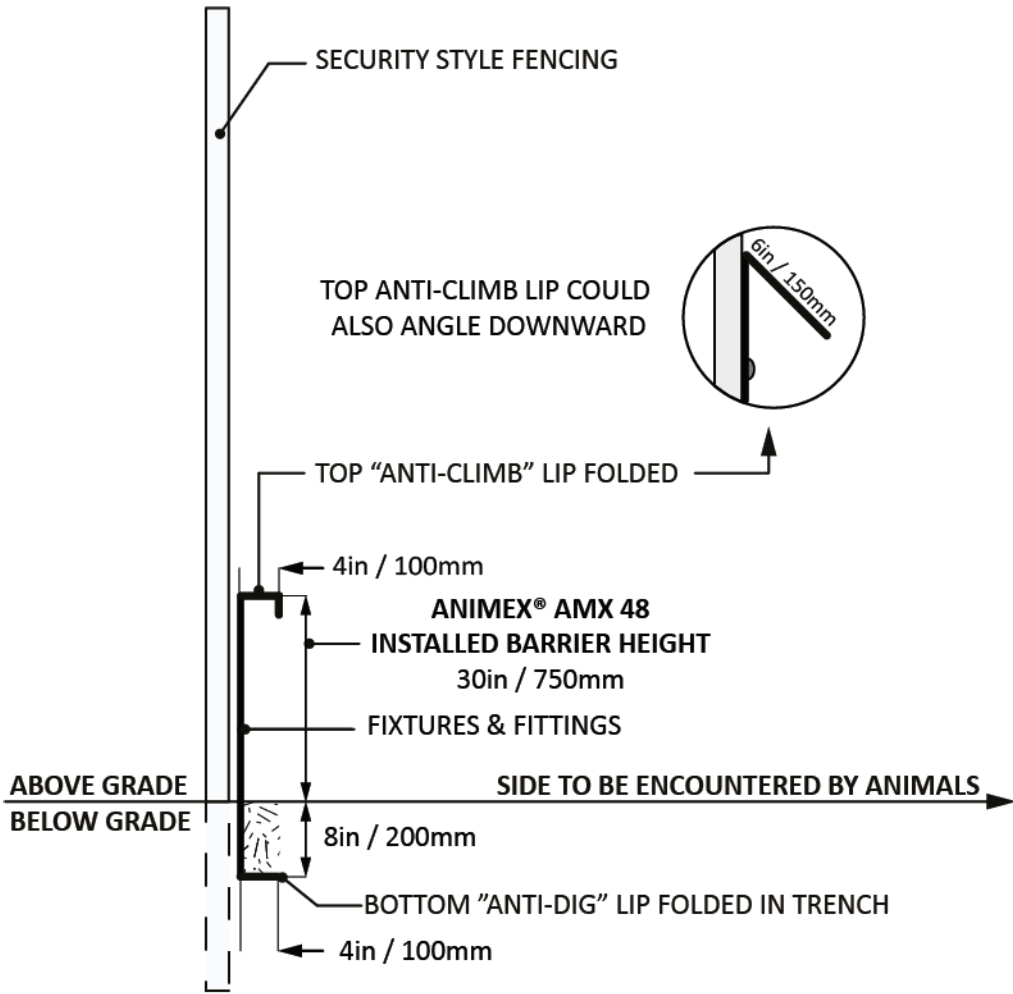
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

IF INSTALLING ABOVE  
GROUND REFER TO:  
**ABOVE GROUND PG.63**



# ● AMX 48

## Attached Security



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

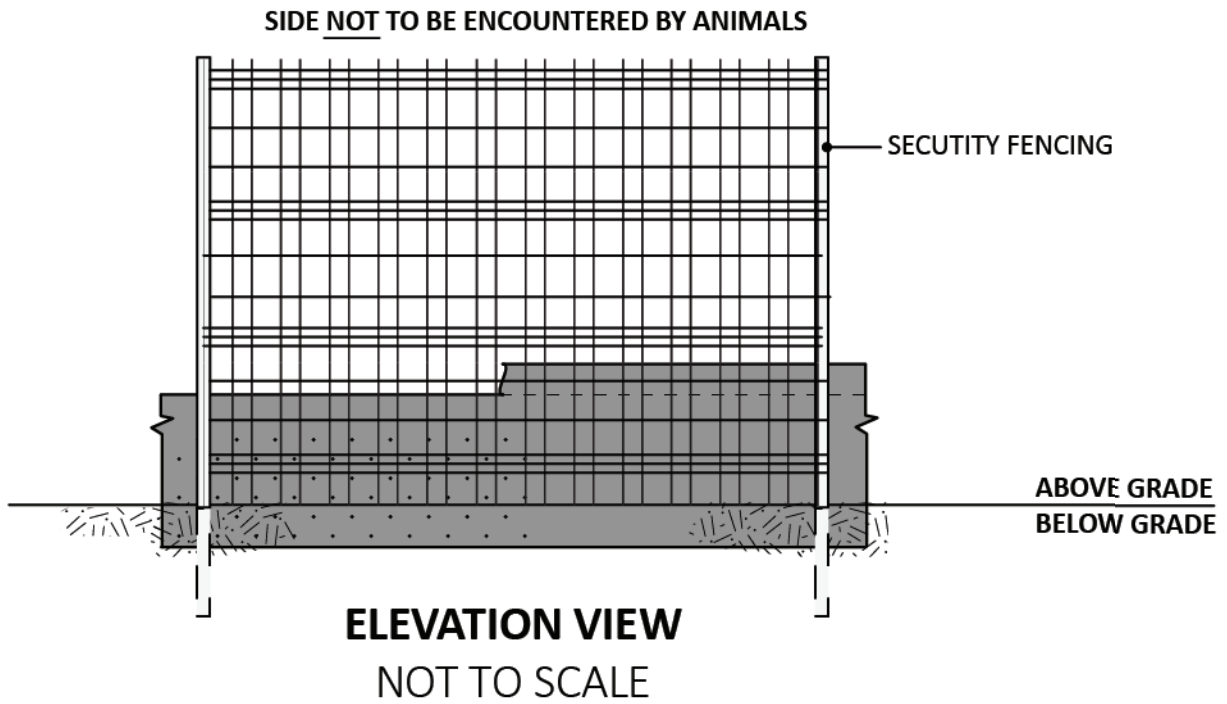
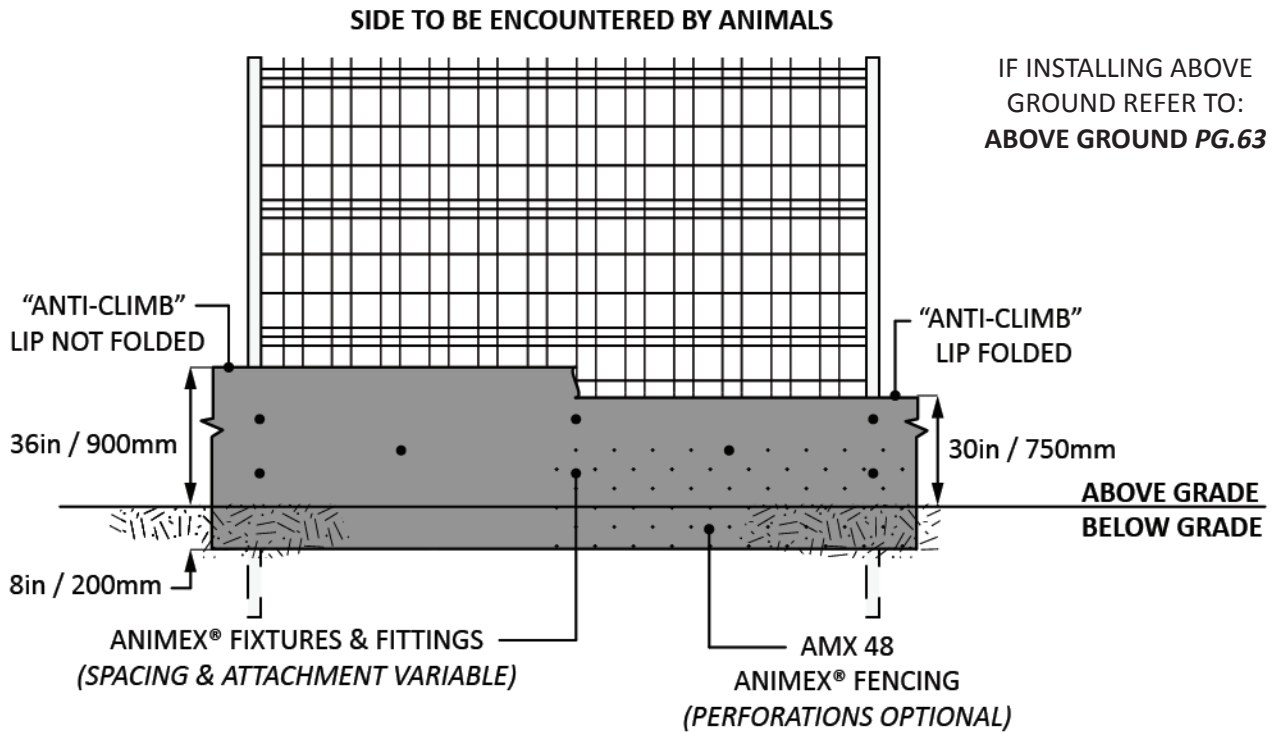
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 48

**AMX 48**  
Attached Security

**NOTES:**

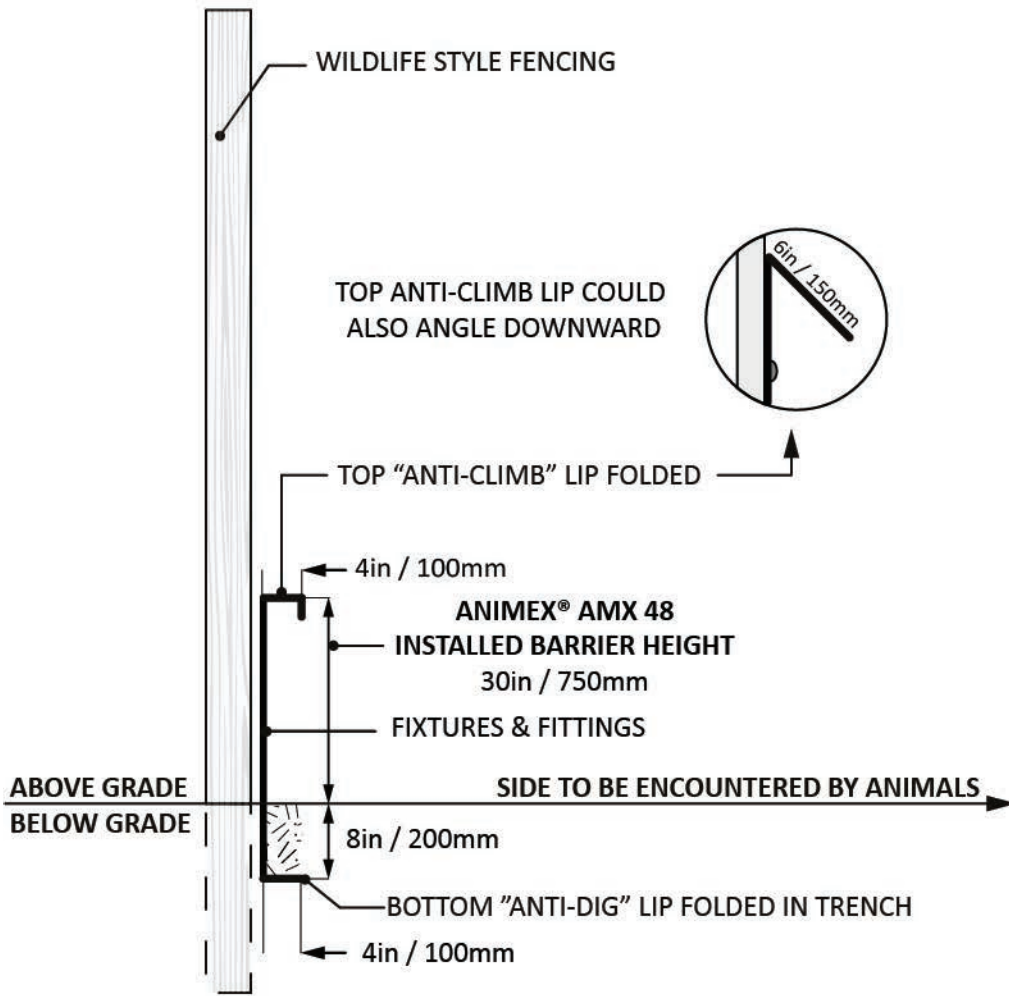
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.





# ● AMX 48

## Attached Large Wildlife



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

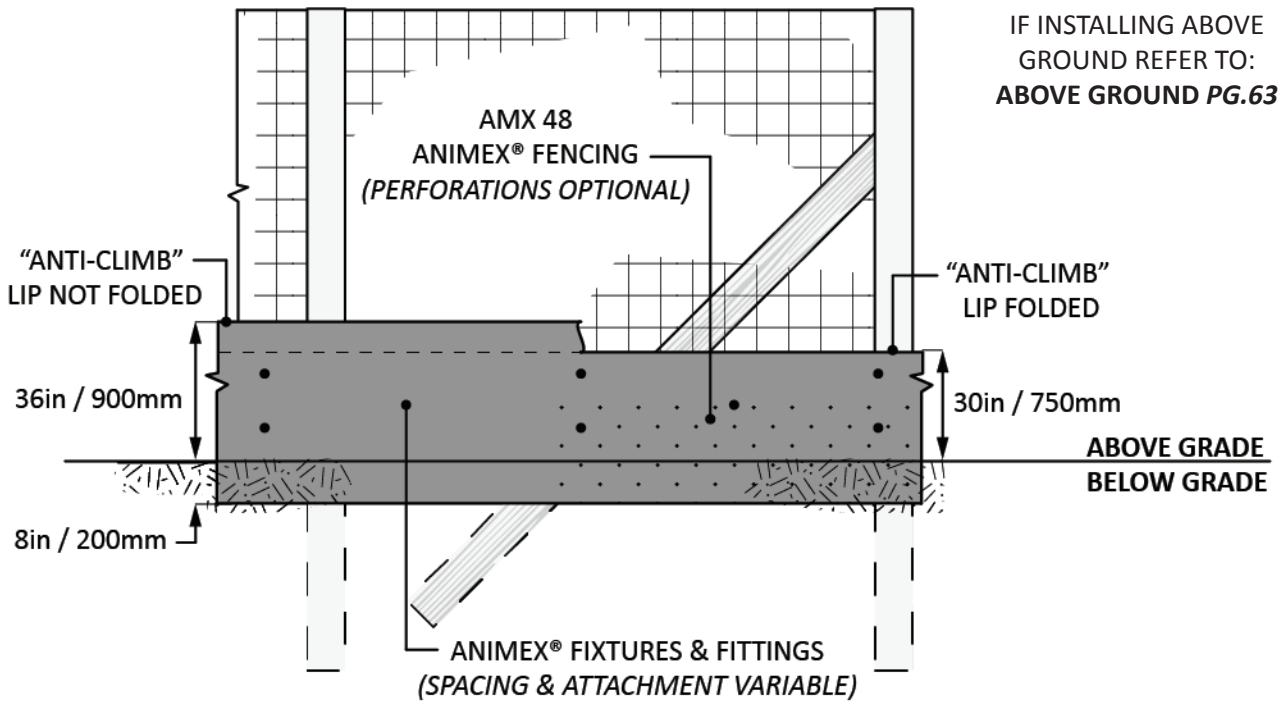
AMX 48

**AMX 48**  
Attached Wildlife

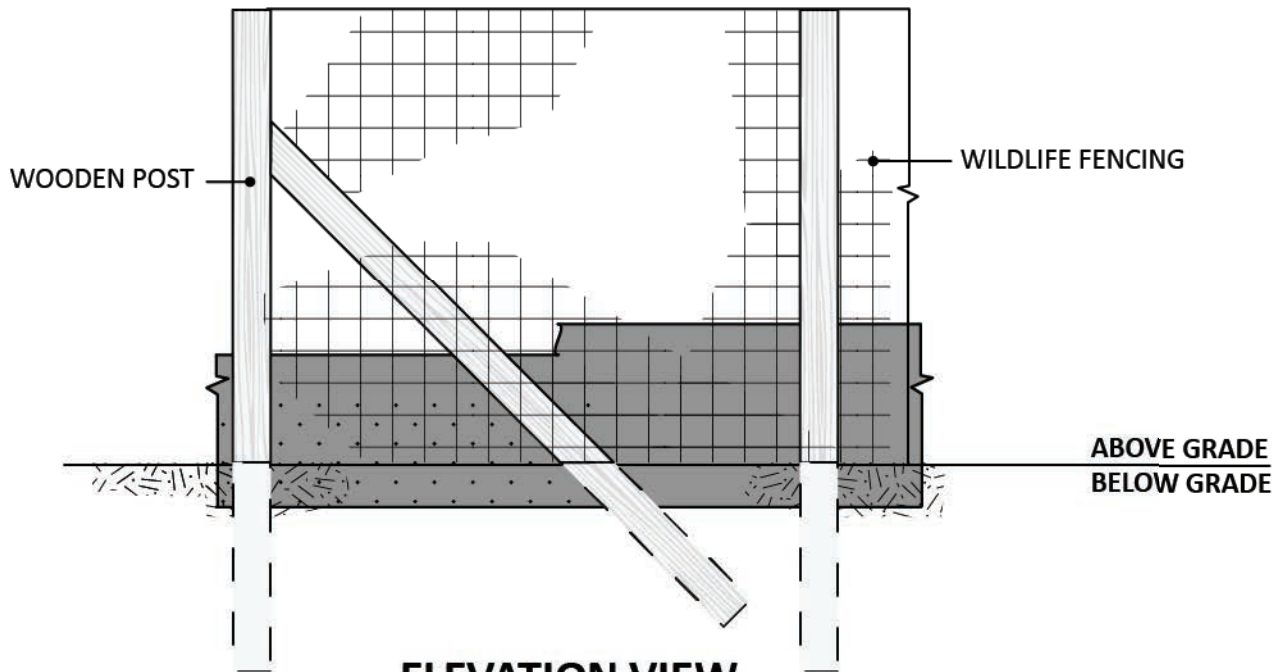
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**



# ● AMX 60

## Basic Material Size & Features

The length of each **AMX 60** section will vary depending on the material choice.

**AMX 60** dimensions based on popular optimal fencing materials (pg14):

### **SCORED PLASTIC** - PERFORATED & NON-PERFORATED

#### *Temporary Applications (AMX-T)*

Thickness: 0.04in / 1mm

Length: 50ft / 15m

Weight: 50lbs / 23kg

#### *Permanent Applications (AMX-SP)*

Thickness: 0.08in / 2mm

Length: 20ft / 6m

Weight: 42lbs / 19kg

### **PREFORMED METAL**- PERFORATED & NON-PERFORATED

#### *Permanent Applications (AMX-XP)*

Thickness: 0.08in / 2mm

Length: 8ft / 2.4m

Weight: 116lbs / 53kg

**AMX 60 INSTALLED ABOVE GROUND HEIGHT: 42in / 1050mm**

#### **Notes:**

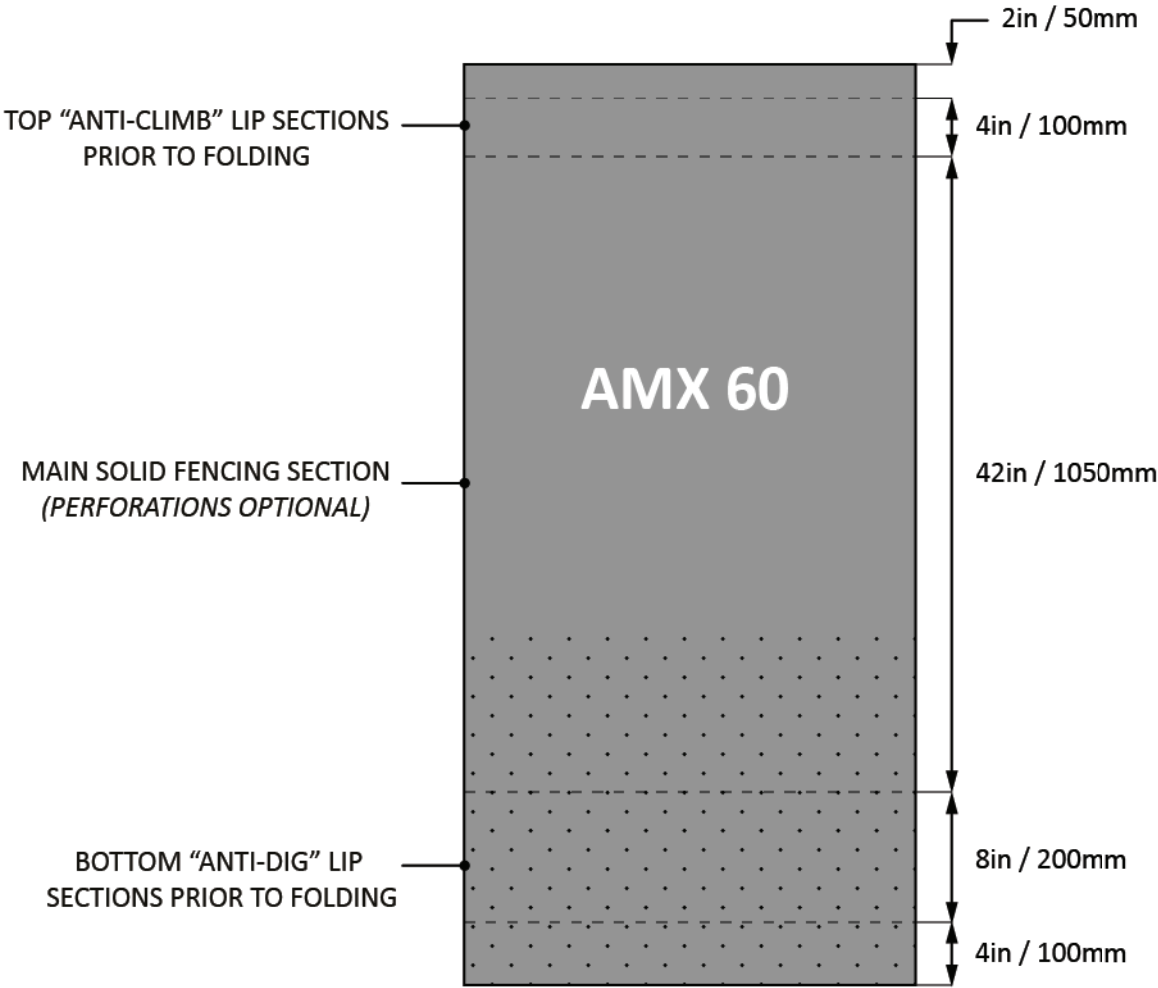
These dimensions are based on maximising the amount of material that can be shipped economically and manoeuvred on site in line with common health and safety guidelines.

Material may be shipped in sheets or rolls depending on their length.

Customised options for alternative **AMX 60** barrier options are available from Animex® Fencing suppliers upon request. Other traditional and existing fencing materials including posts and wire etc can be obtained from local contractors.

**NOTES:**

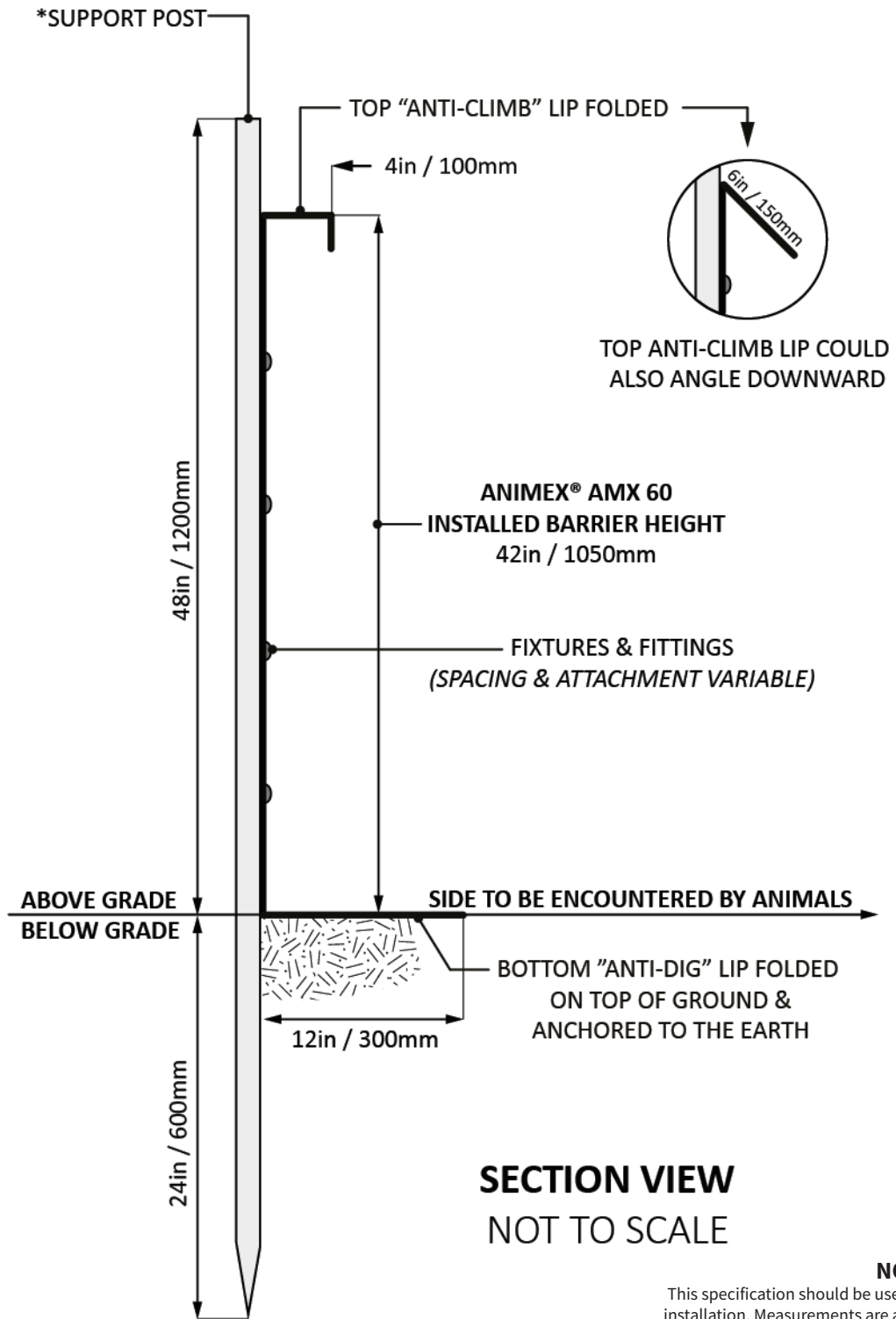
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# ● AMX 60

## Free-standing Below Ground

AMX 60



**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**AMX 60**  
Free-standing Below Ground



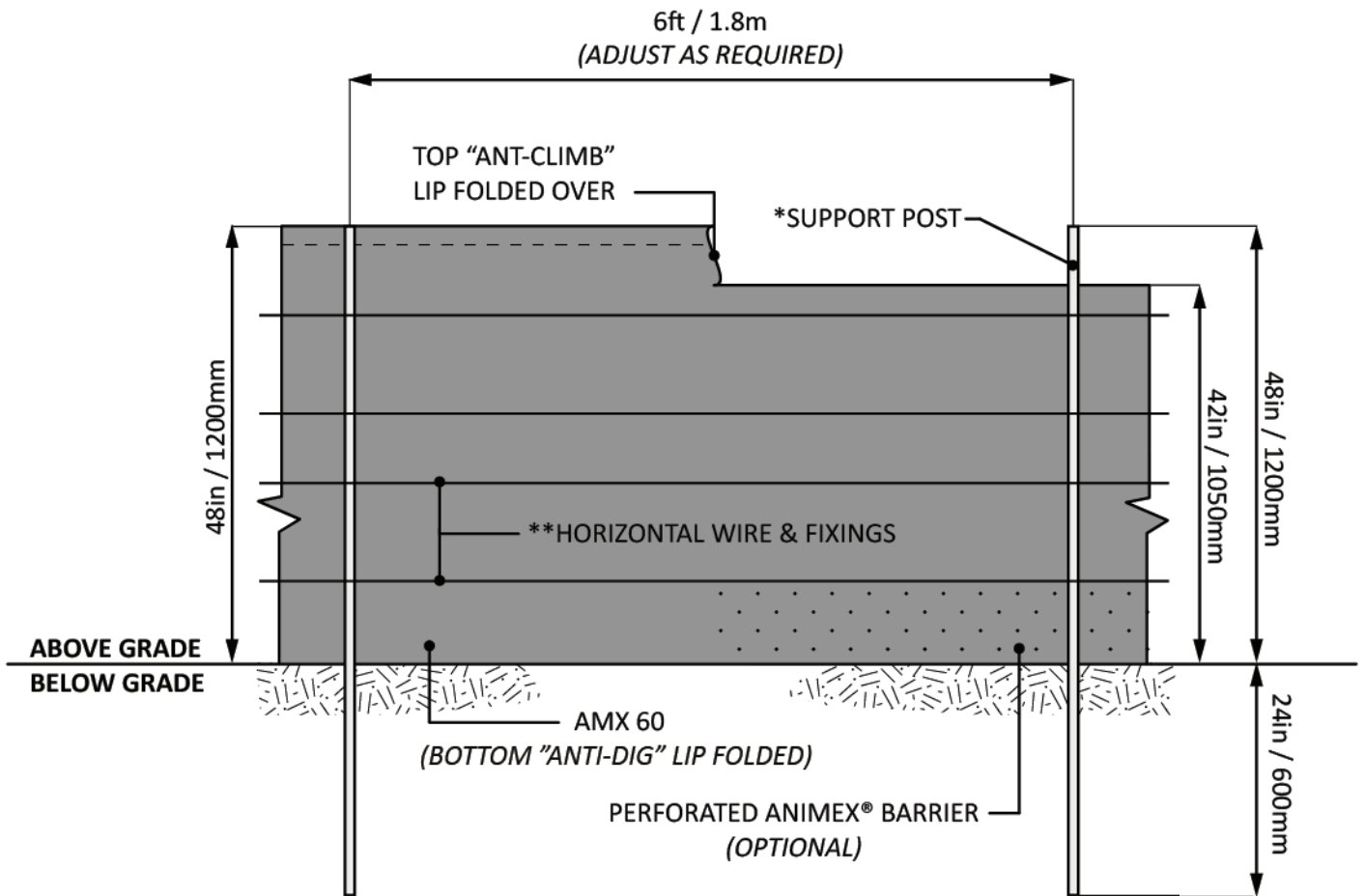
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**APPLY THIS ABOVE GROUND METHOD  
WHEN ATTACHING TO EXISTING  
FENCE TYPES AS WELL**

\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES

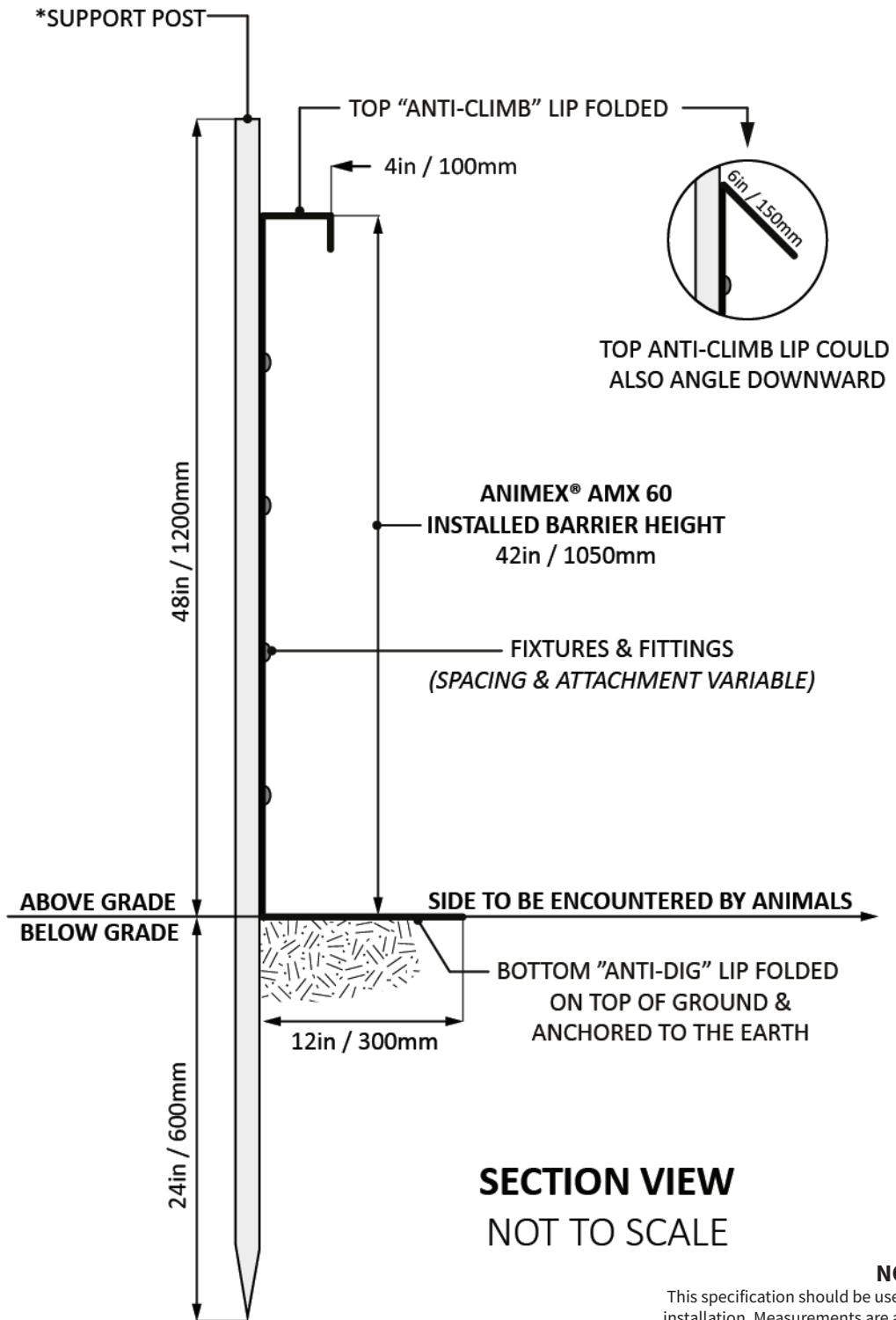


**ELEVATION VIEW**  
NOT TO SCALE

# ● AMX 60

## Free-standing Above Ground

AMX 60



### SECTION VIEW NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**AMX 60**  
Free-standing Above Ground

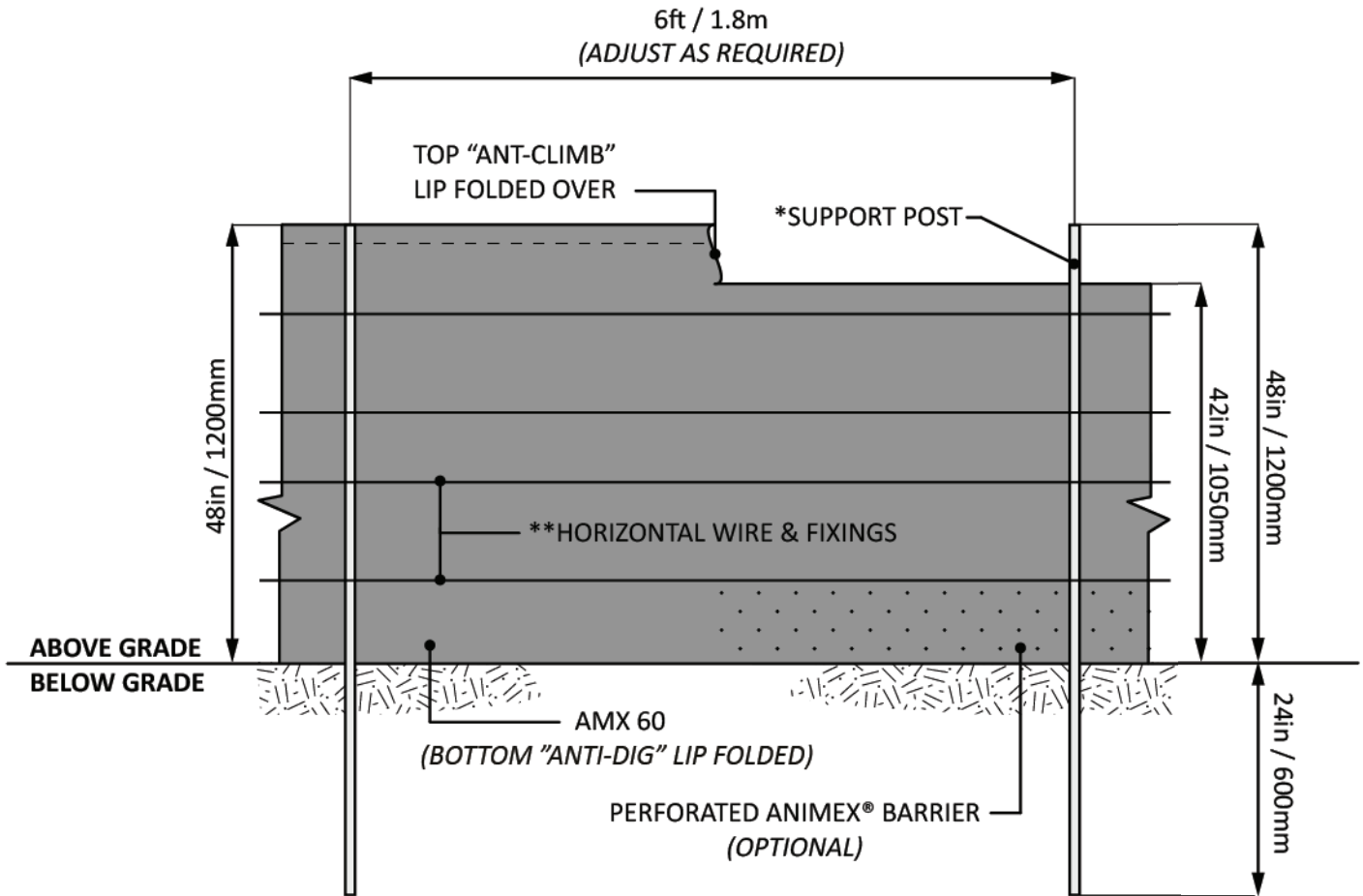
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**APPLY THIS ABOVE GROUND METHOD  
WHEN ATTACHING TO EXISTING  
FENCE TYPES AS WELL**

\*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

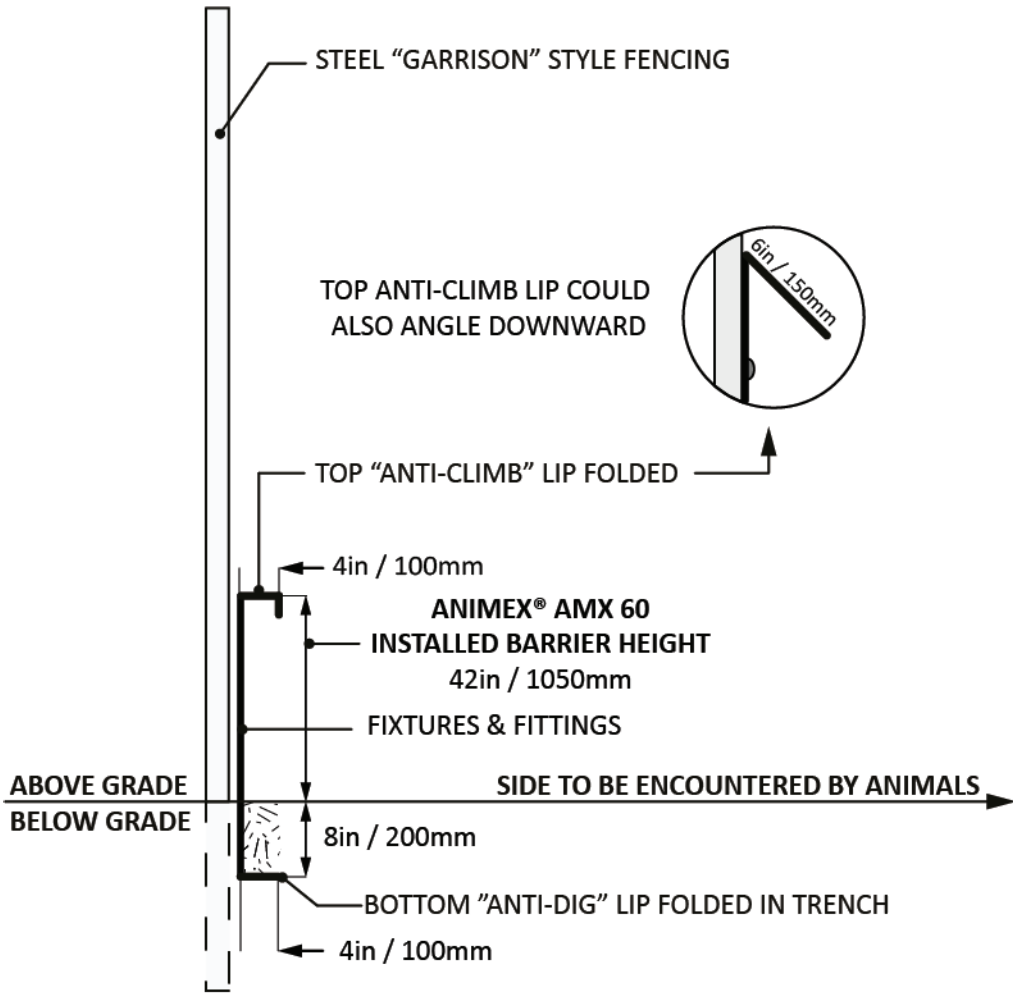
\*\*HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES



**ELEVATION VIEW**  
NOT TO SCALE

# ● AMX 60

## Attached Garrison



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

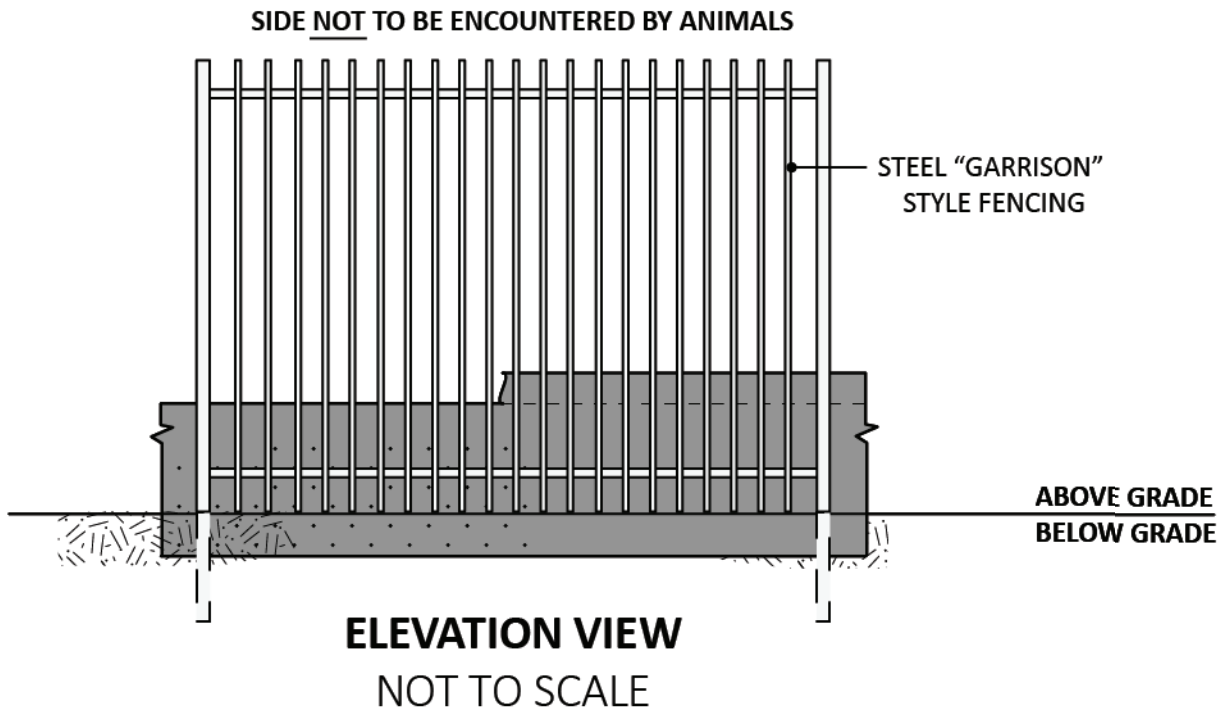
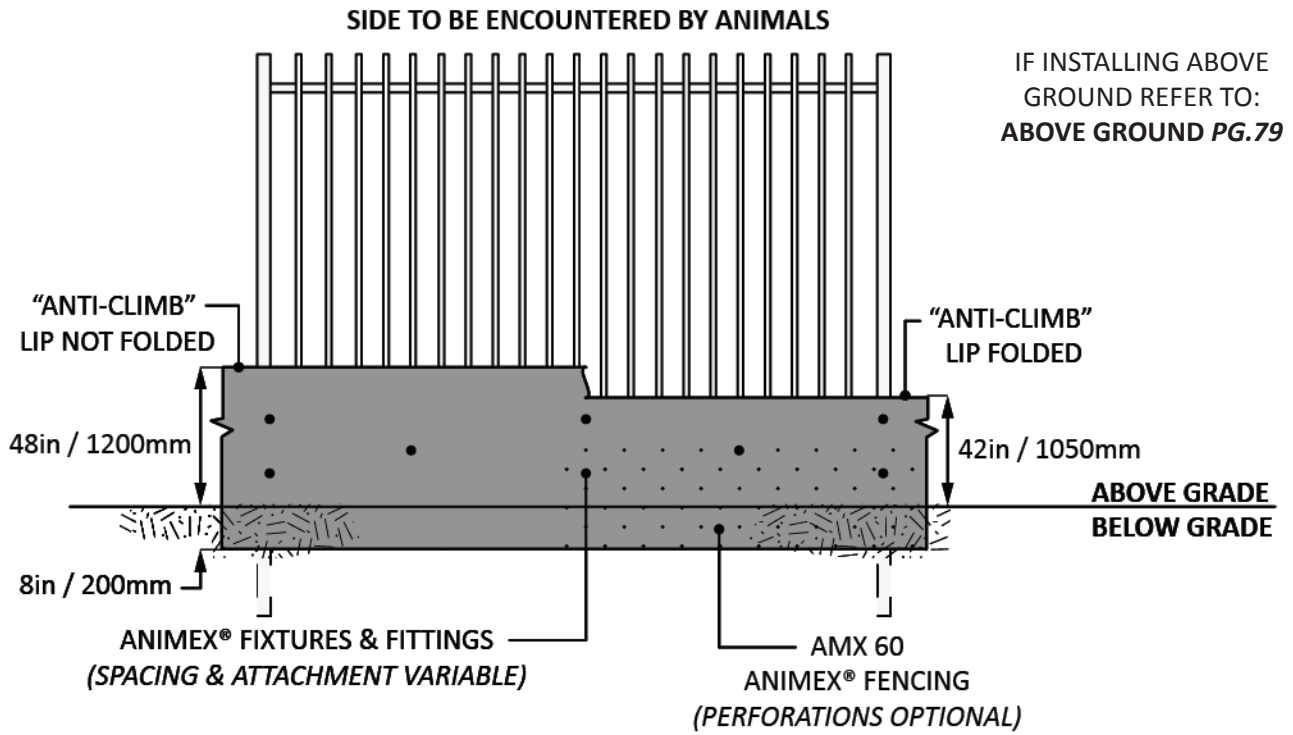
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 60

**AMX 60**  
Attached Garrison

**NOTES:**

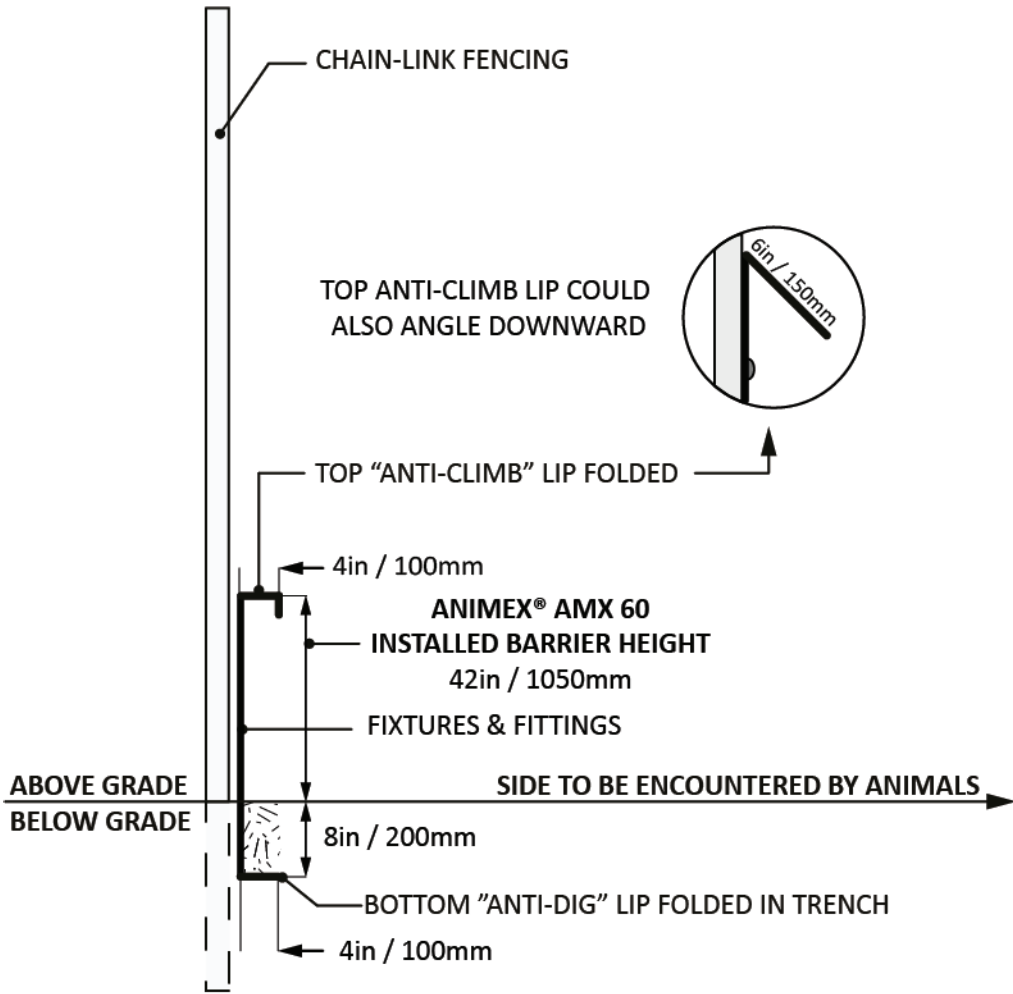
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.





# ● AMX 60

## Attached Chain-link



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

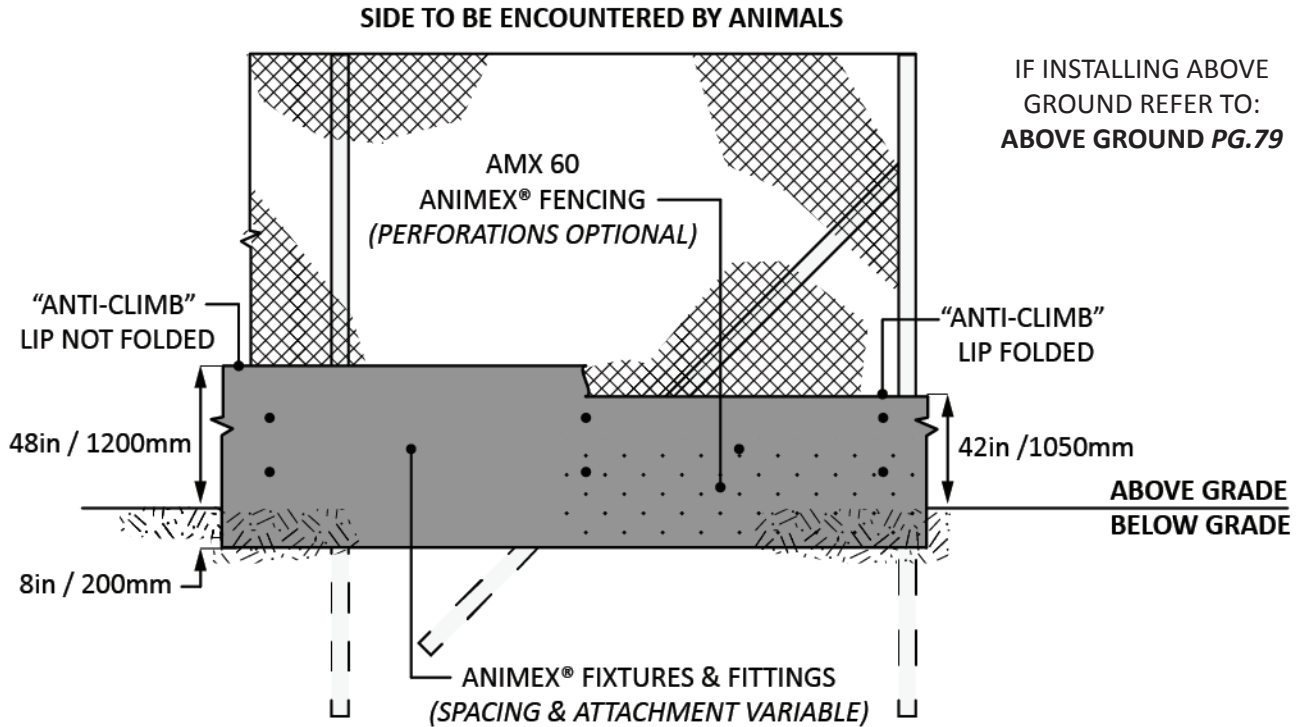
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 60

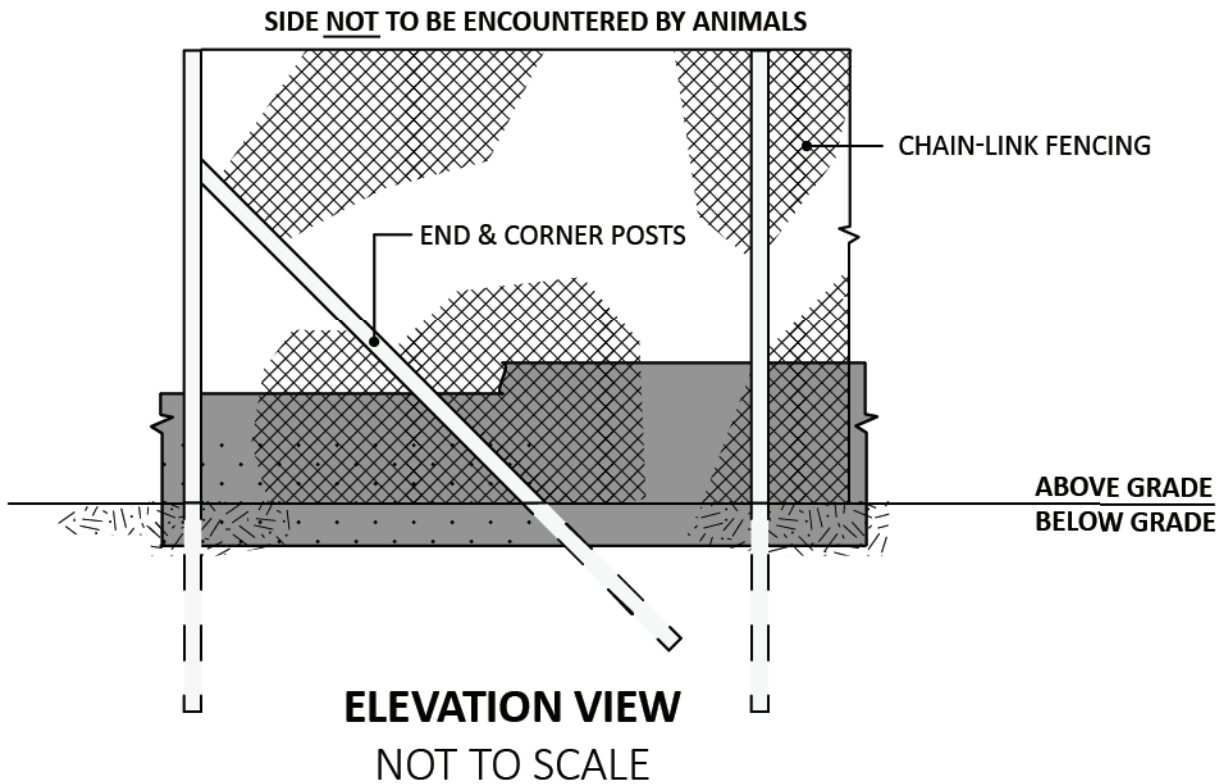
**AMX 60**  
Attached Chain-link

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

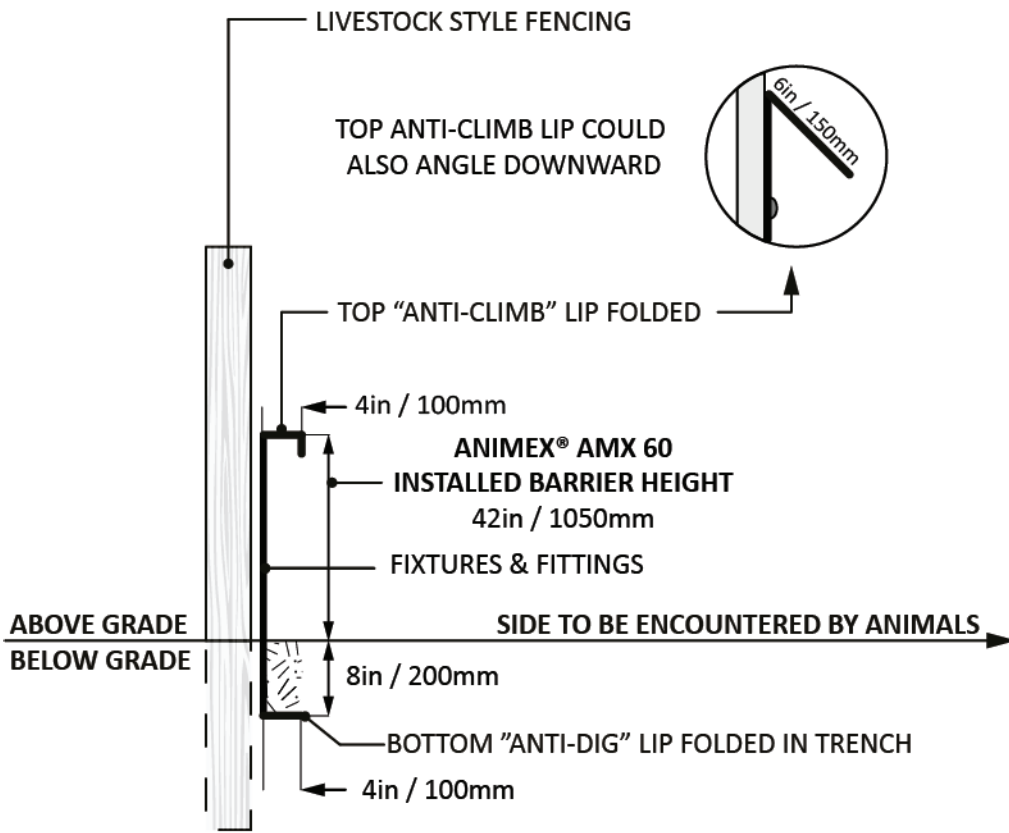


IF INSTALLING ABOVE  
GROUND REFER TO:  
**ABOVE GROUND PG.79**



# ● AMX 60

## Attached Livestock



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

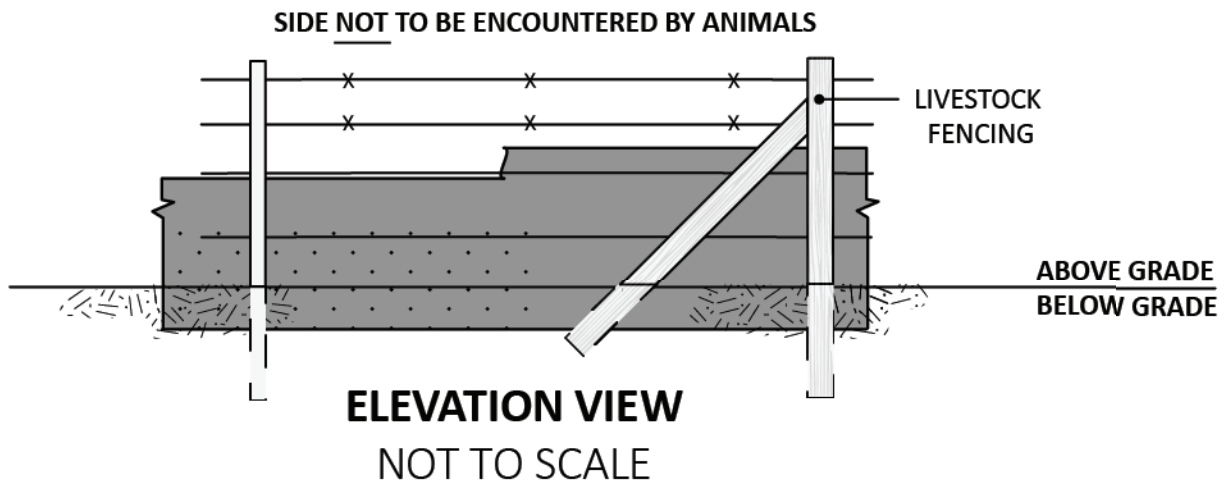
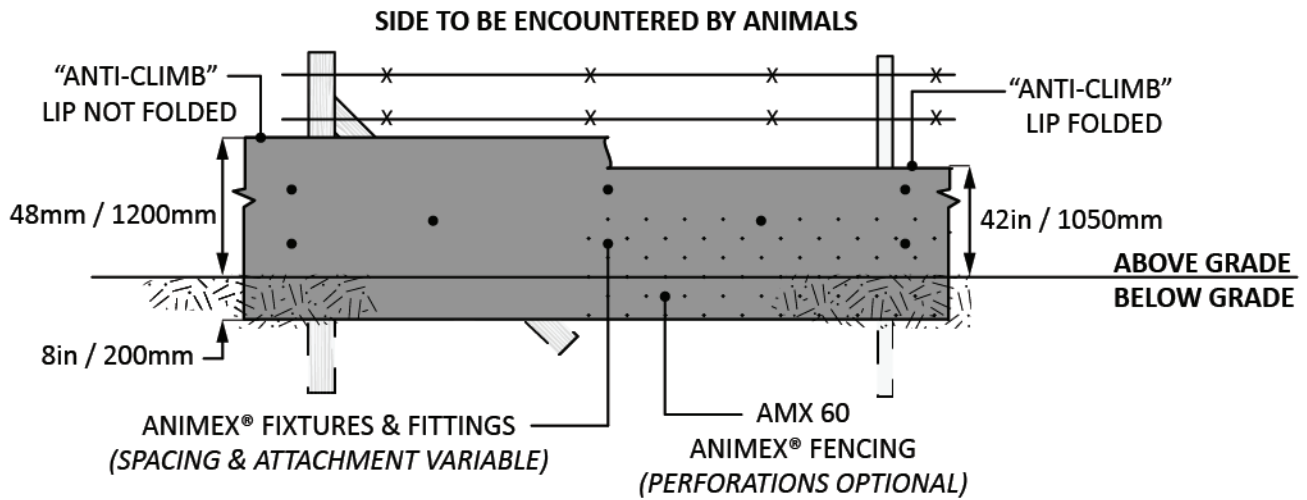
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**AMX 60**  
Attached Livestock

**NOTES:**

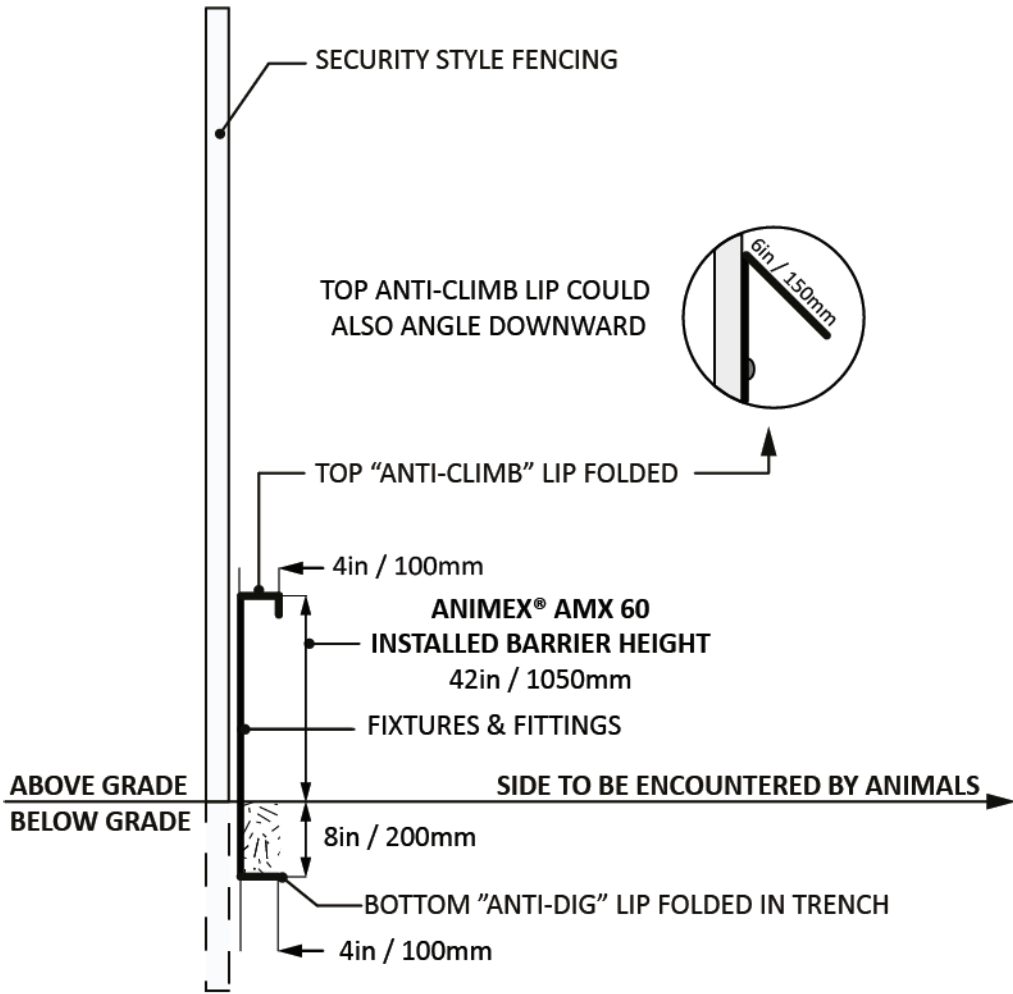
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

IF INSTALLING ABOVE  
GROUND REFER TO:  
**ABOVE GROUND PG.79**



# ● AMX 60

## Attached Security



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

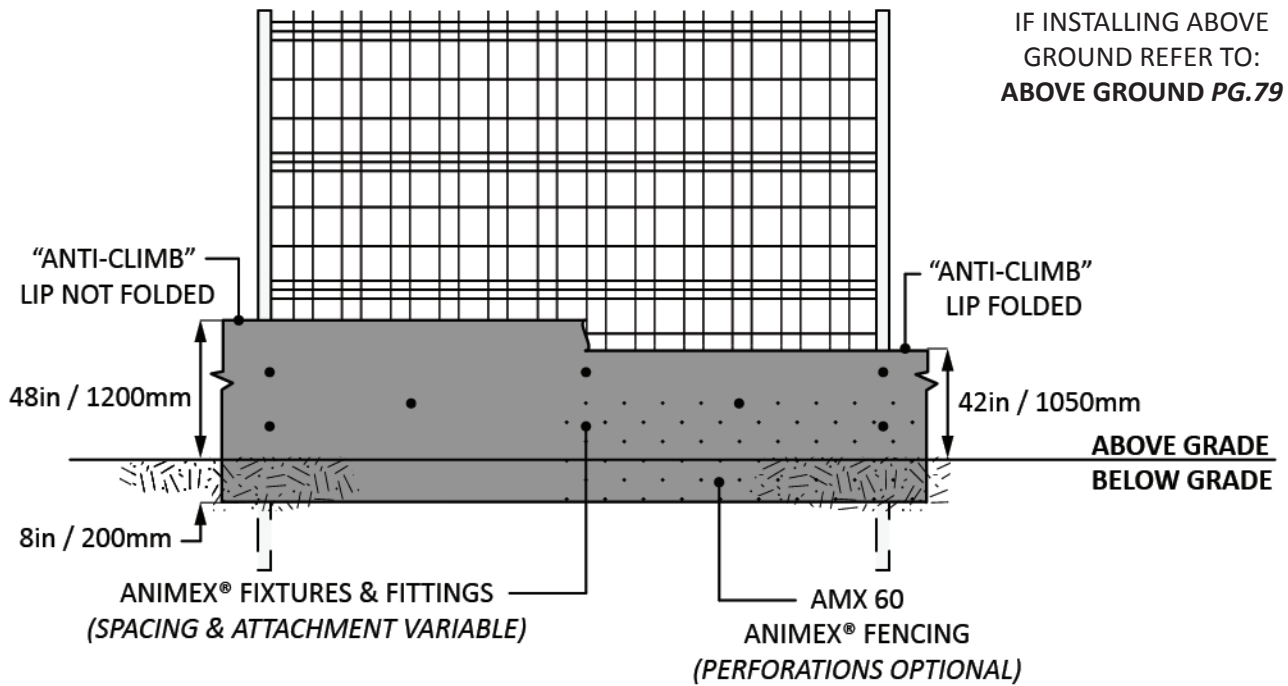
AMX 60

**AMX 60**  
Attached Security

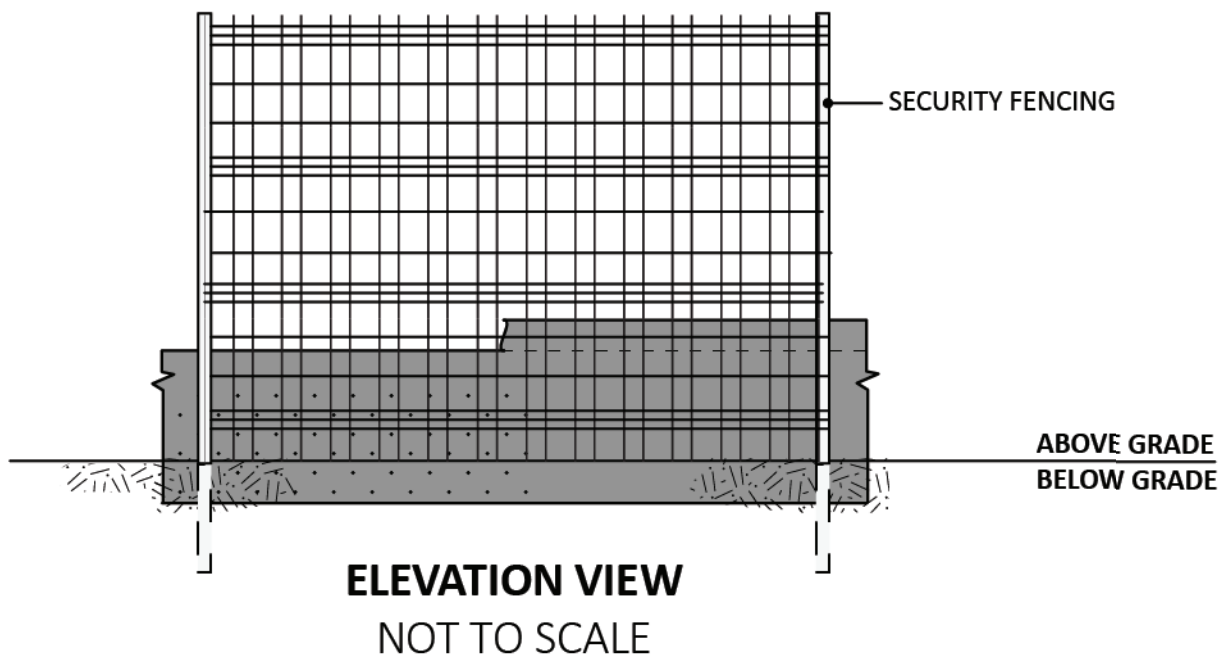
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



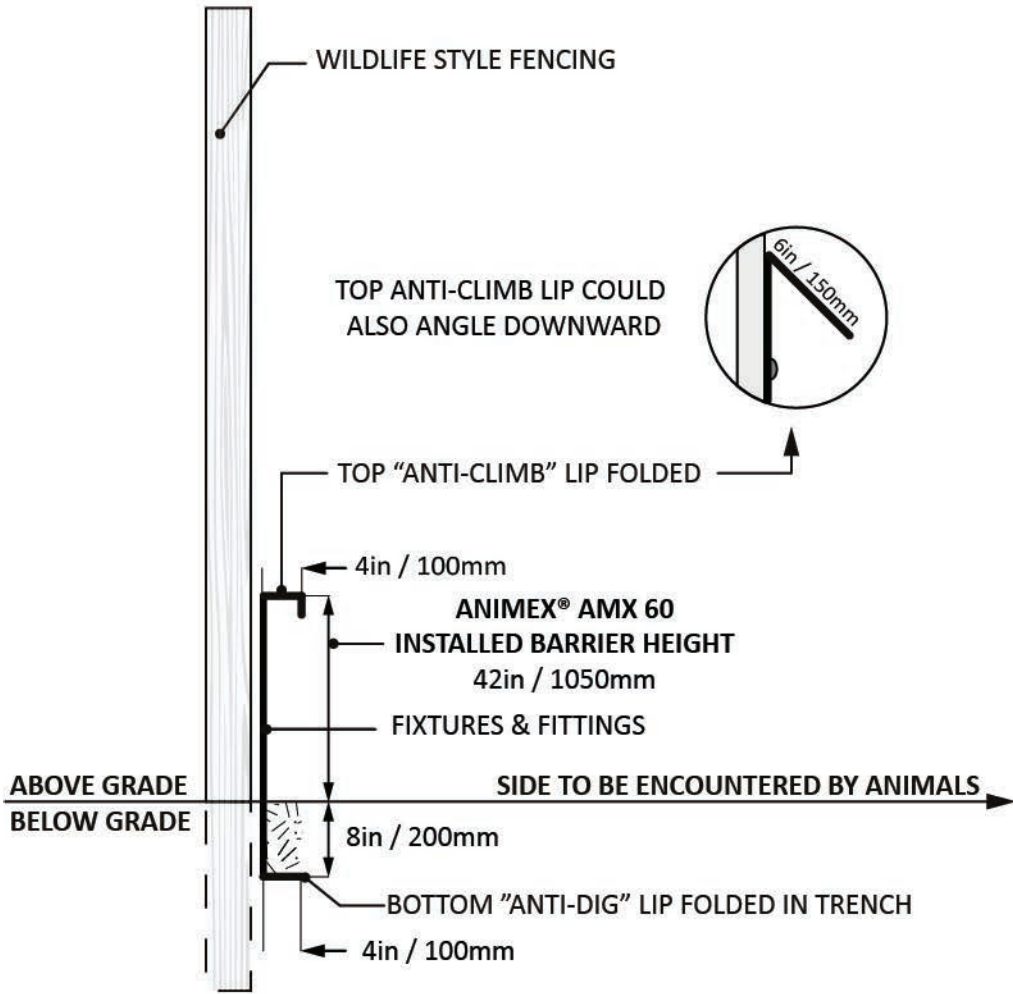
**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**





# ● AMX 60

## Attached Large Wildlife



**SECTION VIEW**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

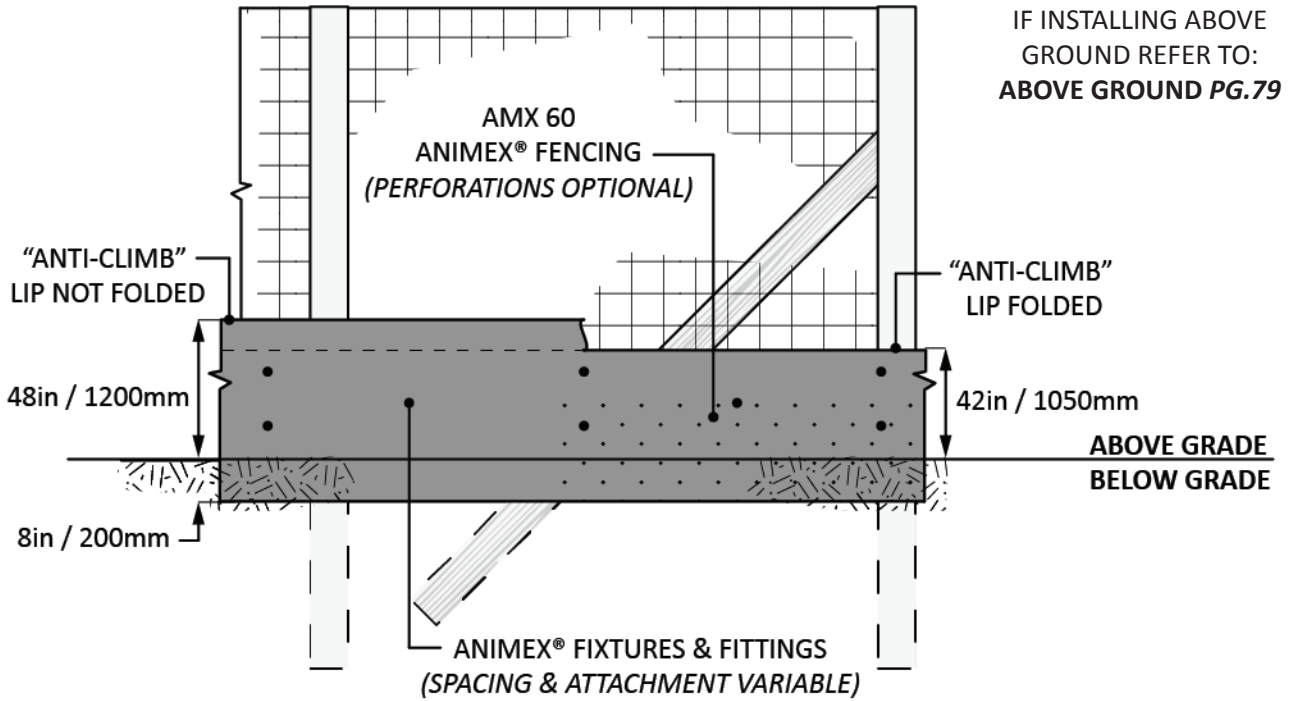
AMX 60

**AMX 60**  
Attached Wildlife

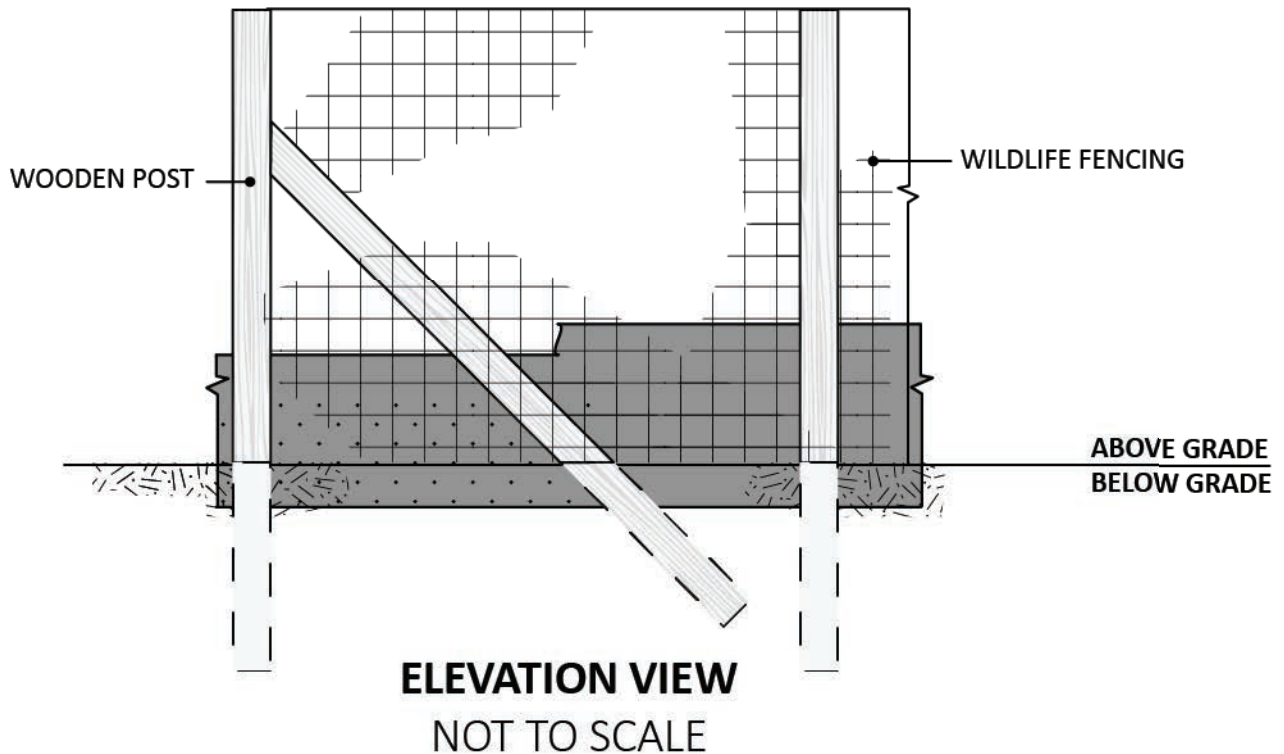
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**



# ● Fixings & Fastening Scored Plastic HDPE

## AMX-T & AMX-SP

Pre-scored plastic (HDPE) sheets and rolls can expand when installed in places where there are large fluctuations in temperature. You should therefore avoid hard fixing this material as this can cause buckling and even open up gaps at overlapped or joining sections.

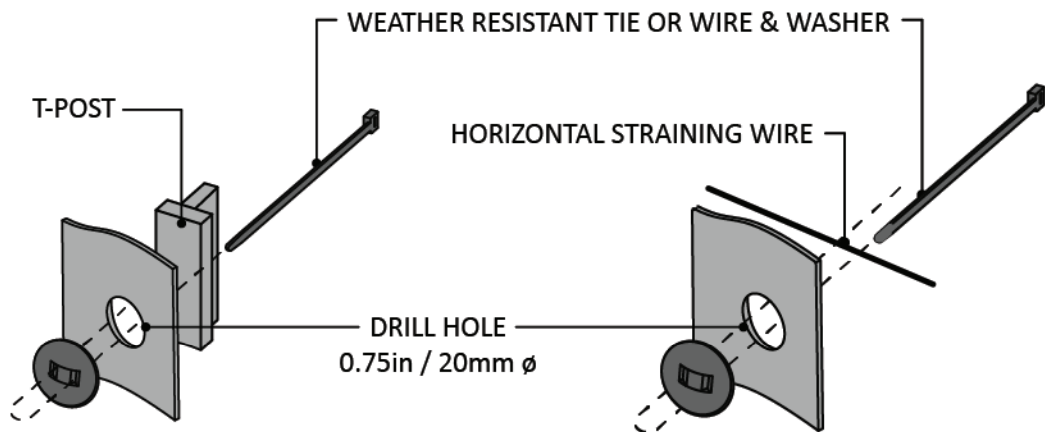
We have prepared some illustrations to demonstrate the best ways to connect and fasten HDPE rolls and sheets.

This technique helps to reduce the chances of gaps opening up at the joins and allows the fencing to expand and contract freely.

Ensuring the trench is backfilled correctly and the earth is compacted tightly against both sides of the fence is also essential to ensure there are no gaps at ground level where animals will be encountering the fence.

Joins should be made between posts where possible.

Adjust and adapt on site as required.

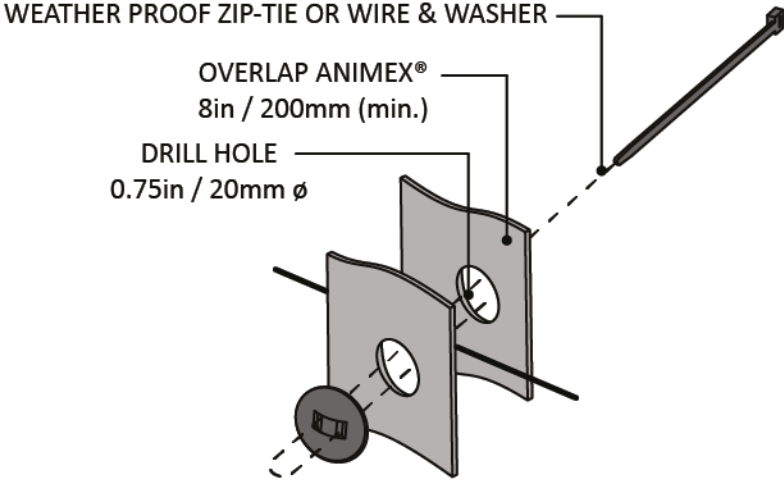


**ATTACH TO POSTS**  
NOT TO SCALE

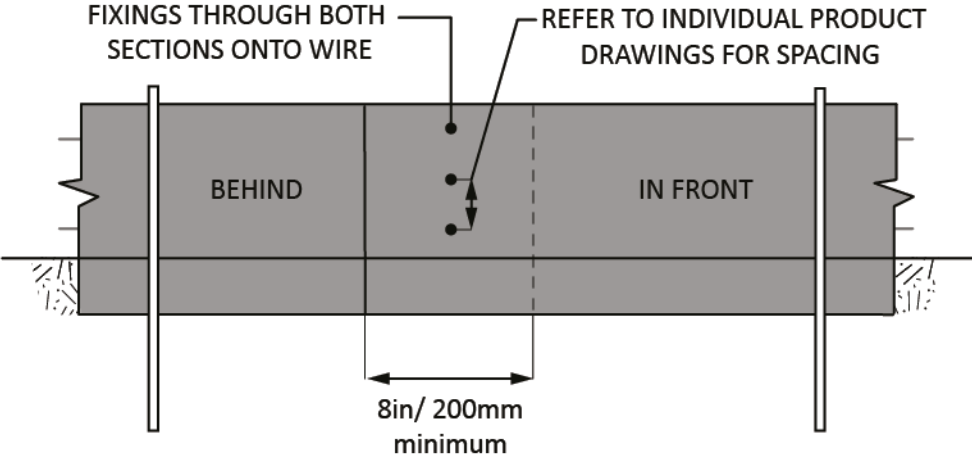
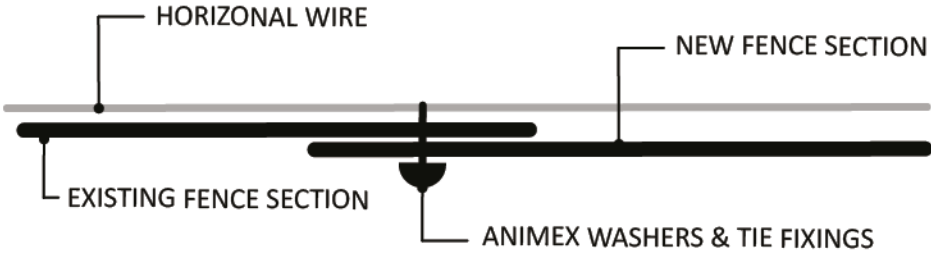
**ATTACH TO WIRE**  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



**JOINING & OVERLAPPING SECTIONS**  
**NOT TO SCALE**



## ● **Fixings & Fastening** **Preformed Metal**

### **AMX-XP**

Preformed metal fencing is supplied in sections that are often custom made for your project.

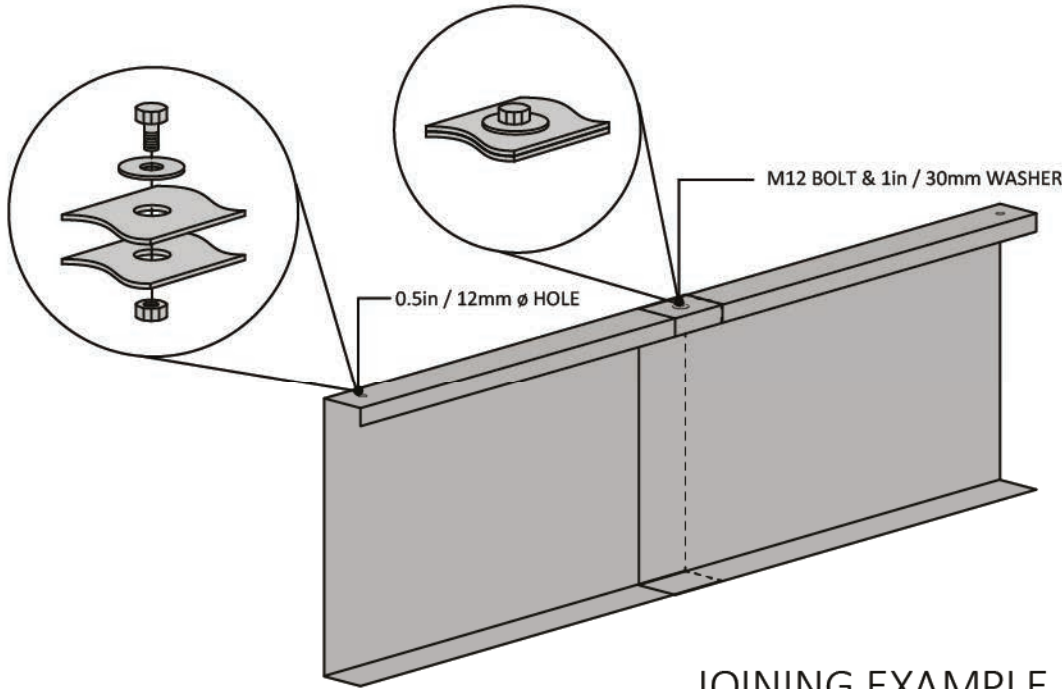
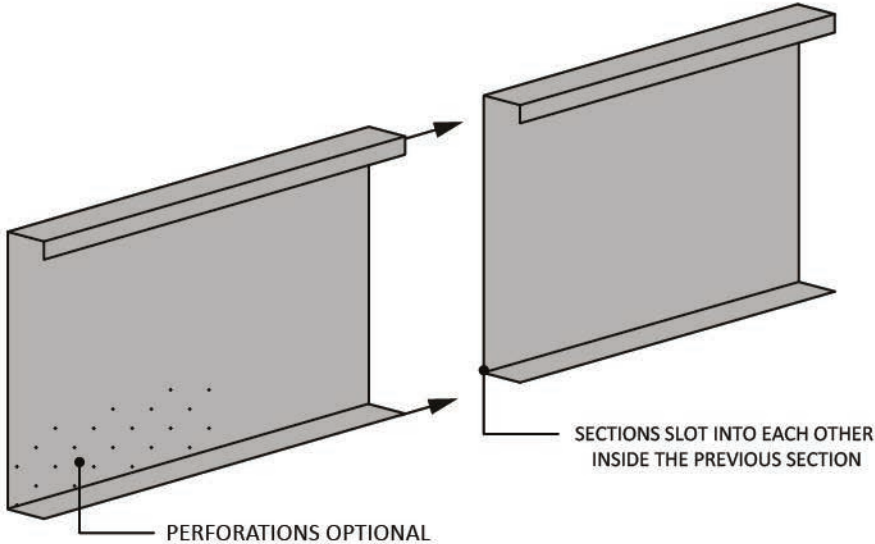
Each section slots inside the other and is then fastened by drilling holes through the overlapping sections and securing with bolts, nuts and washers.

End sections and turn-arounds will also be custom made per project and fitted on site.

Panels can be supplied with a powder-coating but this will increase costs and may need touch-ups after installation.

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.





# Specialized Fencing Specifications

There are many projects where a standard fencing design or specification isn't suitable.




This is why we have designed and provided some specialities and alliterative installation methods to best suit certain situations...

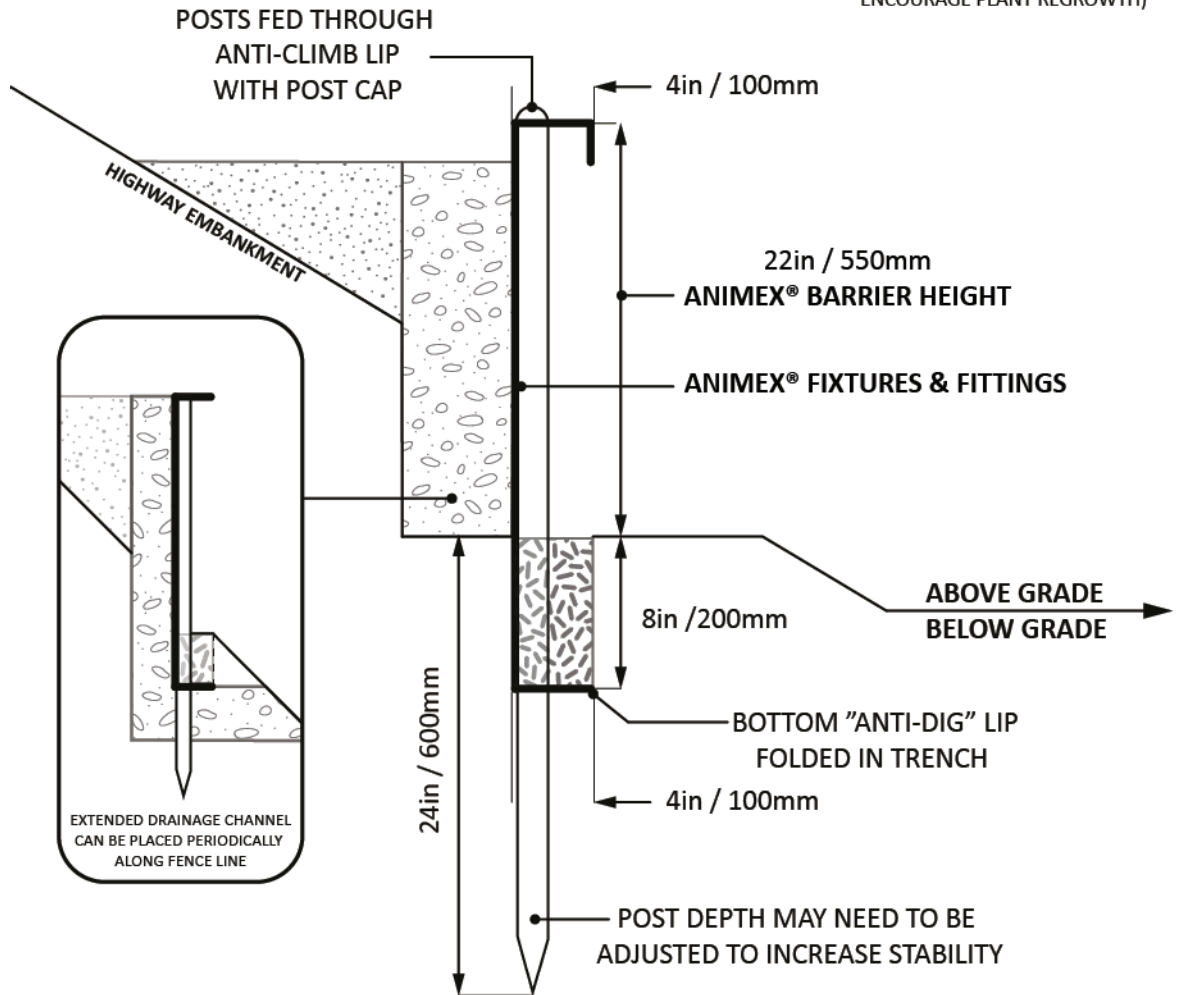
If none of these specifications suit your needs or or they need to be adapted, please contact us and we will be happy to design something for you...

**Roadside Embankment** pg.96  
**Roadside Guard Rail** pg.98

# ● Specialized Fencing Specifications Roadside Embankment

\*AMX 40 Example

-  EMBANKMENT SOIL USED TO BACK FILL SHALLOW TRENCH
-  CLEAR STONE BEHIND FENCE TO PROVIDE DRAINAGE
-  TOP SOIL TO LEVEL EMBANKMENT (EMBED LOCAL SEED MIX TO ENCOURAGE PLANT REGROWTH)

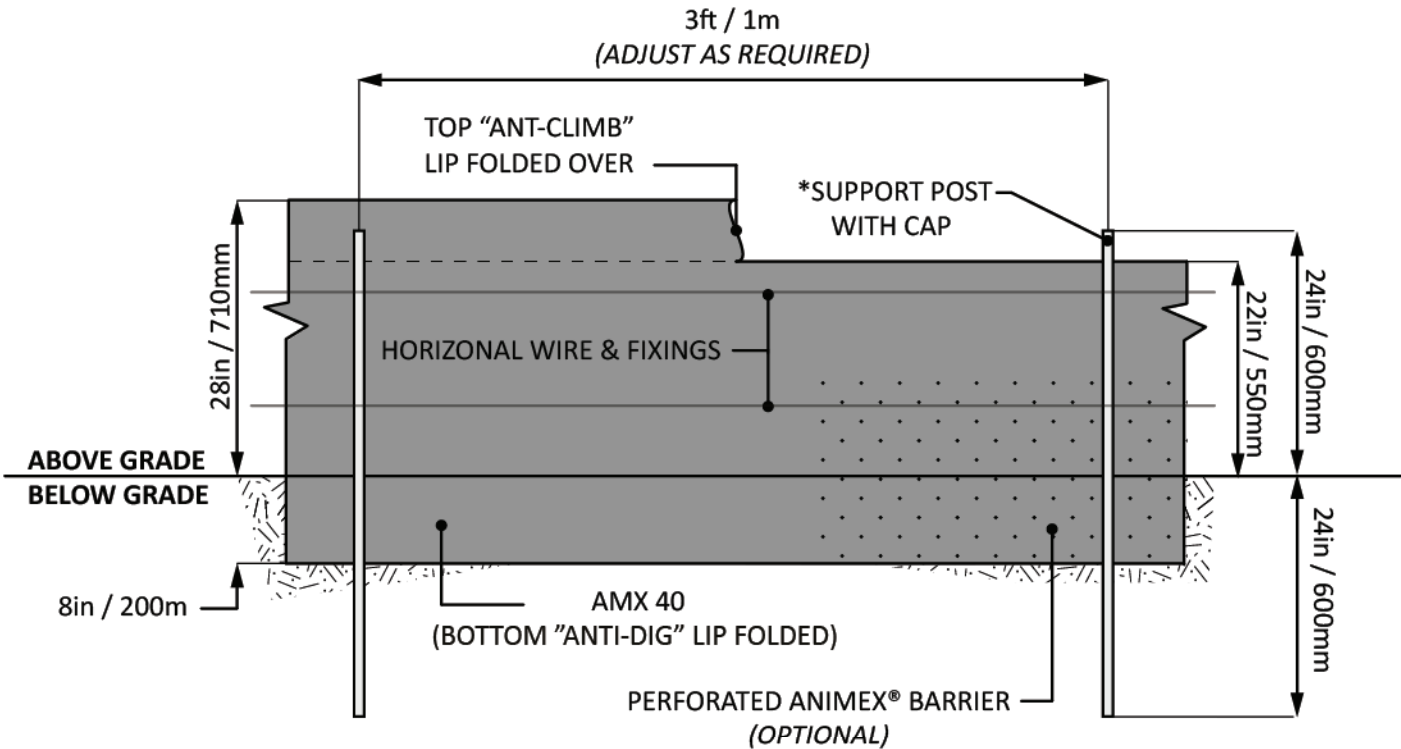


SECTION VIEW  
NOT TO SCALE

**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

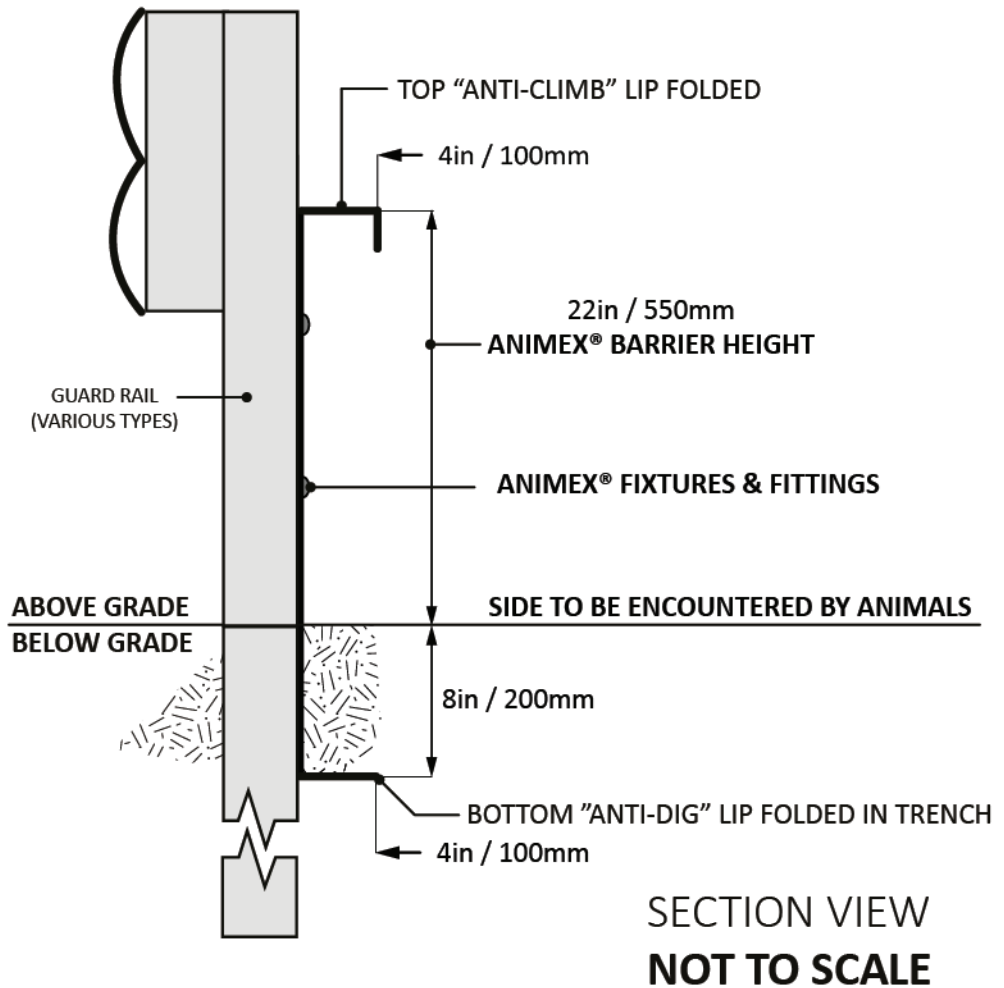
\*SUPPORT POSTS MAY NOT BE NEEDED FOR PRE-FORMED METAL (AMX-XP) FENCES



**ELEVATION VIEW**  
 NOT TO SCALE

# ● Specialized Fencing Specifications Roadside Guardrail

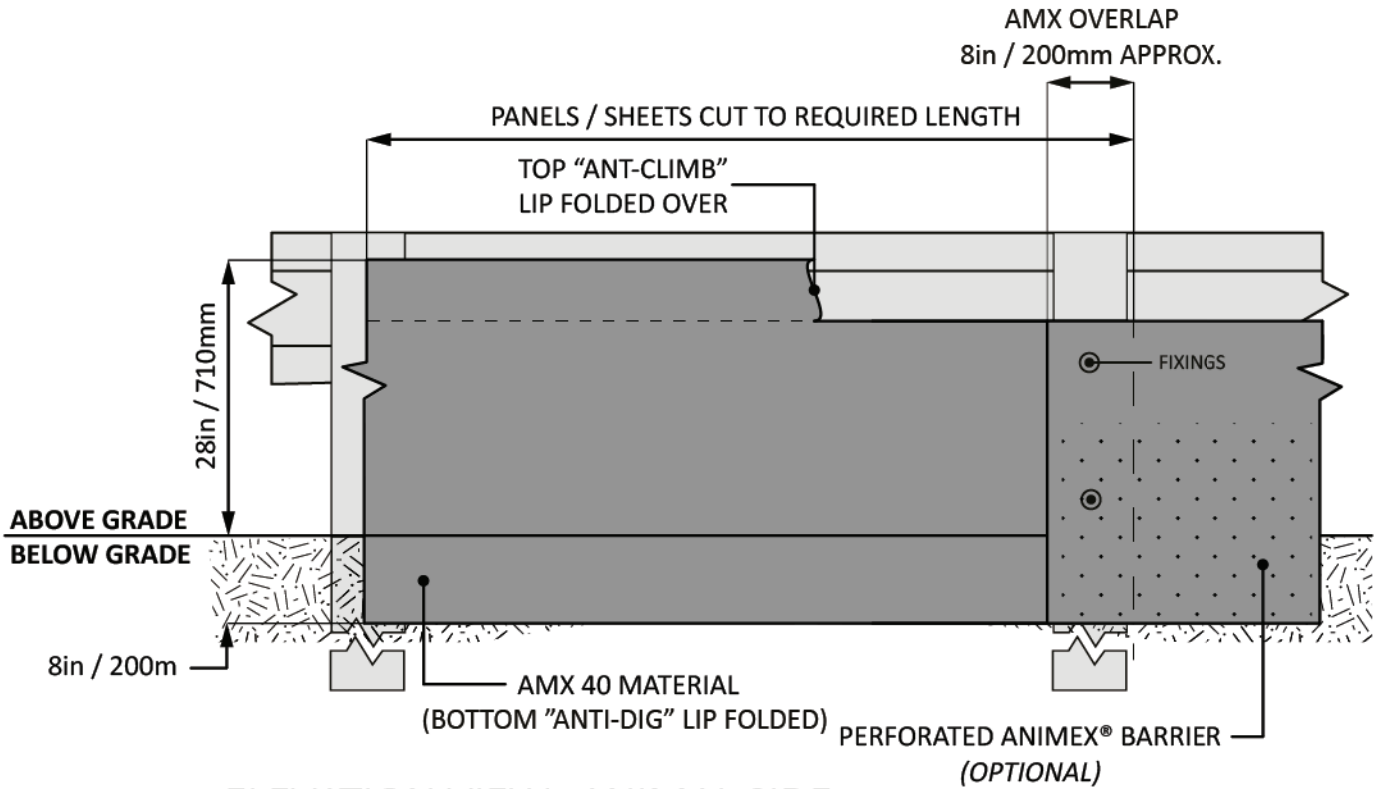
\*AMX 40 Example



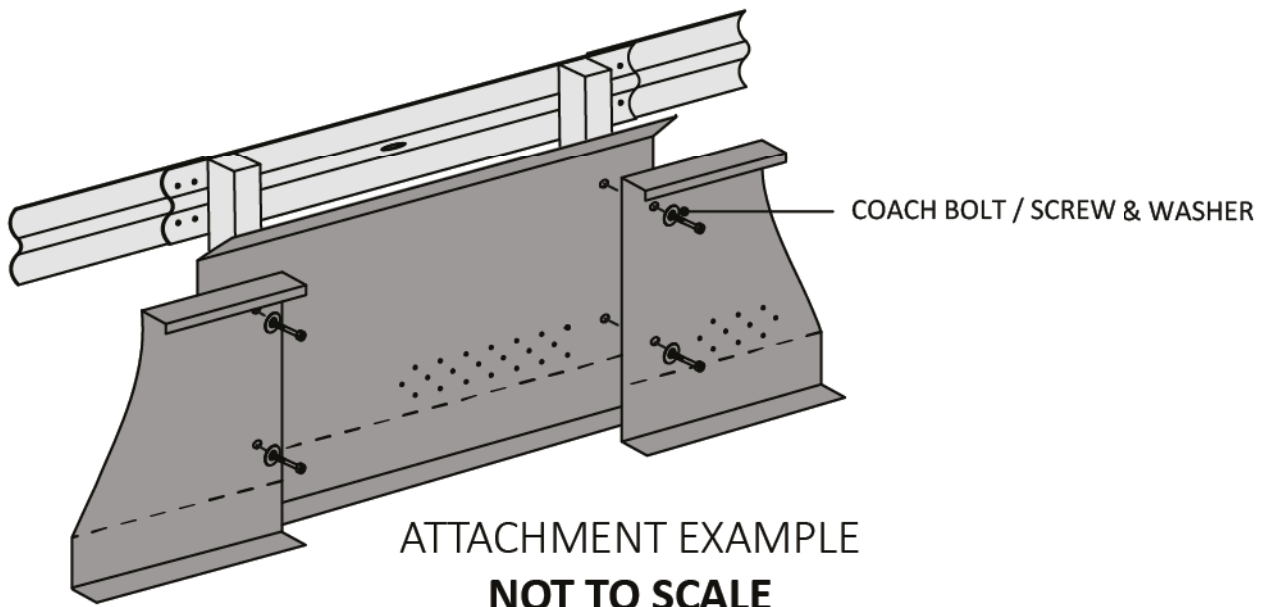
**NOTES:**

This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**ADJUSTMENTS CAN BE MADE TO FIT ALL ROADSIDE GUARD RAILS VARIATIONS**



**ELEVATION VIEW- ANIMAL SIDE  
NOT TO SCALE**



**ATTACHMENT EXAMPLE  
NOT TO SCALE**



# Bibliography.

The following is a selection of titles found useful during the preparation of this handbook and is by no means a complete record of the works and sources consulted for this document.

Amphibian and Reptile Conservation. 2009. *Common toads and roads: guidance for planners and highways engineers (England)*. Booklet, published by Amphibian and Reptile Conservation.

Association of Wetland Stewards for Clayoquot and Barkley Sounds. 2014. New fences to guide amphibians to the tunnel. <https://splatfrogunnel.blogspot.com/2014/08/new-fences-to-guide-amphibians-to-tunnel.html> (Accessed Oct. 20, 2019).

Aresco, M.J. 2005. Mitigation measures to reduce highway mortality of turtles and other herpetofauna at a north Florida lake. *Journal of Wildlife Management* 69:549–560.

Barton, Christopher & Kinkad, Karen. (2005). Do erosion control and snakes mesh?. *Journal of Soil and Water Conservation - J SOIL WATER CONSERV.* 60.

Baxter-Gilbert, JH, JL Riley, D Lesbarrères and JD Litzgus. 2015. Mitigating reptile road mortality: fence failures compromise ecopassage effectiveness. *PLOS ONE* 10(3), p.e0120537.

Beasley, B. 2018a. Designing effective barriers to reduce road mortality and guide amphibians to crossing structures on Highway 4 on the west coast of Vancouver Island. Part 2: BACI design to test roadside HDPE fencing. Abstract and poster presented at the Herpetofauna and Roads Workshop II, B.C. Ministry of Environment, Kamloops, B.C., Sept. 21, 2018.

Brehme, CS and RN. Fisher. 2021. Research to Inform Caltrans Best Management Practices for Reptile and Amphibian Road Crossings. USGS Cooperator Report to California Department of Transportation, Division of Research, Innovation and System Information, 65A0553.

Clevenger, AP and MP Huijser. 2011. *Wildlife Crossing Structure Handbook, Design and Evaluation in North America*, Publication No. FHWA-CFL/TD-11-003. Department of Transportation, Federal Highway Administration, Washington D.C., USA.

Dodd, K.J., W.J. Barichivich, and L.L. Smith. 2004. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. *Biological Conservation* 118:619–631.

Fisher, R, D Stokes, C Rochester, C Brehme, S Hathaway and T Case. 2008. Herpetological monitoring using a pitfall trapping design in southern California. *U.S. Geological Survey Techniques and Methods Vol. 2:A5*. <https://pubs.usgs.gov/tm/tm2a5/pdf/tm2a5.pdf>.

Gunson, KE, DC Seburn and D. Lesbarrères. 2014. Monitoring turtle movements on Highways 7 & 41; 2012 and 2013. Final report submitted to the Ministry of Transportation, Kingston, Ontario.

Hamer, AJ, TE Langton, and D Lesbarrères. 2015. Making a safe leap forward: mitigating road impacts on amphibians. *Handbook of road ecology*, Van Der Ree, R, DJ. Smith, and C Grilo (eds). *Handbook of Road Ecology*. John Wiley & Sons, pp. 261–270.

Helldin, J.O. and S.O. Petrovan. 2019. Effectiveness of small road tunnels and fences in reducing amphibian roadkill and barrier effects at retrofitted roads in Sweden. *PeerJ* 7:e7518. DOI: 10.7717/peerj.7518.

- Hopkins, CB, JS Johnson, SR Kuchta, , DS McAvoy, VD Popescu, SC Porter, WM Roosenburg, GP Sisson, BR Sperry, MT Trainer and RL Wiley. 2018. Effectiveness of Wildlife Mitigation Treatments along the Nelsonville Bypass (No. FHWA/OH-2018-8).
- Hughes, D.F., Green, M.L., Warner, J.K. and Davidson, P.C. (2021), Evaluating Exclusion Barriers for Treefrogs in Agricultural Landscapes. *Wildl. Soc. Bull.*. <https://doi.org/10.1002/wsb.1168>
- Jackson, S.D. and T.F. Tynning. 1989. Effectiveness of drift fences and tunnels for moving Spotted Salamanders *Ambystoma maculatum* under roads. In: *Amphibians and Roads. Proceedings of the Toad Tunnel Conference*. T.E.S. Langton, editor. ACO Polymer Products, Shefford, UK., pp. 93–99.
- Langton, T.E.S. and A.P. Clevenger. 2021. Measures to Reduce Road Impacts on Amphibians and Reptiles in California. Best Management Practices and Technical Guidance. Prepared by Western Transportation Institute for California Department of Transportation, Division of Research, Innovation and System Information.
- Langen, T.A. 2011. Design considerations and effectiveness of fencing for turtles: three case studies along northeastern New York State highways. In: *Proceedings of the 2011 International Conference on Ecology and Transportation*. P.J. Wagner, D. Nelson, and E. Murray (editors). Center for Transportation and the Environment, North Carolina State University, Raleigh, N.C., pp. 521-532.
- Malt, J. 2012. Assessing the effectiveness of amphibian mitigation on the Sea to Sky Highway: population-level effects and best management practices for minimizing highway impacts. Final report, Oct. 1, 2012. B.C. Ministry of Forests, Lands and Natural Resource Operations, Surrey, B.C.
- Ottburg, F.G.W.A., and E.A. van der Grift. 2013. Effectiveness of road mitigation for preserving a common toad population. *Proceedings of the 2013 International Conference on Ecology and Transportation*. Poster.
- Peadar, J.M., A.J. Nowakowski, T.D. Tuberville, K.A. Buhlmann, and B.D. Todd. 2017. Effects of roads and roadside fencing on movements, space use, and carapace temperatures of a threatened tortoise. *Biological Conservation* 214:13–22.
- Ruby, DE, JR Spotila, SK Martin and SJ Kemp. 1994. Behavioral responses to barriers by desert tortoises: implications for wildlife management. *Herpetological Monographs* 8: 144–160.
- Woltz, H.W., J.P. Gibbs, and P.K. Ducey. 2008. Road crossing structures for amphibians and reptiles: informing design through behavioral analysis. *Biological Conservation* 141:2745–2750.
- Semlitsch, RD. 2008. Differentiating migration and dispersal processes for pond breeding amphibians. *Journal of Wildlife Management* 72(1): 260–267.
- Ministry of Forests, Lands, and Natural Resource Operations, 2016. Best Management Practices for Amphibian and Reptile Salvages in British Columbia. Version 1.0., June 2, 2016.
- Ministry of Environment and Climate Change Strategy, 2020. Guidelines for Amphibian and Reptile Conservation during Road Building and Maintenance Activities in British Columbia. Version 1.0., March 30, 2020.
- Milburn-Rodríguez JC, J Hathaway, K Gunson, D Moffat, S Béga and D Swensson. 2016. Road mortality mitigation: The effectiveness of Animex fencing versus mesh fencing. <https://animexfencing.com/why-animex>
- Ontario Ministry of Natural Resources and Forestry. April 2016. Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptile Species at Risk in Ontario. Queen's Printer for Ontario.
- van der Ree, R, JW Gagnon and DJ Smith. 2015. Fencing: a valuable tool for reducing wildlifevehicle collisions and funneling fauna to crossing structures. *Handbook of Road Ecology*. Oxford: John Wiley & Sons, pp. 159–171.
- Yorks DT, Sievert PR. 2015 Tunnel and Fencing Options for Reducing Road Mortalities of Freshwater Turtles. <https://rosap.nhtl.gov/view/dot/36355>

This document is continually updated based on new research and information.

To ensure you are referencing the most recent version please visit:

**<https://www.wildlifefencing.com/>**



**SUGGESTED CITATION**

The Wildlife Fencing Guide: Amphibians, Reptiles & Small Mammals. 2021. Version 1  
<https://www.wildlifefencing.com/>