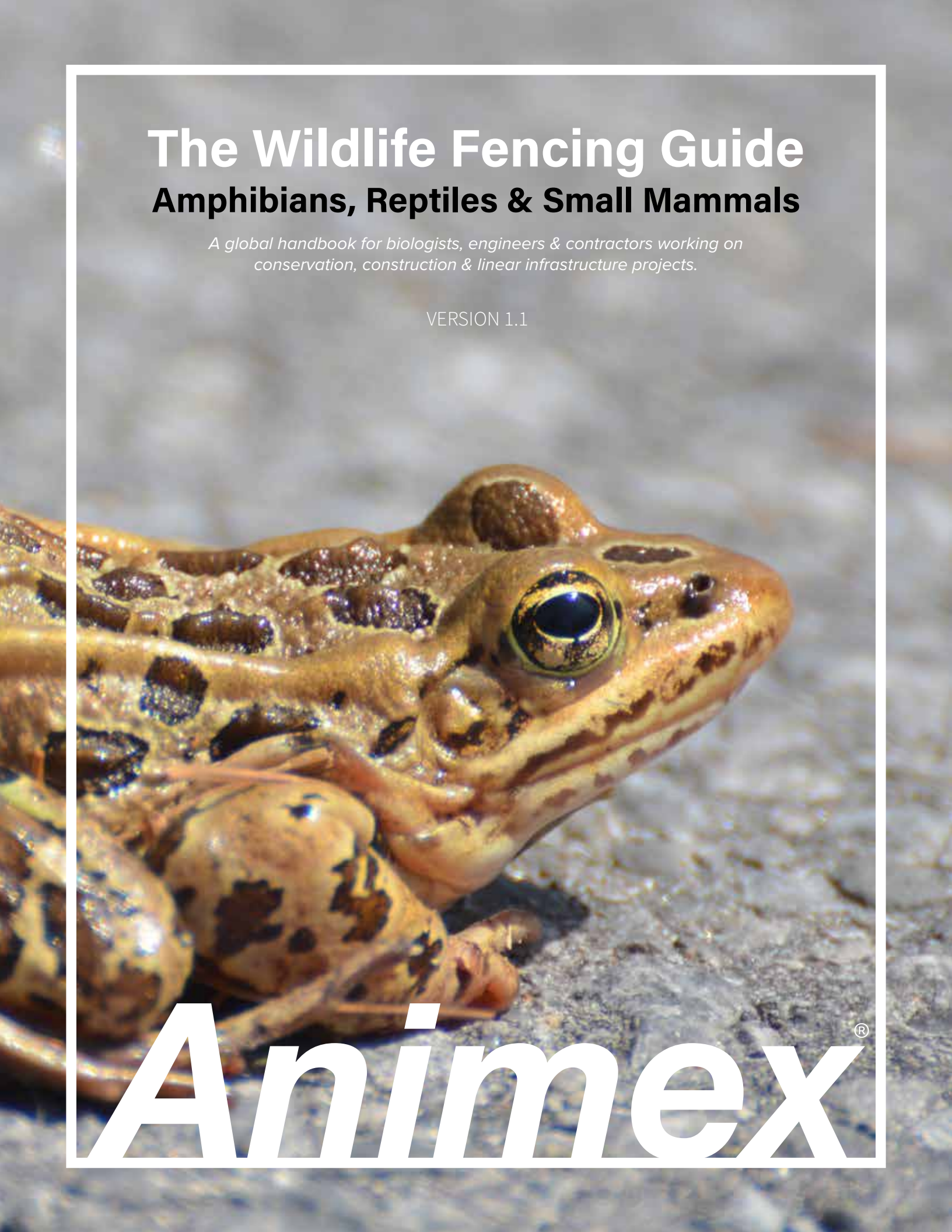
# The Wildlife Fencing Guide

## Amphibians, Reptiles & Small Mammals

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

VERSION 1.1



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**ACKNOWLEDGEMENTS**
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 communites. 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, Travis McCleary, Jerry Roe, John Mulder, Mark Backus, Mabyn Armstrong, Tony Ashton, Caroline Zank, Holly Anderson, Joe Carter, Tricia Stewart & Royal Botanic Gardens Cranbourne.

Design, illustrations and specification drawings by Steve Béga

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

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# Introduction.

I began my career as a wildlife biologist in 1998 and formed an ecological consultancy that ensured clients adhered to legislation that protected wildilfe and habitats from the impacts of fragmentation and degradation due to development, construction and infrastructure.

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

After realizing that the generic fencing methods and materials available to us off the shelf during my early career 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 that were purposely desgined for wildlife.

Shortly after, Animex Fencing was born.

After 10 years operating solely in Europe we began recieving calls from other countries where biologists and contractors expressed the same frustrations and limitations as a result of using generic mixed fencing materials that we 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 useful for other species and practitioners across the world.

To date we are proud to have worked on numerous projects with various partners targeting multiple species. Every project has taught us valuable lessons that has enabled us to continually 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 as we 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...

**Dean Swensson** CEO
***Animex*** *International*

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**INFORMATION TO BE ADDED TO FUTURE EDITIONS**
- Detailed shelter design
- Monitoring protocol
- Fence-ends / Turn-around design
- Pitfall trap-line / Fence layouts

**If you have anything to contrubite please get in touch:** info@wildlifefencing.com

# SECTION I

**Common Toad** *Bufo bufo* **excluded by AMX-SP** Steve Béga

## 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 help improve our collective approach we have compiled a comprehensive wildlife fencing handbook that you can trust and utilize on any future projects to help 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.



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 led scientists to begin researching what happens when animals come into contact with these barriers. The aim is 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*

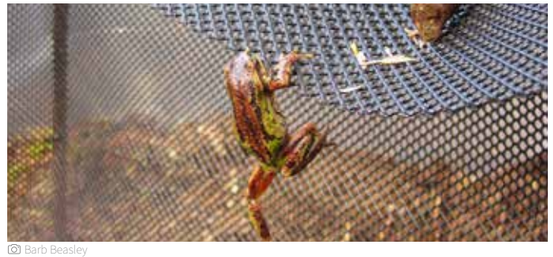
**A.**

Carlos Milburn-Rodriguez

**B.**

nineT2

**C.**



Barb Beasley

**Image Sources:**

**A.** https://ansuseye.wordpress.com/2017/05/17/turtle_attention/

**B.** https://imgur.com/gallery/Ph8YK

**C.** https://splatfrogtunnel.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 transparency and 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. It can 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 strands of material and a high transparency. 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 high opacity 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

**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 transparency and percentage of open area**

Jerry Roe


**Traditional USFWS specificed 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 are comprised of multiple 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 some incoproating a high percentage of open areas (gaps or holes) such as mesh and hardware cloth. This poses 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 unknown and avoidable damage. The weather resistance of some metal mesh fencing (hardware cloths) is also difficult to predict, as origins 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 transparency 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 higher opacity.

## Key Links:

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

**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 breach 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 fixings and fastenings 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 arching 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://splatfrogtunnel.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

**AMX-SP Attached to existing fencing** Travis McCleary

## Selecting the best fencing.

With growing amounts of scientific research and expanding anecdotal information, we can now clarify the most appropriate materials and products that will inform the best fencing decisions for your project(s).

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

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





## Effectiveness

Fencing materials are often 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 frequently 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 high opacity and avoid products made from fibrous or mesh materials.

## Maintenance

Overlooking the durability and maintenance requirements of fencing materials can often be extremely expensive. It is important to understand how much time and money is required to ensure your newly installed fence is effective after the initial purchase to avoid costly surpises in the future.

Fibrous and mesh materials often require significant amounts of maintenance compared to 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.

Areas with heavy snowfall can also destory lightweight fences posing a great risk to hibernating animals which are often quick to move once it thaws.

It is also advisable to use perforated materials in aquatic environments or areas with expected heavy rainfall to avoid pooling against the barrier, which may lead to scoring under the fence.

## Cost

Project budgets for environmental management or mitigation can be limited so it is important to invest in long lasting products which reduce ongoing costs. Although some materials may be cheaper upfront, these fences have incredibly high maintenance costs and are therefore much more expensive overall due to replacment and repair needs over the duration of a project compared to others. It is advised that you consider investing in more durable materials up front as this will create big savings in the long run 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 will also further reduce landfill, disposal and environmental costs.

## 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.16

**Sub-optimal** pg.20

# Optimal. Material Comparison

| | SUMMARY | EFFECTIVENESS | COST | LONGEVITY | MAINTENANCE |
|---|---|---|---|---|---|
|  **AMX-XP**<br>**PREFORMED METAL**<br>SECTIONS | • Extremely durable<br>• Attach to existing barriers<br>• Low maintenance<br>• High opacity | HIGH | HIGH | 30+ YEARS | LOW |
|  **AMX-PL**<br>**RECYCLED PLASTIC LUMBER**<br>SECTIONS | • Extremely durable<br>• Attach to existing barriers<br>• Low maintenance<br>• High opacity | HIGH | HIGH | 30+ YEARS | LOW |
|  **AMX-SP**<br>**SCORED PLASTIC (HDPE)**<br>THICK ROLLS & SHEETS | • Extremely durable<br>• Attach to existing barriers<br>• Low maintenance<br>• High opacity | HIGH | MID | 15 YEARS | LOW |
|  **AMX-T**<br>**SCORED PLASTIC (HDPE)**<br>THIN ROLLS & SHEETS | • Extremely durable<br>• Attach to existing barriers<br>• Low maintenance<br>• High opacity | HIGH | LOW | 1-5 YEARS | LOW |
|  **AMX-SP & AMX-T**<br>**PERFORATED SCORED PLASTIC (HDPE)**<br>VARIOUS THICKNESS ROLLS & SHEETS | • Extremely durable<br>• Attach to existing barriers<br>• Low maintenance<br>• High opacity | HIGH | LOW | 5-15 YEARS | LOW |

# Optimal fencing examples.

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

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

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

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

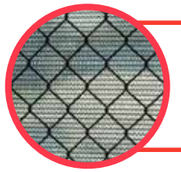
**AMX-XP**
**Pre-formed metal**
*Various species*

**AMX-SP**
**Scored plastic (HDPE)**
*Various species*

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

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

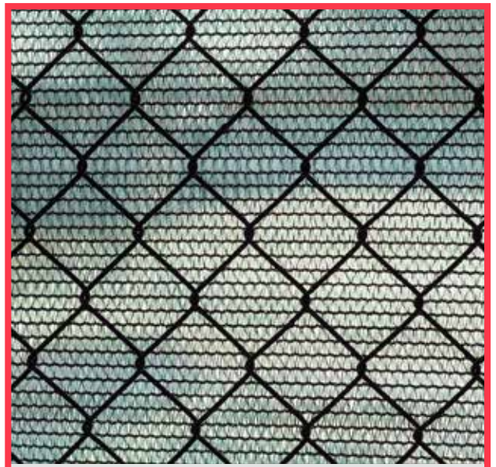
# Sub-Optimal. Material Comparison

| | SUMMARY | EFFECTIVENESS | COST | LONGEVITY | MAINTENANCE |
|---|---|---|---|---|---|
|  **SHADE CLOTH / WINDBREAK / WOVEN PLASTIC**<br>SUN COVERAGE - WIND CONTROL - VISUAL SCREENING | • Torn & ripped easily<br>• Animal entanglement<br>• High maintenance<br>• Climbable<br>• High Transparency | MID | LOW | < 1 YEAR | HIGH |
|  **PLASTIC MESH**<br>FISH CONTAINMENT - ANIMAL CONTROL - POULTRY NETTING | • Torn & ripped easily<br>• Animal entanglement<br>• High maintenance<br>• Climbable<br>• High Transparency | MID | MID | < 1 YEAR | HIGH |
|  **SILT FENCING / EROSION CONTROL**<br>WOVEN POLYTHENE | • Torn & ripped easily<br>• Animal entanglement<br>• High maintenance<br>• Climbable<br>• High Transparency | LOW | LOW | < 1 YEAR | HIGH |
|  **HARDWARE CLOTH / METAL MESH / CHAIN-LINK**<br>GENERAL FENCING PURPOSES | • Animal entanglement<br>• Corrosion risk<br>• Climbable<br>• High Transparency | MID | MID | 10 YEARS | HIGH |
|  **SNOW FENCING / WARNING BARRIER**<br>SNOW DRIFT - HUMAN SAFETY - TEMPORARY FENCING | • Torn & ripped easily<br>• Animal entanglement<br>• High maintenance<br>• Climbable<br>• High Transparency | LOW | LOW | < 1 YEAR | HIGH |
|  **LIGHT WEIGHT POLYTHENE**<br>AGRICULTURE - ANIMAL CONTROL | • High maintenance<br>• Climbable<br>• Torn & ripped easily<br>• High Transparency | LOW | LOW | < 1 YEAR | HIGH |

# Sub-optimal fencing examples.

**Polythene & wooden posts**
*Various species*

**Plastic mesh**
*Various species*



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

**Chain-link fencing**
*Various species*

**Wire reinforced silt fencing**
*Various species*

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

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

**Orange plastic mesh**
*Various species*

# SECTION III

## Standard
# Fencing Specifications

# 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.16*

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 material’s 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** *pg26* **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*

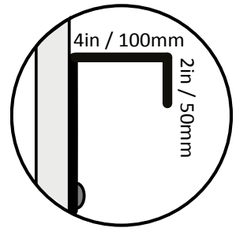
It is also important to understand that although you many be considering a fence for a particular species, the chances are that there are many other species present that will be impacted by the fencing. All the specifications in this document consider multiple species applications but, if you are targeting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

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

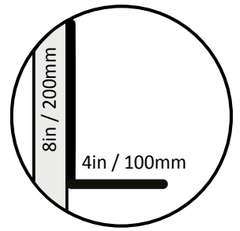


Before looking at the detailed drawings it is important to understand some key aspects of wildlife fencing for reptiles, amphibians and small mammals. We need to identify what makes them different from other fences aswell as highlighting important aspects that are key to making them effective.

**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 standardized 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. Further research is needed to explore what effect this may have on animals but for good practice, shelters should be placed periodically along a fence to provide unexposed refuge areas. Our standard recommendations state shelters should be placed no greater than **30ft (10m)** apart. The exact spacing and size of the shelters can be adapted if it is appropriate for your project. Consideration should also be made to the color of the fence, however lighter colors degrade quicker than dark due to UV so always consult to determine which option is best for your projects needs.

**Joining Sections**
It is surprising how small gaps between overlapped fencing materials can allow for animals to get through or becomg entrapped. It is extremely important to make sure when connecting sections of fencing to each other or to other structures such as culverts, or crossings that there is a good seal.

**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).

**Timing**
It is not advised to install fences during times when animals are anticipated to be within, or in close proximity to the working area. Considerations should also be made to material properties and installing during extreme hot or cold temperatures is not recommended.

# 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; 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(s) each spring to breed, very often the pool(s) 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 time and money.

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

**California Newt** *Taricha torosa*

## Species Examples:

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

# Specifications:

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



### Free-standing

*Suitable for temporary & permanent*



### Attached

*Suitable for temporary & permanent*



### Fixing & Fastening

# 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 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.

**Desert Tortoise** *Gopherus agassizii*

## Species Examples:

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

# 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*

### 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 site 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.

**San Francisco Gareter Snake** *Thamnophis sirtalis tetrataenia*

## Species Examples:

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

# Specifications:

## 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 60 :** 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 at 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.

**Blandings Turtle** *Emydoidea blandingii*

## Species Examples:

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

# Specifications:

## 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 mccallii*) 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.

**Blunt-nosed Leopard Lizard** *Gambelia sila*

## Species Examples:

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

# Specifications:

## 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 favored 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.

**Pacific Tree Frog** *Pseudacris regilla*

## Species Examples:

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

# Specifications:

## 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 60 :** 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.

**Salt Marsh Harvest Mouse** *Reithrodontomys raviventris*

## Species Examples:

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

# 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 60 :** 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*

# AMX 40
## Basic Material Size & Features

**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.



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
**(AMX-T)** ***Temporary: 1-5 years***
Thickness: 0.04in / 1mm
Length: 75ft / 22m
Weight: 50lbs / 23kg

**SCORED PLASTIC -** PERFORATED & NON-PERFORATED
**(AMX-SP)** ***Semi-Permanent: Up to 15 years***
Thickness: 0.08in / 2mm
Length: 35ft / 10m
Weight: 50lbs / 23kg

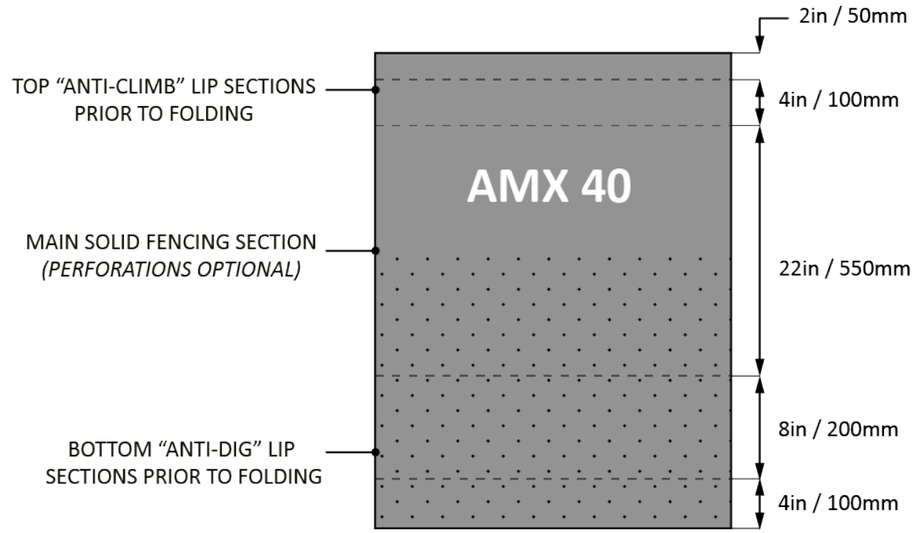
**PREFORMED METAL -** PERFORATED & NON-PERFORATED
**(AMX-XP)** ***Permanent: 30+ years / Lifetime solution***
Thickness: 0.08in / 2mm
Length: 8ft / 2.4m
Weight: 85lbs / 38kg

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

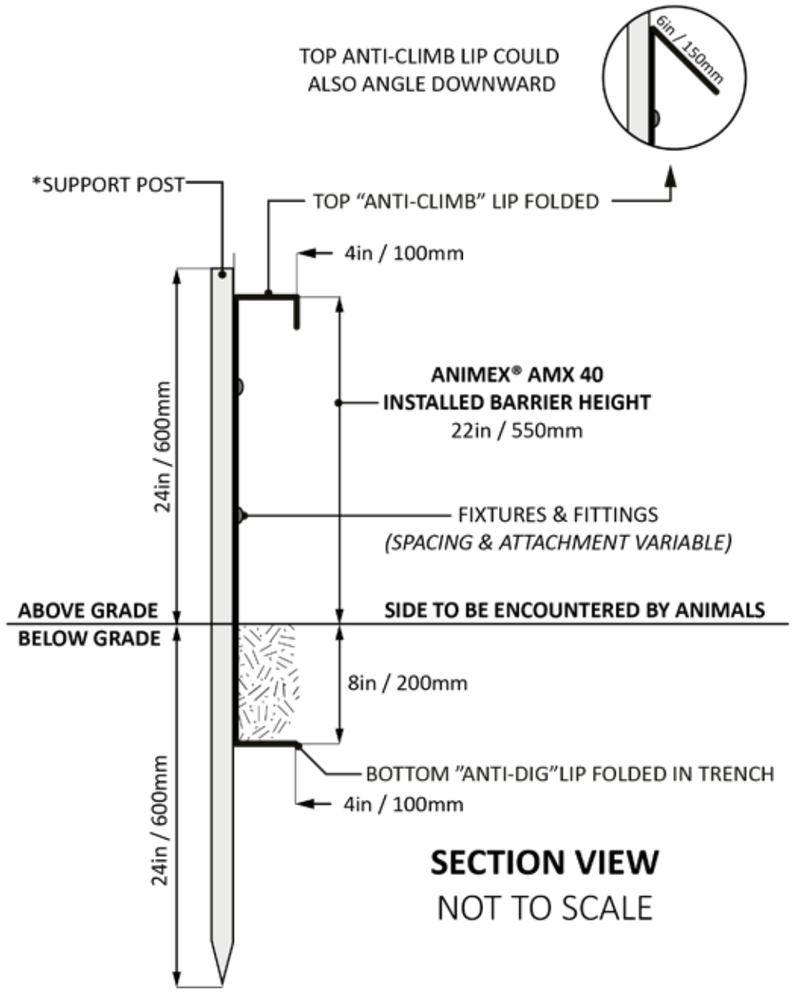
***Notes:***
These dimensions are a guide and based on maximizing the amount of material that can be shipped economically and maneuvered on site in line with common health and safety guidelines. The exact lengths, thickness and weights may vary.

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

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



# AMX 40
## **Free-standing** Below Ground




**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.



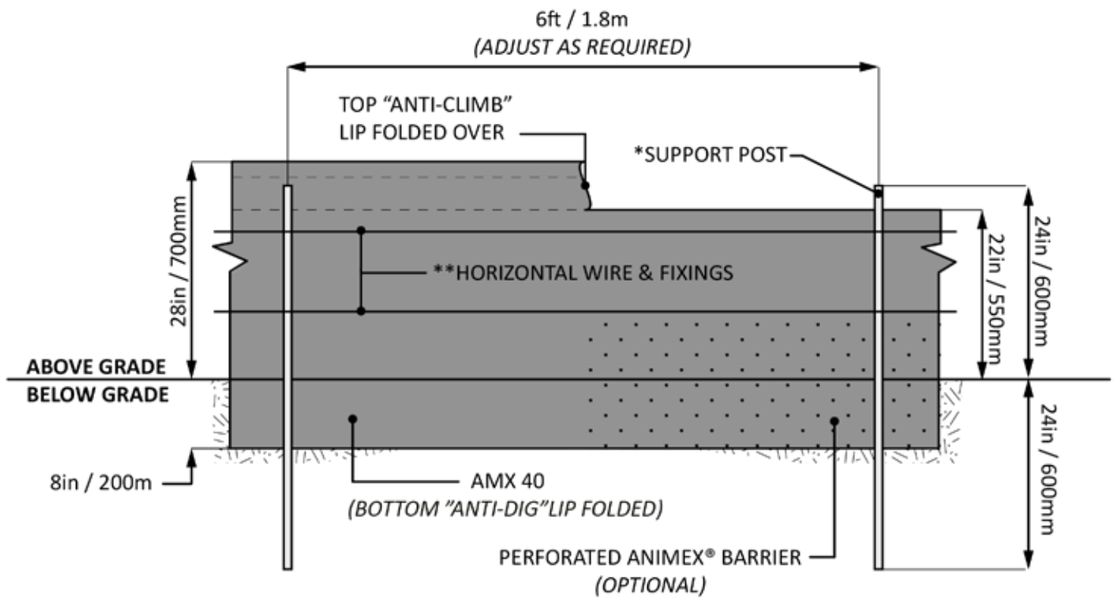






*SUPPORT POSTS & HORIZONTAL WIRE MAY NOT BE NEEDED FOR PREFORMED METAL (AMX-XP) FENCES

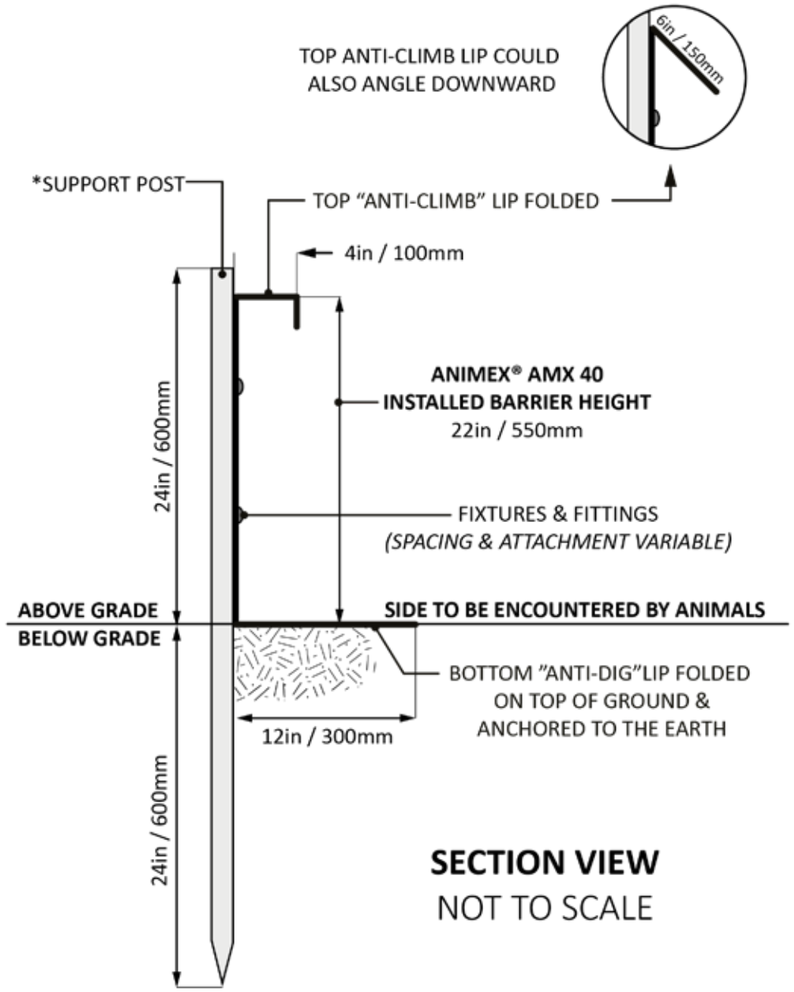
**HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES




**ELEVATION VIEW**
NOT TO SCALE

AMX 40

# AMX 40
## Free-standing Above Ground



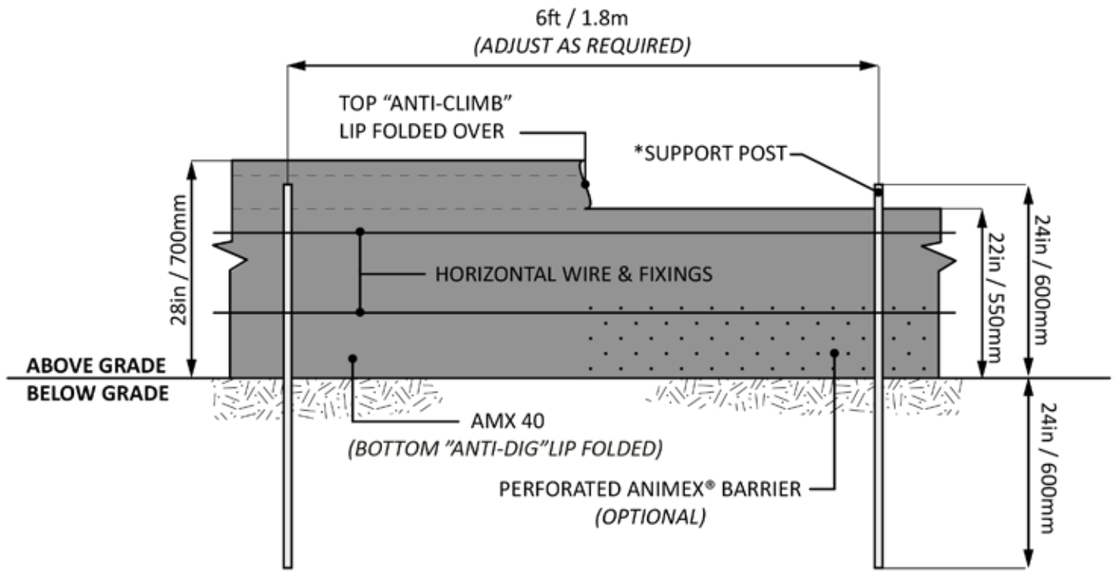

**SECTION VIEW**
NOT TO SCALE

**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.

**APPLY THIS ABOVE GROUND METHOD WHEN ATTACHING TO EXISITING 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



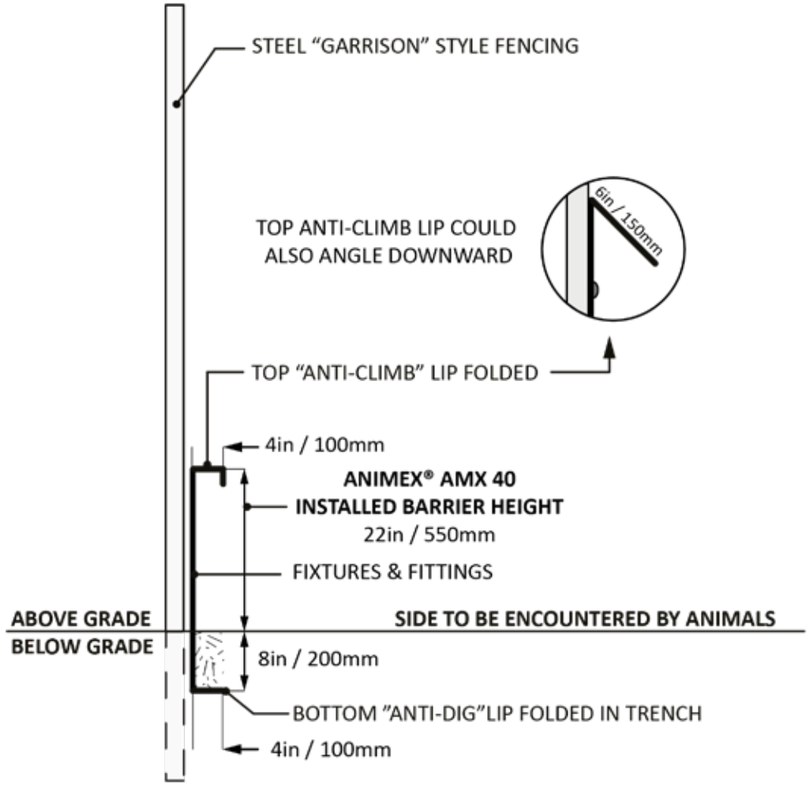

**ELEVATION VIEW**
NOT TO SCALE

**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
Free-standing Above Ground

# AMX 40
## **Attached** Garrison




**SECTION VIEW**
NOT TO SCALE

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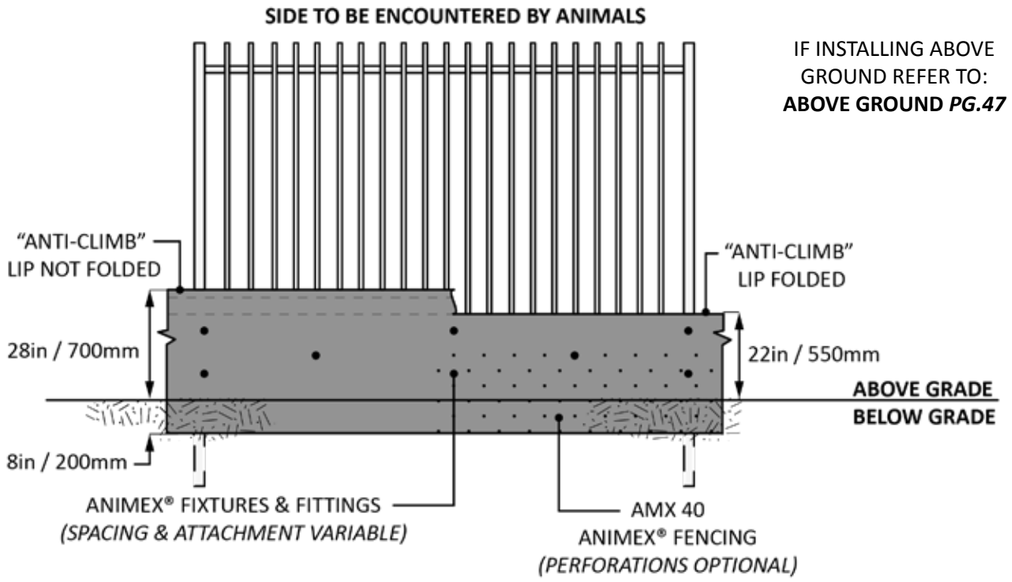
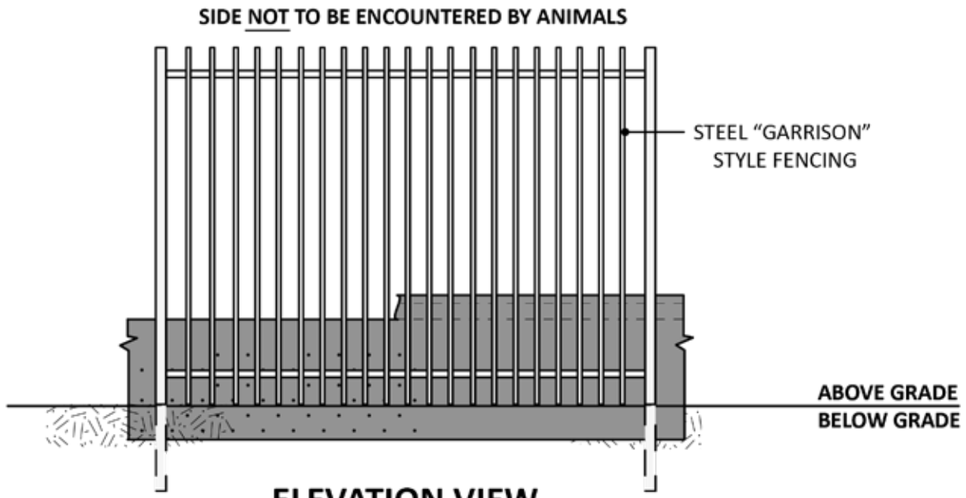
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



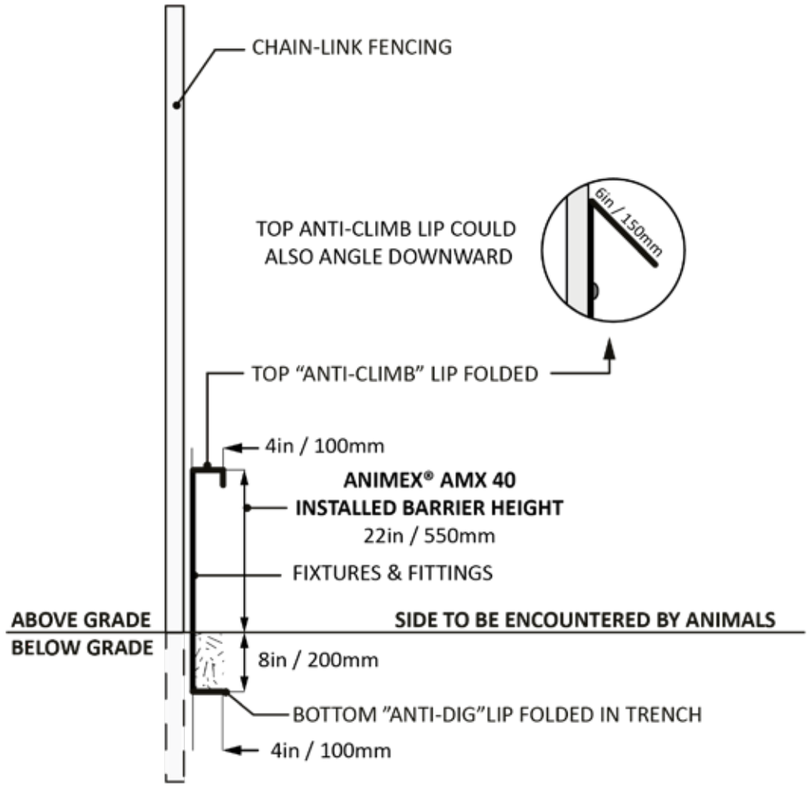



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.47***




**ELEVATION VIEW**
NOT TO SCALE

# AMX 40
## **Attached** Chain-link




**SECTION VIEW**
NOT TO SCALE

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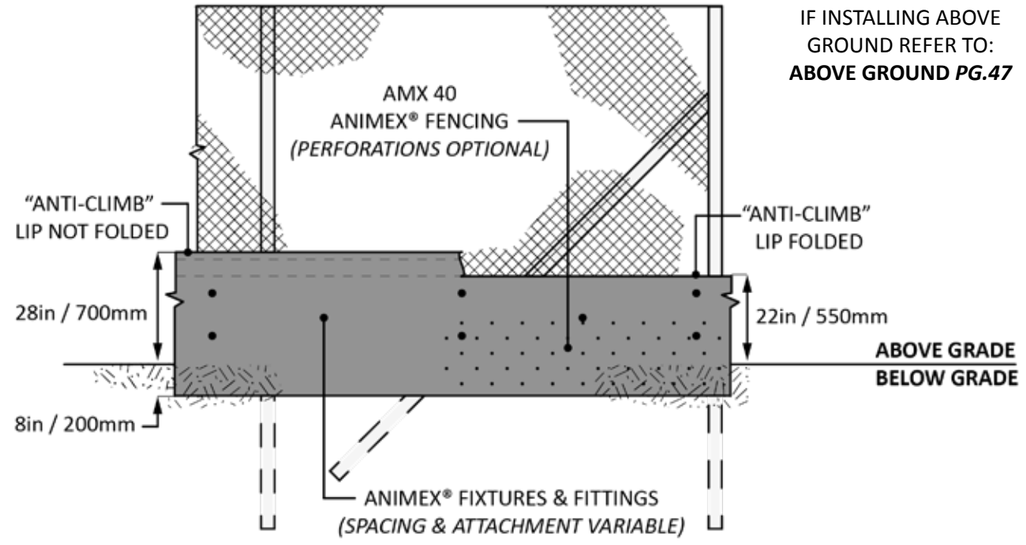
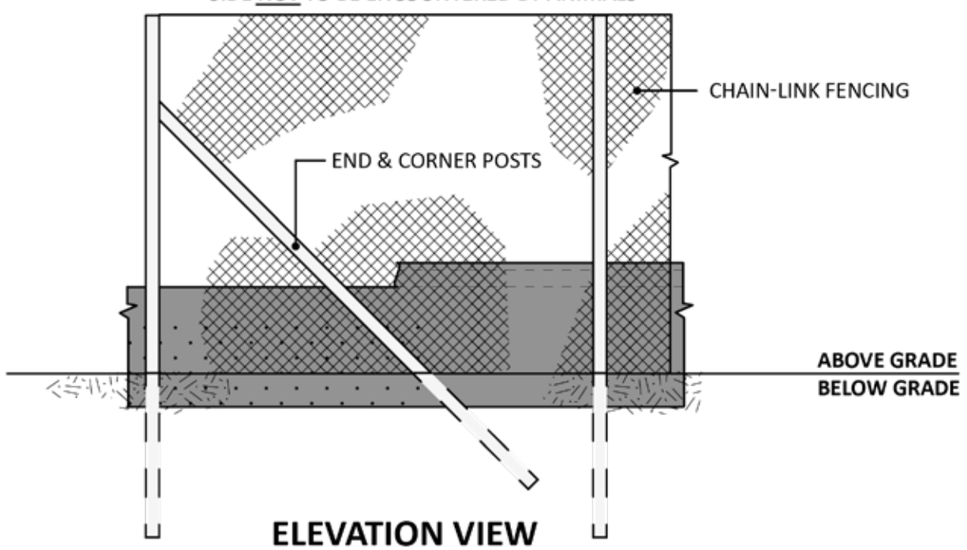
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

**SIDE TO BE ENCOUNTERED BY ANIMALS**



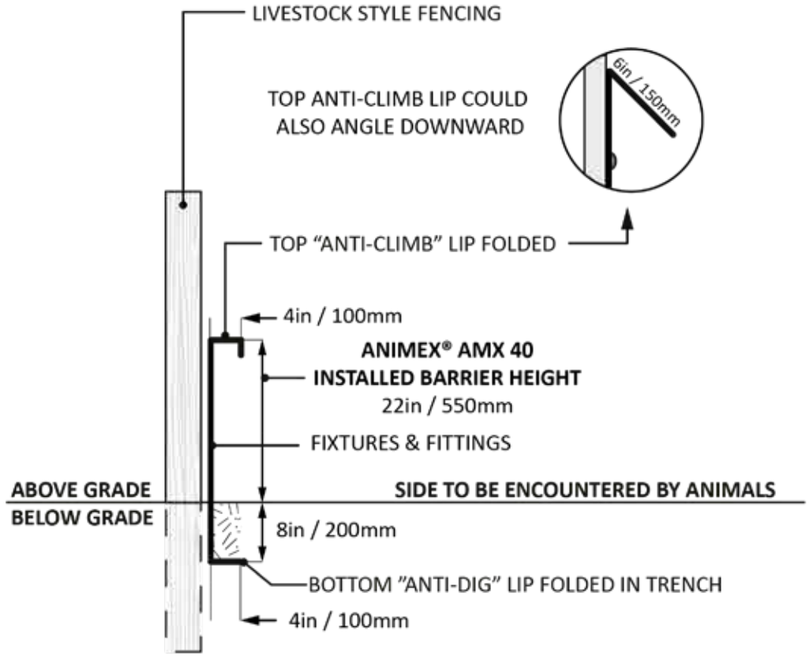

IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.47***

**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**




**ELEVATION VIEW**
NOT TO SCALE

# AMX 40
## **Attached** Livestock




**SECTION VIEW**
NOT TO SCALE

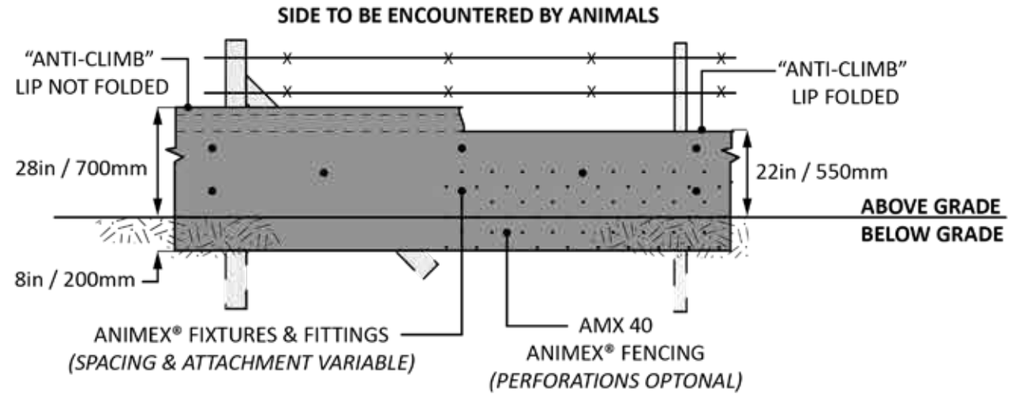
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

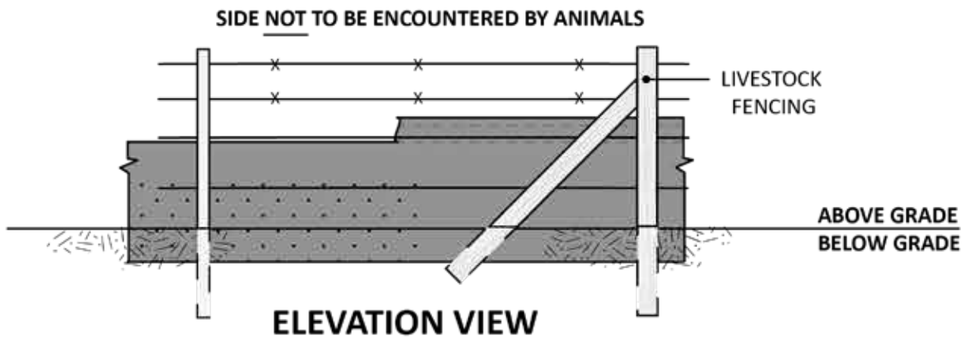






IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND *PG.47***




**ELEVATION VIEW**
NOT TO SCALE

**NOTES:**
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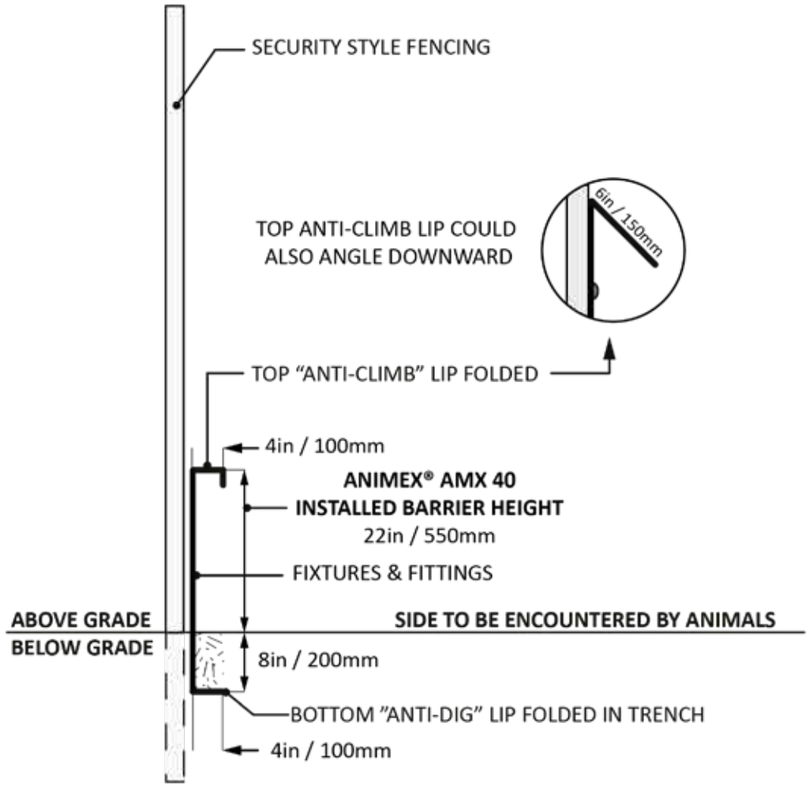
# AMX 40
## Attached Security




**SECTION VIEW**
NOT TO SCALE

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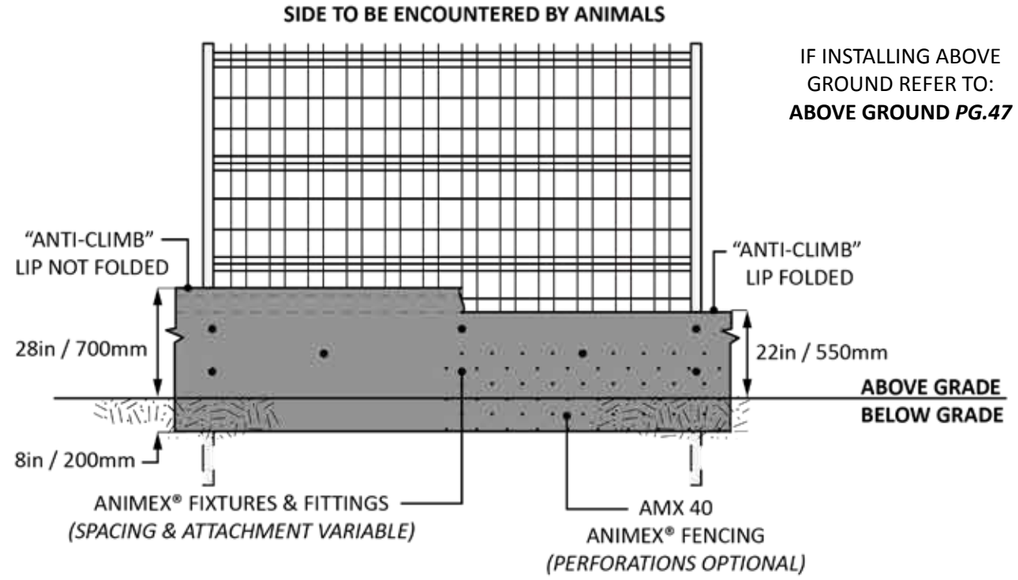
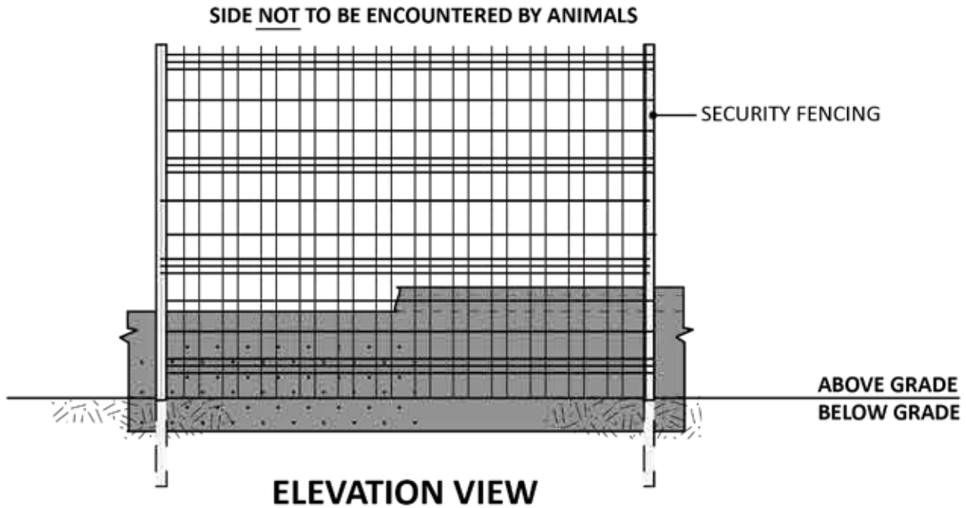
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.





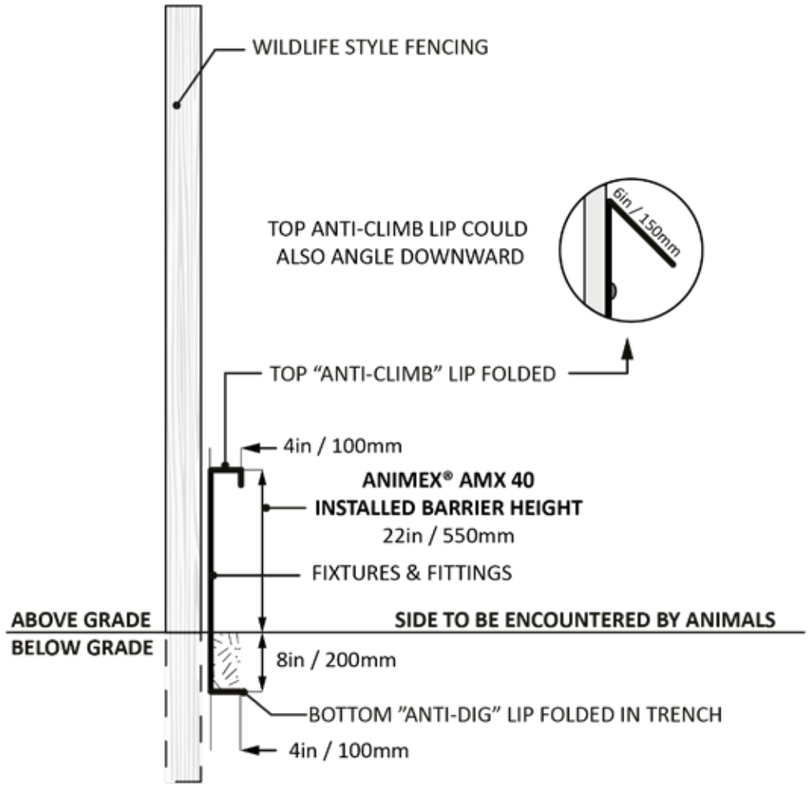

IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND *PG.47***




**ELEVATION VIEW**
NOT TO SCALE

# AMX 40

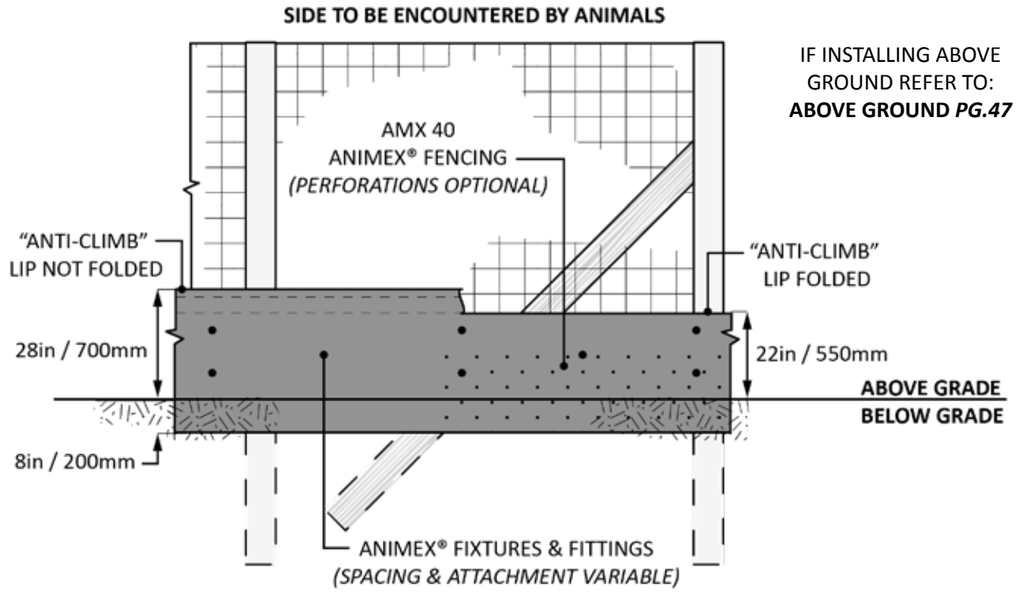
## **Attached** Large Wildlife



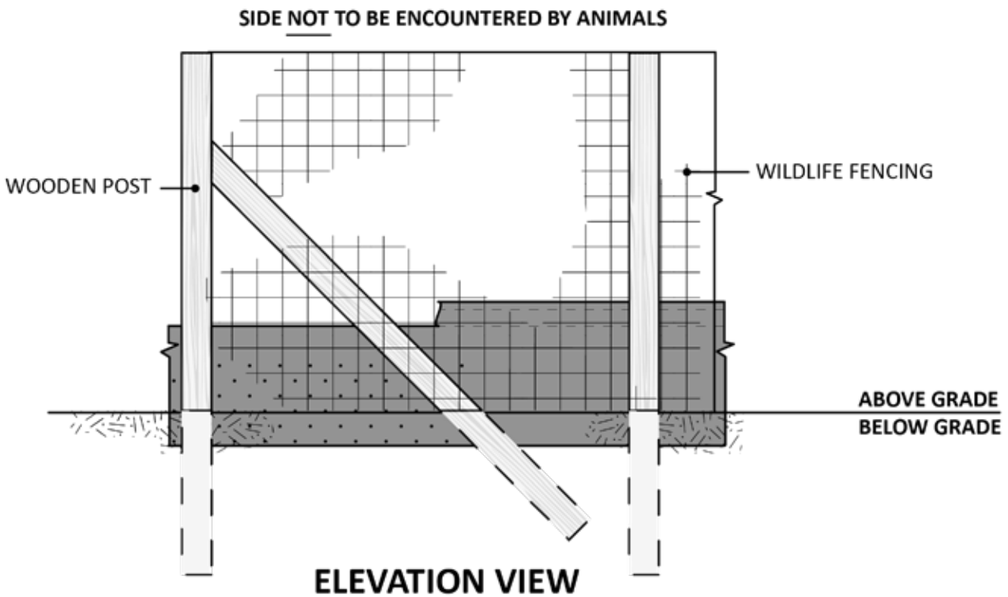

**SECTION VIEW**
NOT TO SCALE

**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.






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




**ELEVATION 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
## Basic Material Size & Features

**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.



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

**AMX 48** dimensions based on popular **optimal fencing** materials *(pg16)*:

**SCORED PLASTIC -** PERFORATED & NON-PERFORATED
**(AMX-T)** ***Temporary: 1-5 years***
Thickness: 0.04in / 1mm
Length: 60ft / 18.2m
Weight: 50lbs / 23kg

**SCORED PLASTIC -** PERFORATED & NON-PERFORATED
**(AMX-SP)** ***Semi-Permanent: Up to 15 years***
Thickness: 0.08in / 2mm
Length: 30ft / 9m
Weight: 50lbs / 23kg

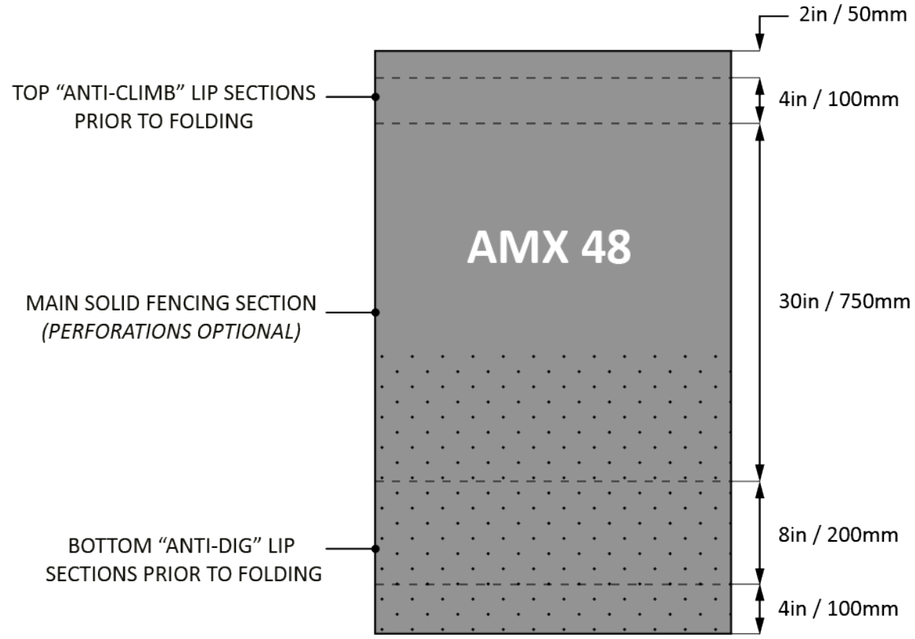
**PREFORMED METAL -** PERFORATED & NON-PERFORATED
**(AMX-XP)** ***Permanent: 30+ years / Lifetime solution***
Thickness: 0.08in / 2mm
Length: 8ft / 2.4m
Weight: 99lbs / 45kg

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

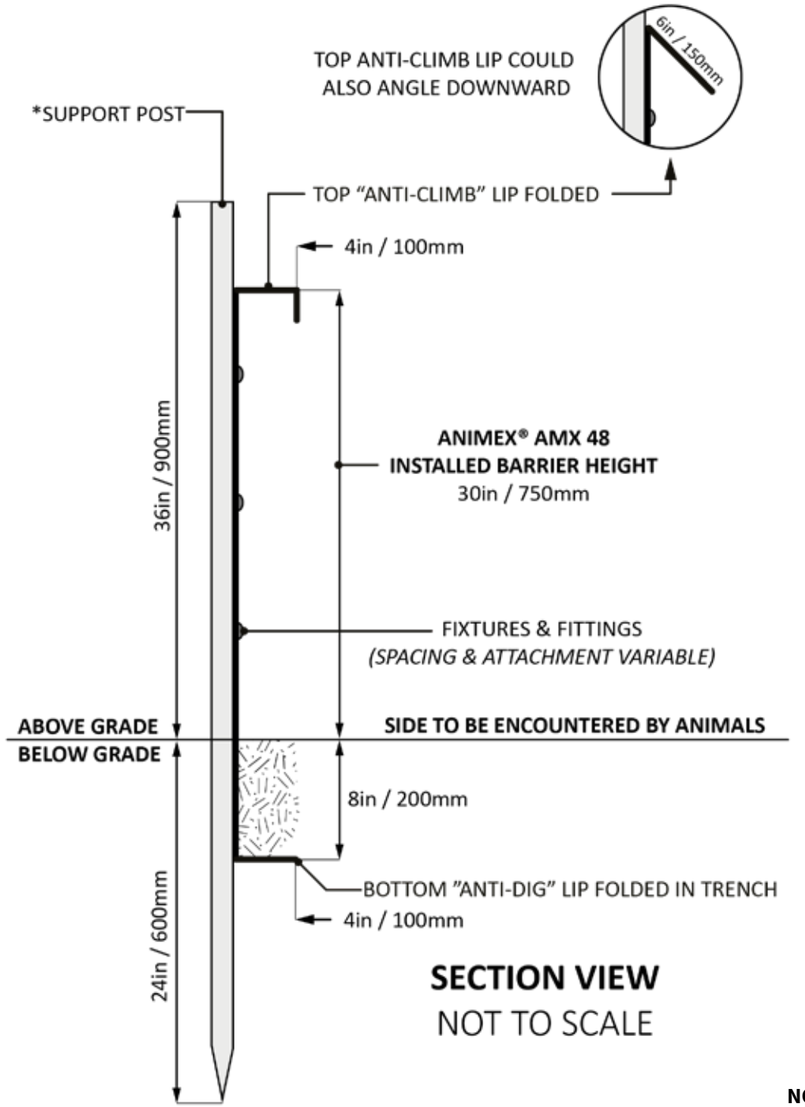
***Notes:***
These dimensions are a guide and based on maximizing the amount of material that can be shipped economically and maneuvered on site in line with common health and safety guidelines. The exact lengths, thickness and weights may vary.

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

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



# AMX 48
## **Free-standing** Below Ground

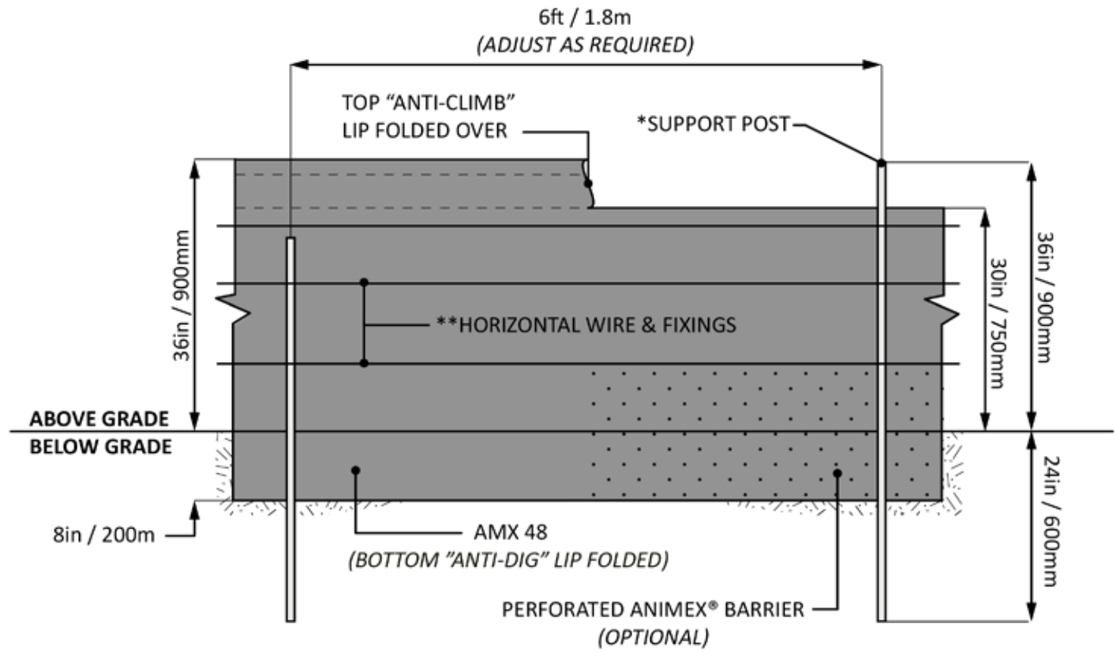



**SECTION VIEW**
NOT TO SCALE

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

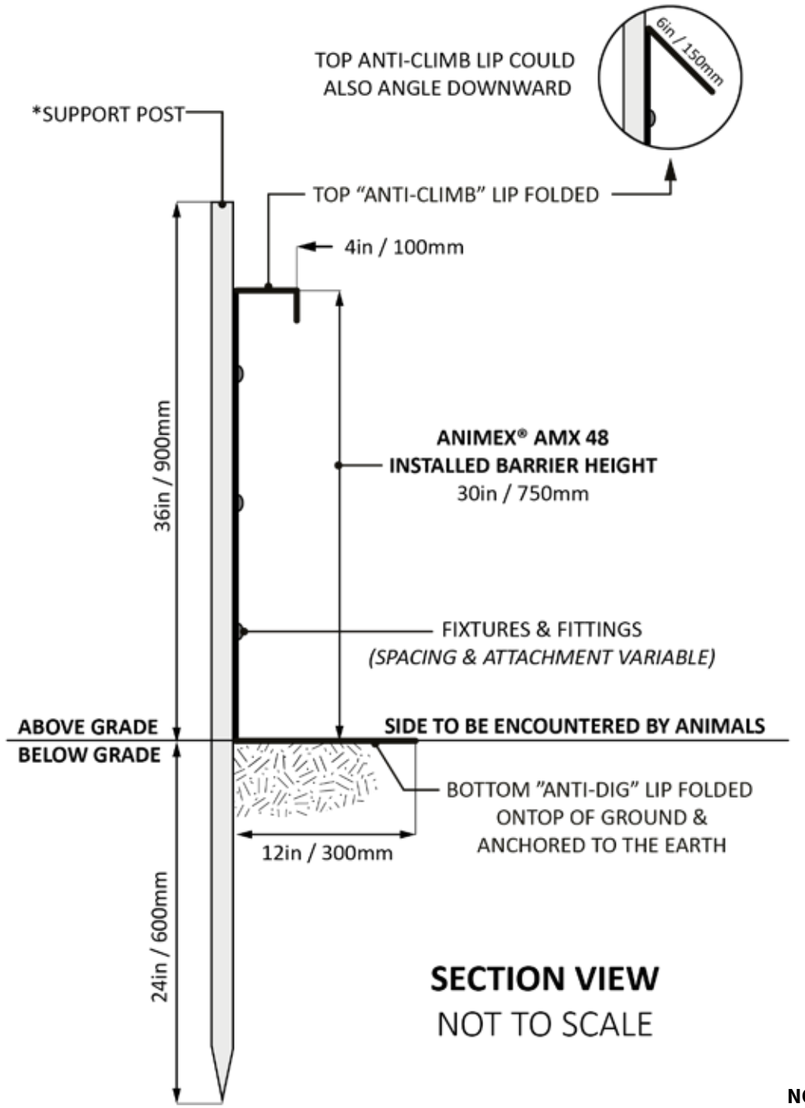
**HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES




**ELEVATION VIEW**
NOT TO SCALE

**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




**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.







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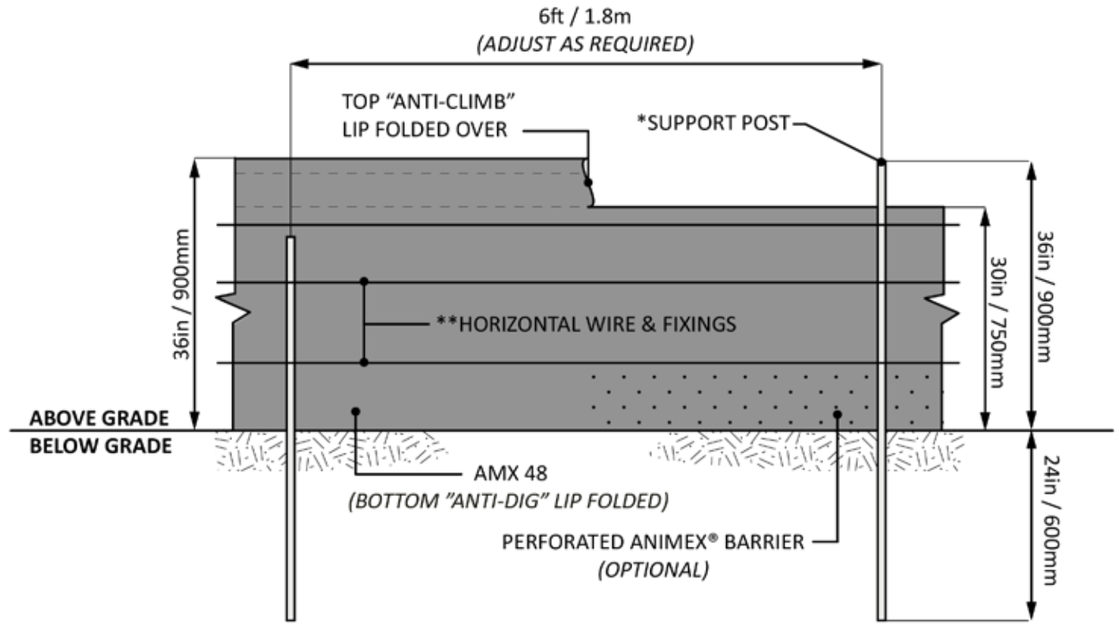
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



**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

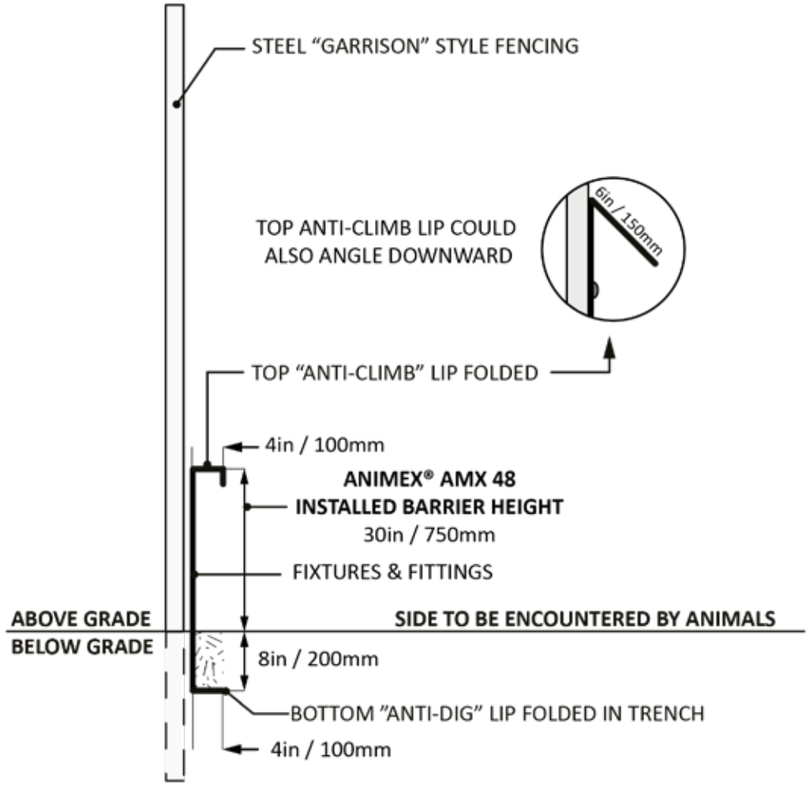



**ELEVATION VIEW**
NOT TO SCALE



AMX 48

# AMX 48
## **Attached** Garrison




**SECTION VIEW**
NOT TO SCALE

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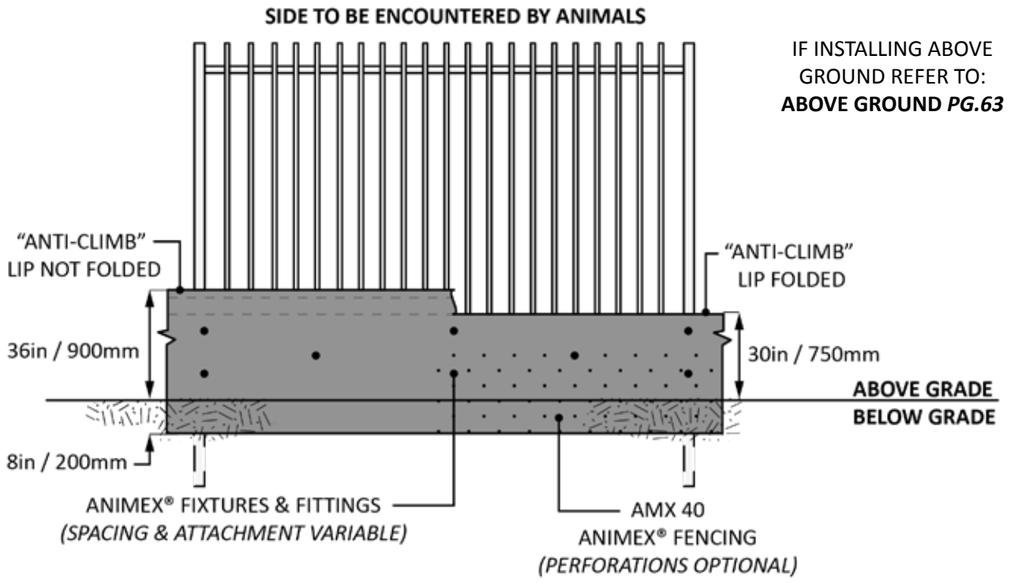
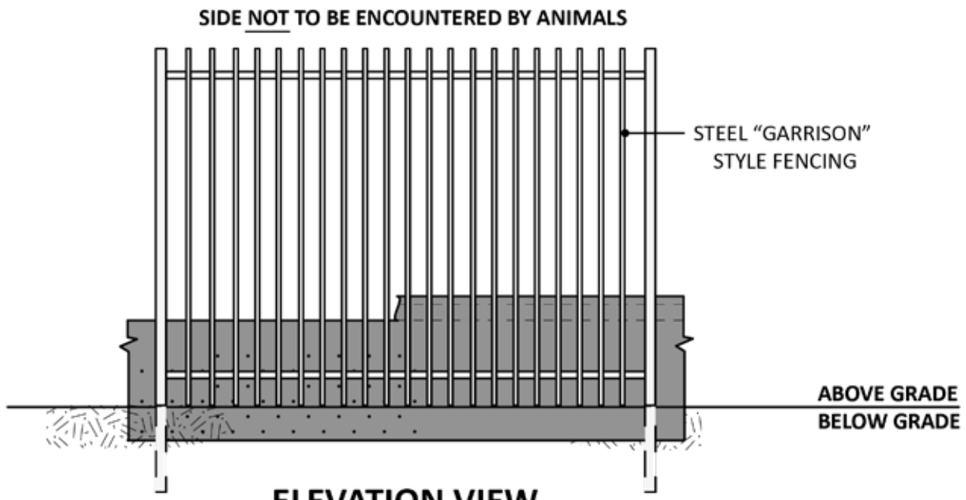
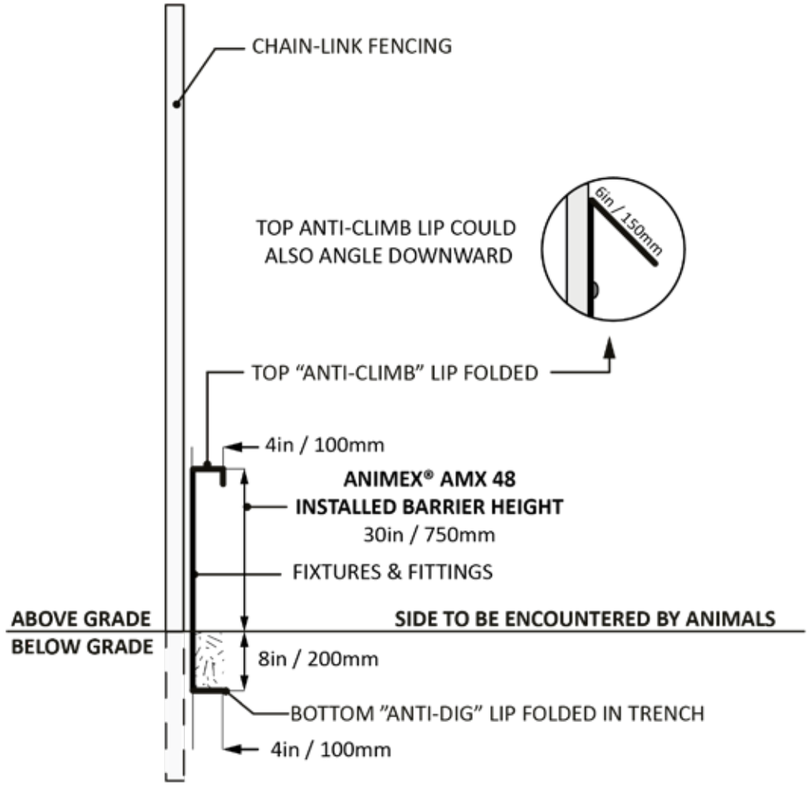



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.63***




**ELEVATION VIEW**
NOT TO SCALE

# AMX 48
## **Attached** Chain-link




**SECTION VIEW**
NOT TO SCALE

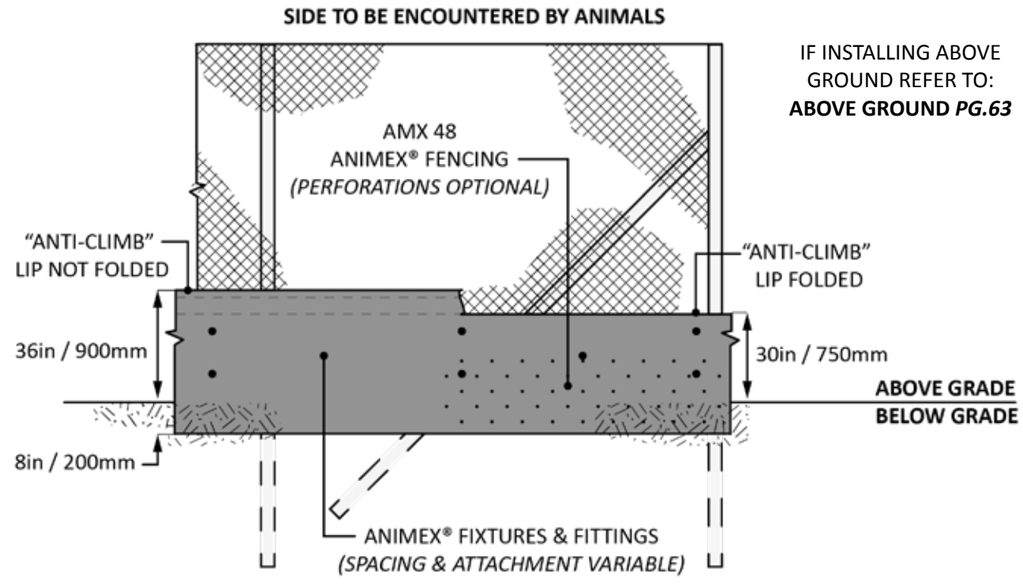
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.

AMX 48
**Attached** Chain-link

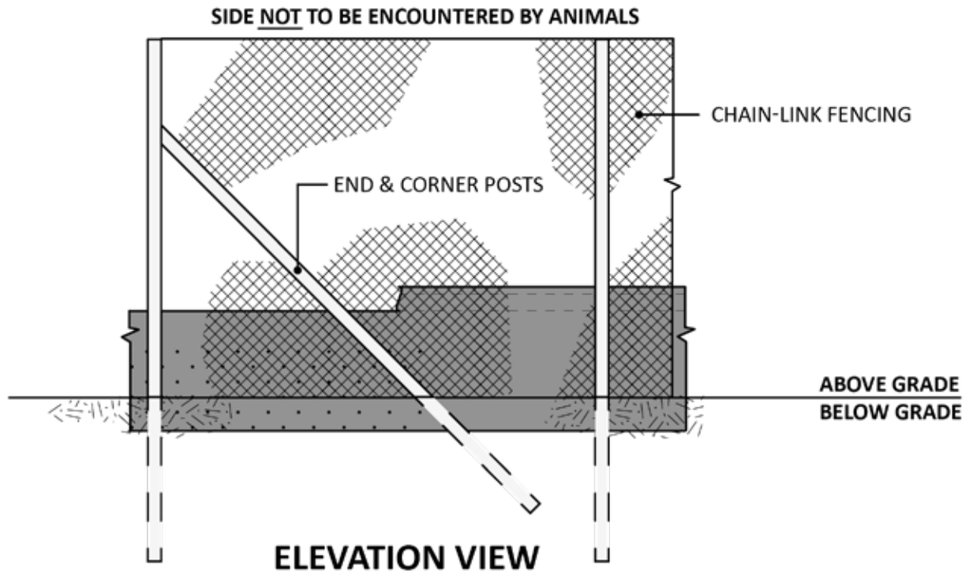




**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.




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

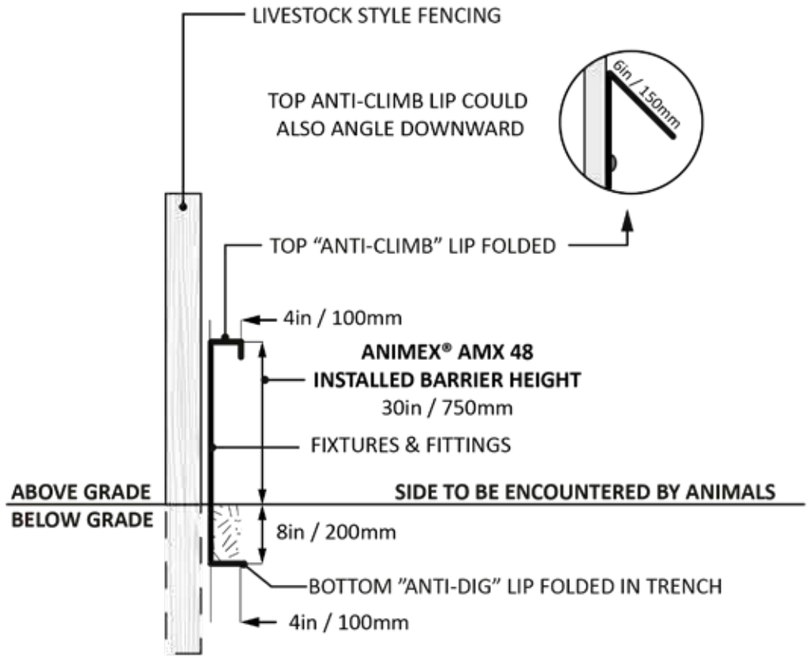



**ELEVATION VIEW**
NOT TO SCALE

AMX 48

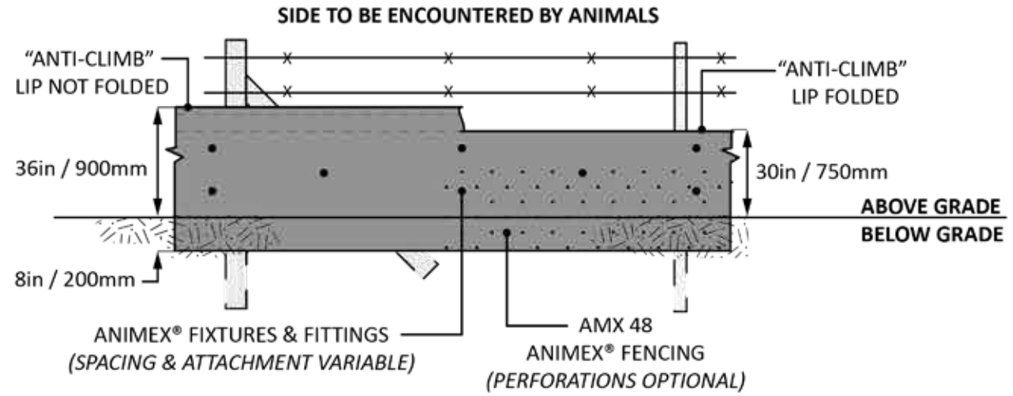
# AMX 48
## Attached Livestock

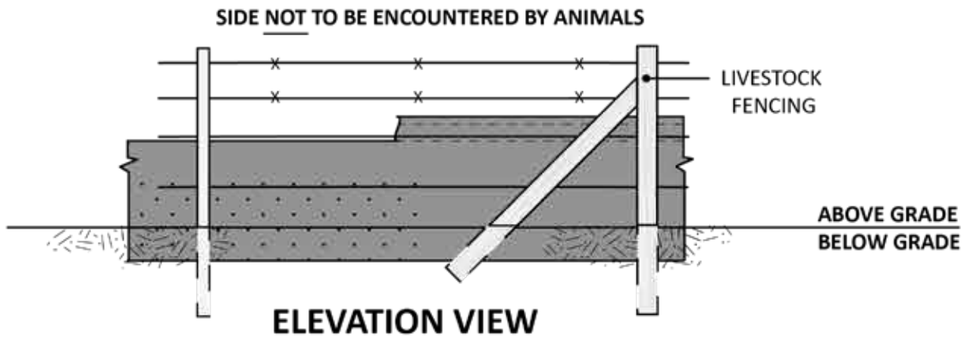
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.




**SECTION VIEW**
NOT TO SCALE

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

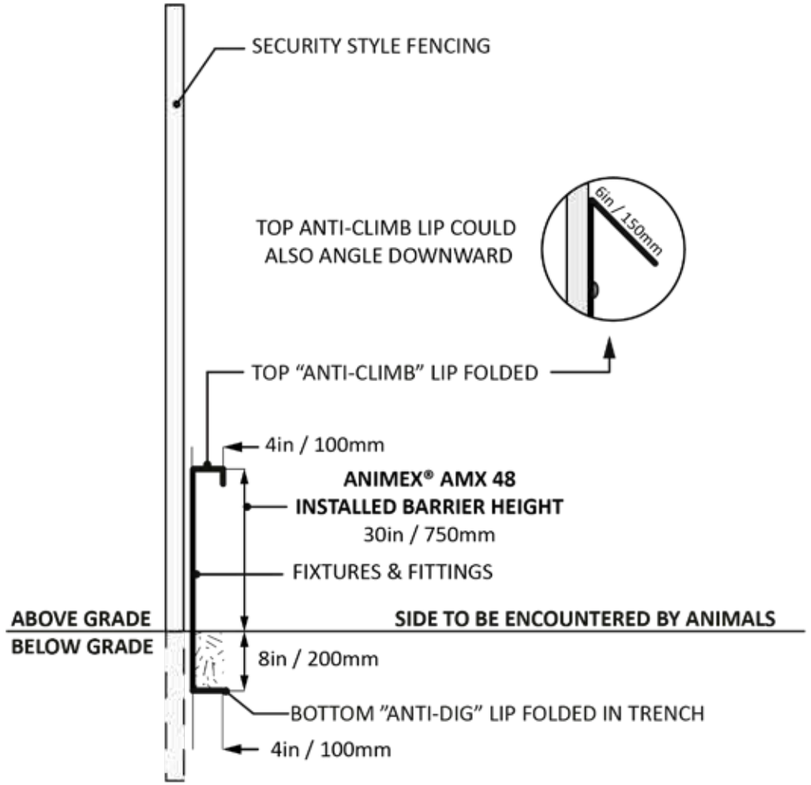



**ELEVATION VIEW**
NOT TO SCALE

**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
## **Attached** Security




**SECTION VIEW**
NOT TO SCALE

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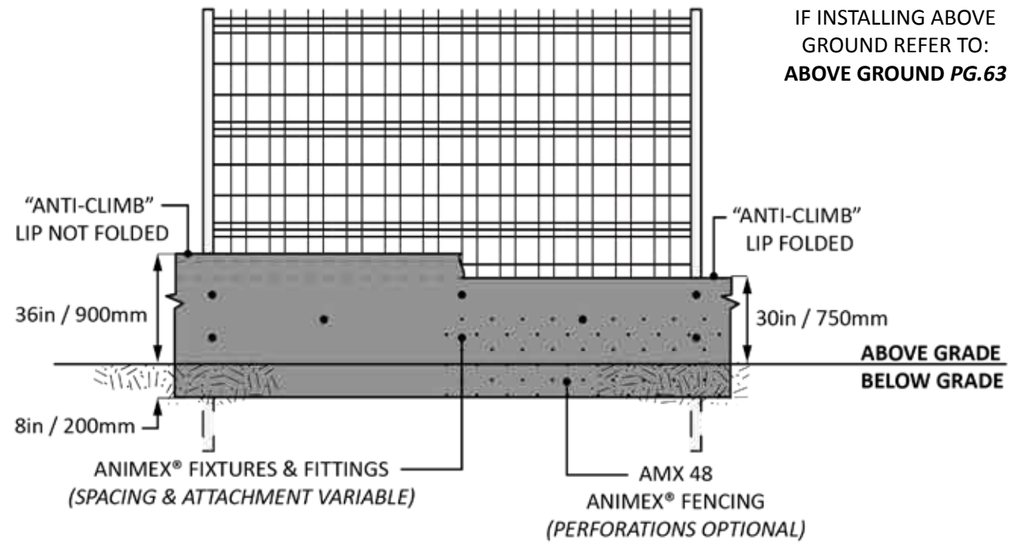
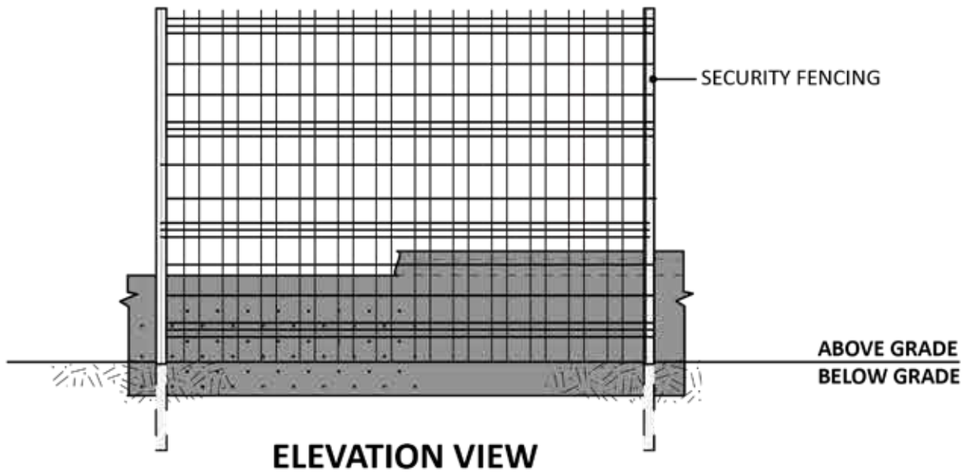
**SIDE TO BE ENCOUNTERED BY ANIMALS**




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

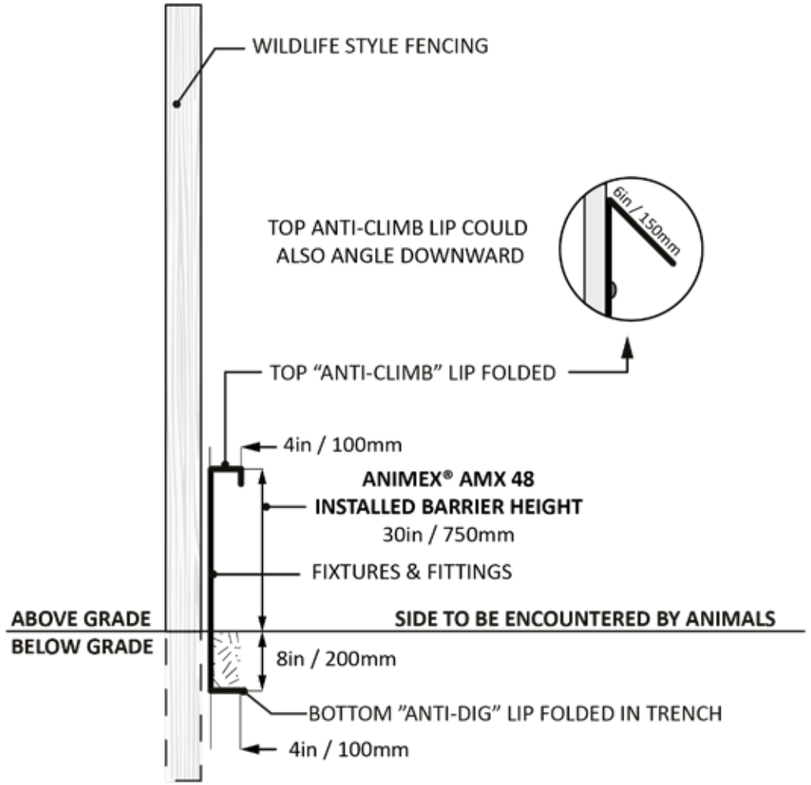
**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**




**ELEVATION VIEW**
NOT TO SCALE

# AMX 48

## **Attached** Large Wildlife




**SECTION VIEW**
NOT TO SCALE

**NOTES:**
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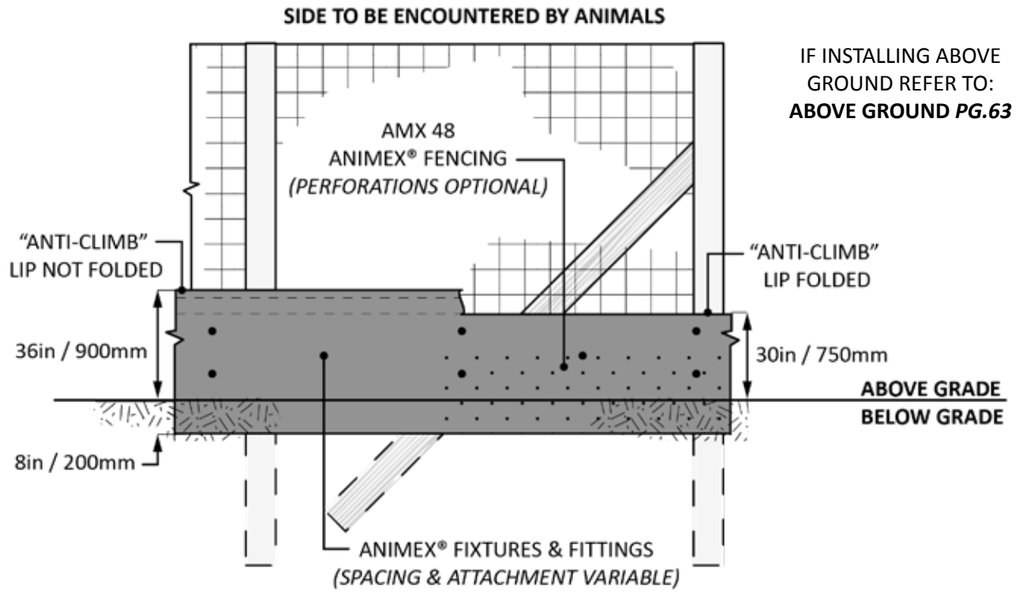
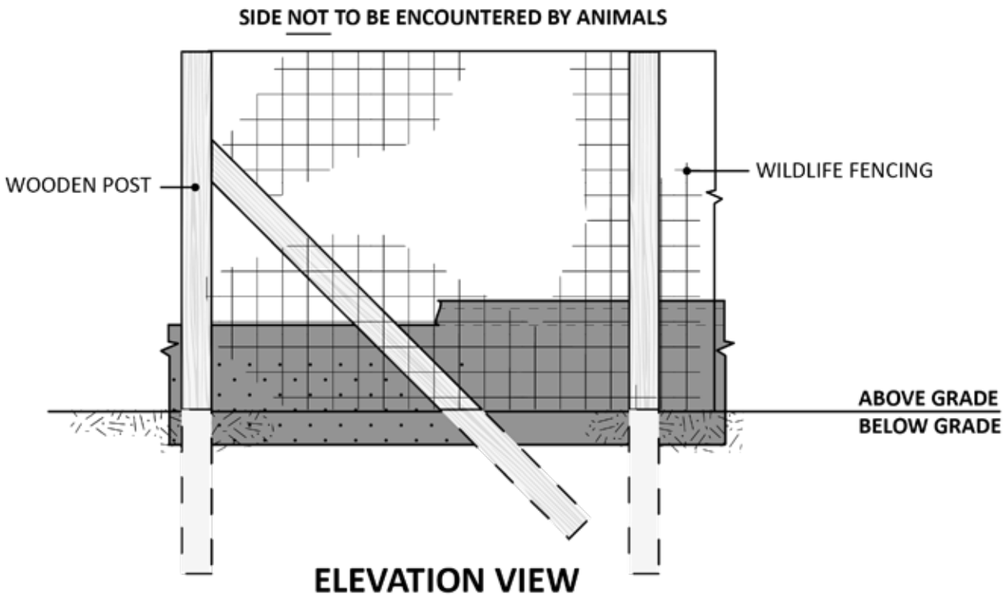



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.63***




**ELEVATION VIEW**
NOT TO SCALE

# 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 *(pg16)*:

**SCORED PLASTIC -** PERFORATED & NON-PERFORATED
**(AMX-T)** ***Temporary: 1-5 years***
Thickness: 0.04in / 1mm
Length: 50ft / 15m
Weight: 50lbs / 23kg

**SCORED PLASTIC -** PERFORATED & NON-PERFORATED
**(AMX-SP)** ***Semi-Permanent: Up to 15 years***
Thickness: 0.08in / 2mm
Length: 20ft / 6m
Weight: 50lbs / 23kg

**PREFORMED METAL -** PERFORATED & NON-PERFORATED
**(AMX-XP)** ***Permanent: 30+ years / Lifetime solution***
Thickness: 0.08in / 2mm
Length: 8ft / 2.4m
Weight: 116lbs / 53kg

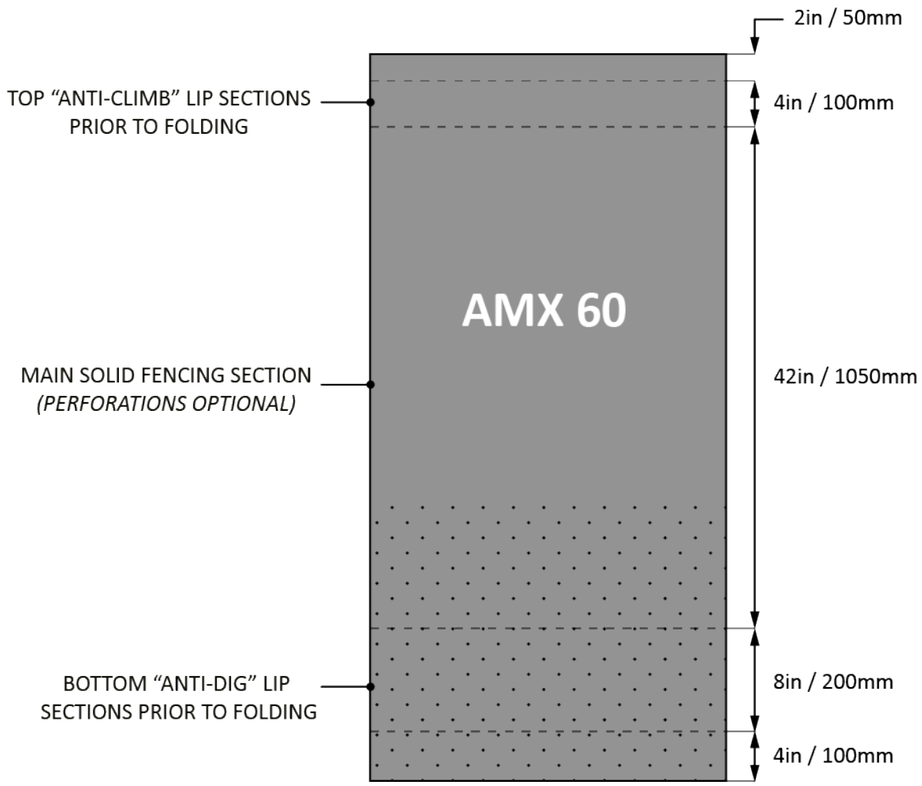
**AMX 60 INSTALLED ABOVE GROUND HEIGHT: 42in / 1050mm**

***Notes:***
These dimensions are a guide and based on maximizing the amount of material that can be shipped economically and maneuvered on site in line with common health and safety guidelines. The exact lengths, thickness and weights may vary.

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

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

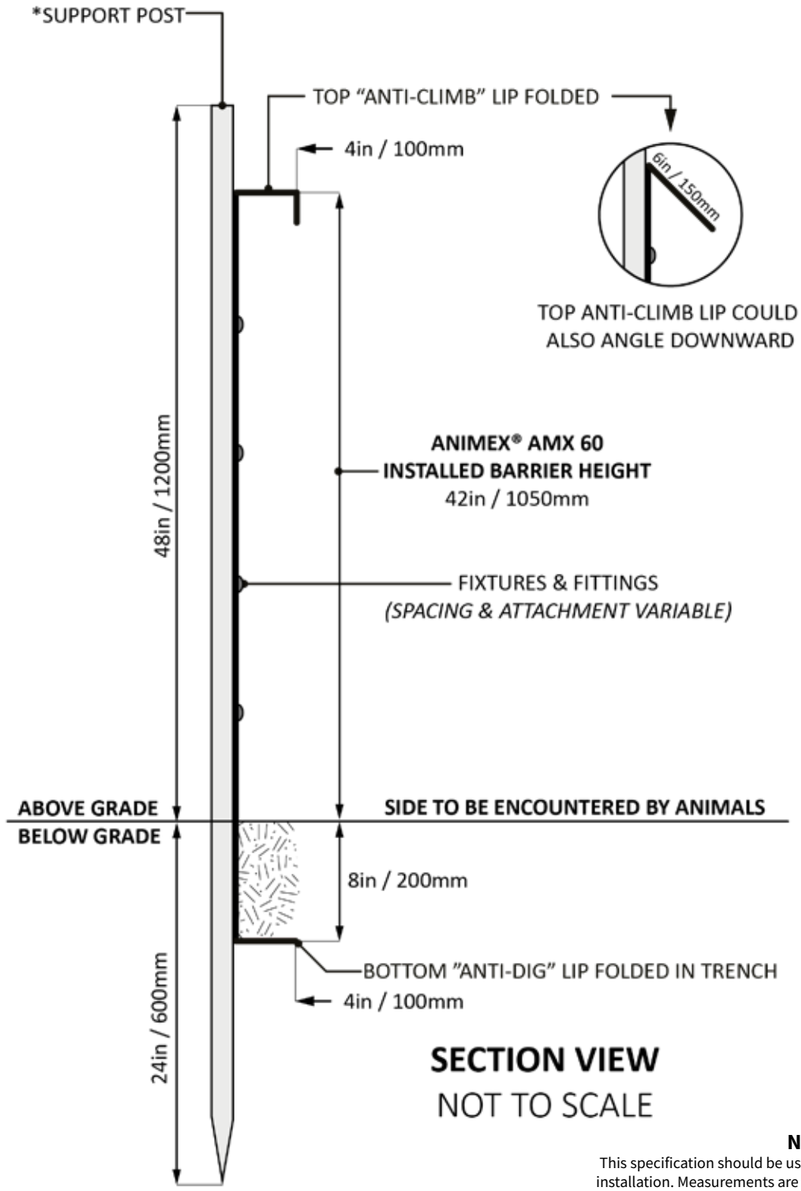
**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.



# AMX 60
## **Free-standing** Below Ground

**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.

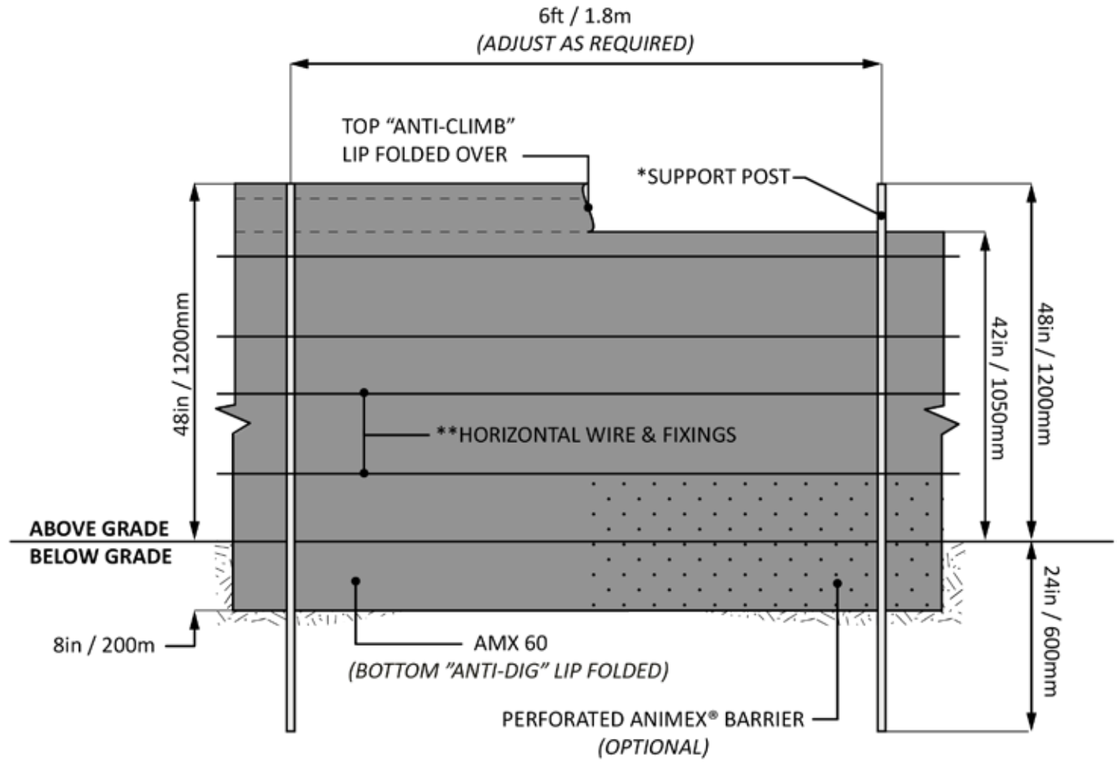





**SECTION VIEW**
NOT TO SCALE

*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

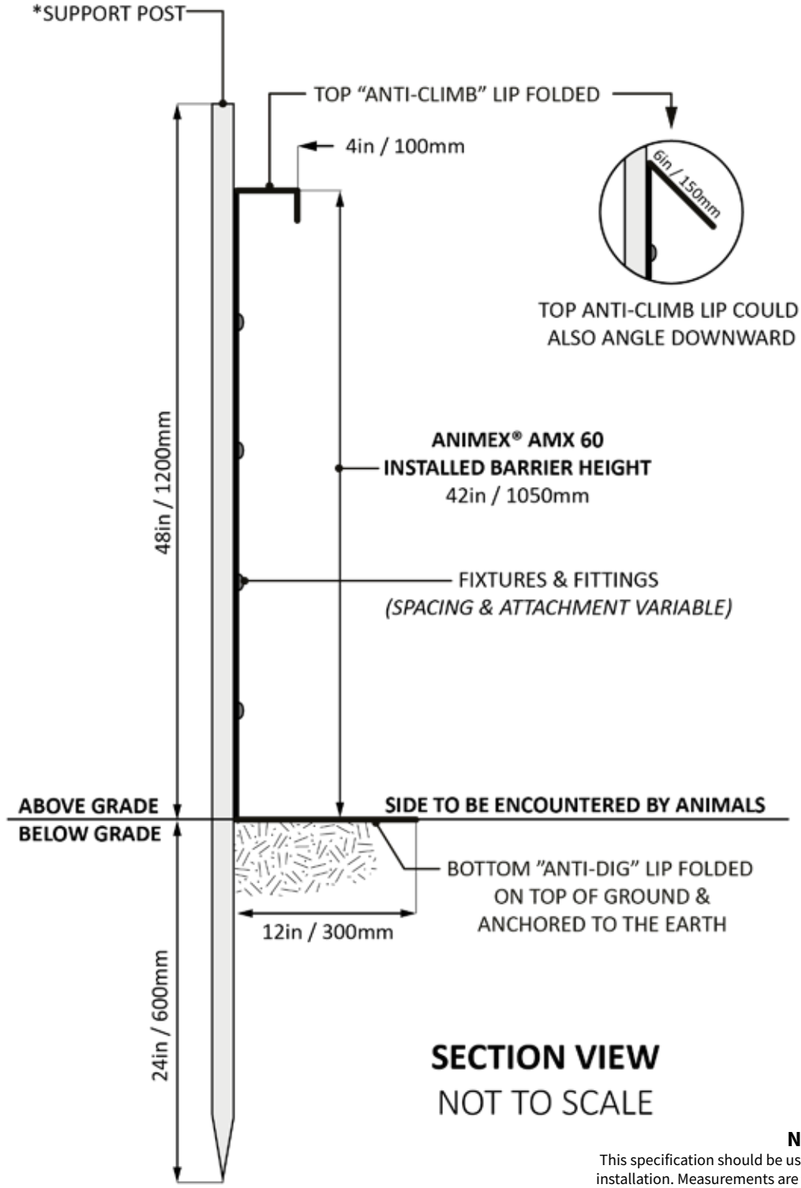



**ELEVATION VIEW**
NOT TO SCALE

**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




**SECTION VIEW**
NOT TO SCALE

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

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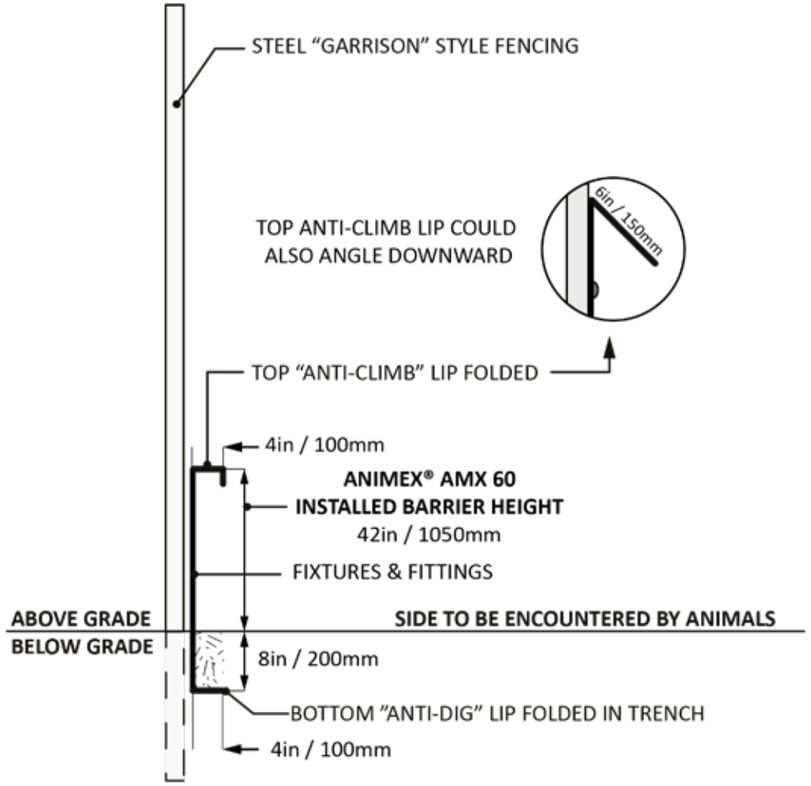
**HORIZONTAL WIRE MAY NOT BE NEEDED FOR TEMPORARY (AMX-T) FENCES




**ELEVATION VIEW**
NOT TO SCALE

# AMX 60
## **Attached** Garrison




**SECTION VIEW**
NOT TO SCALE

**NOTES:**
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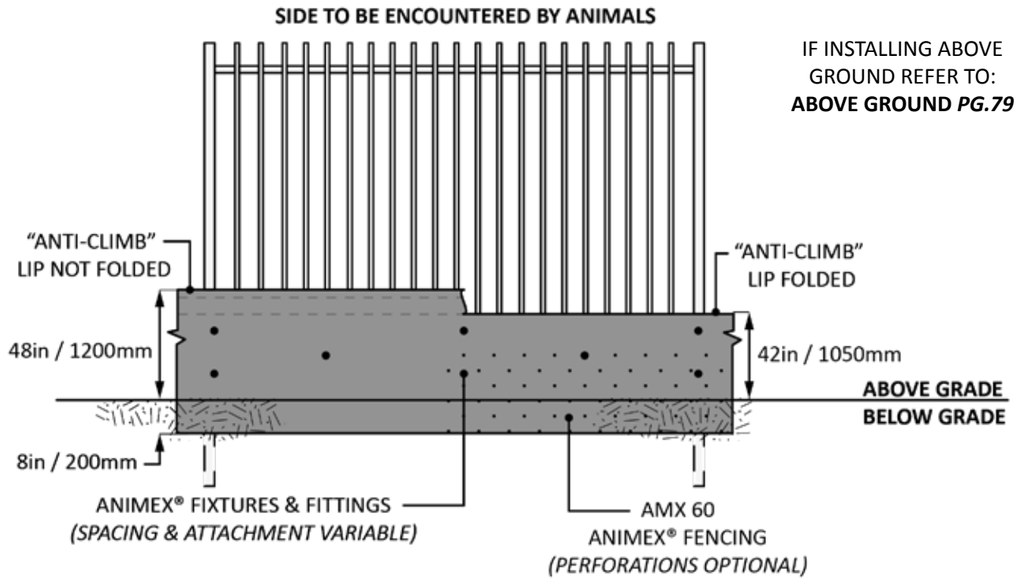
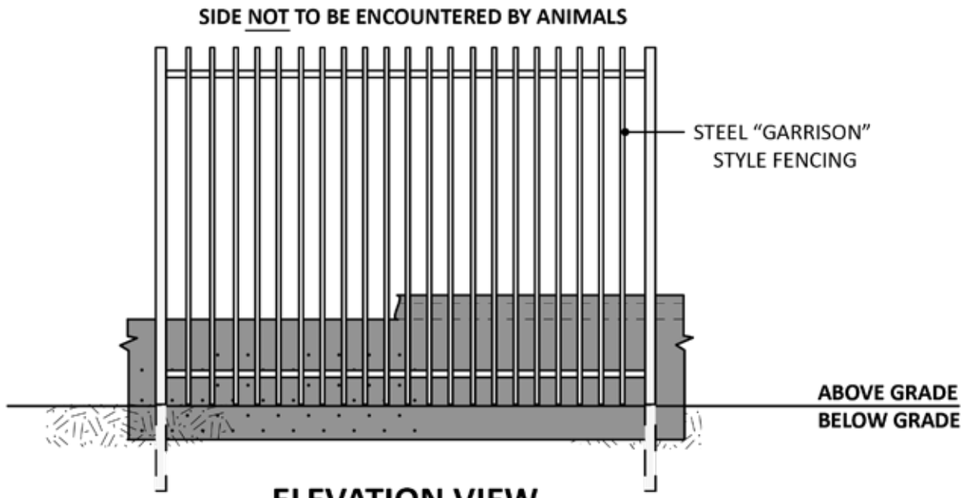



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.79***

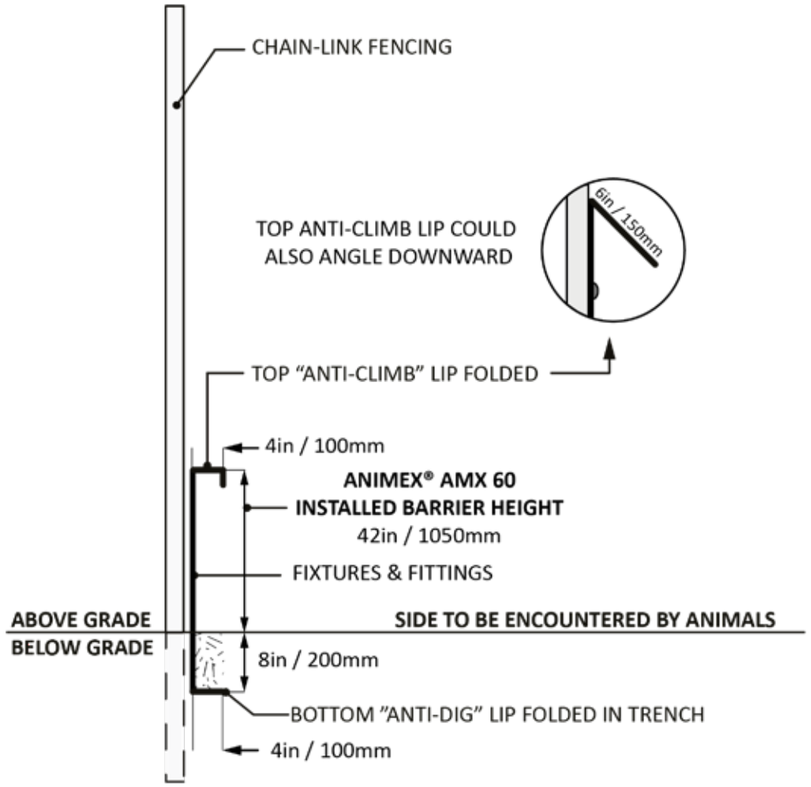



**ELEVATION VIEW**
NOT TO SCALE



AMX 60
**Attached** Garrison

# AMX 60
## **Attached** Chain-link




**SECTION VIEW**
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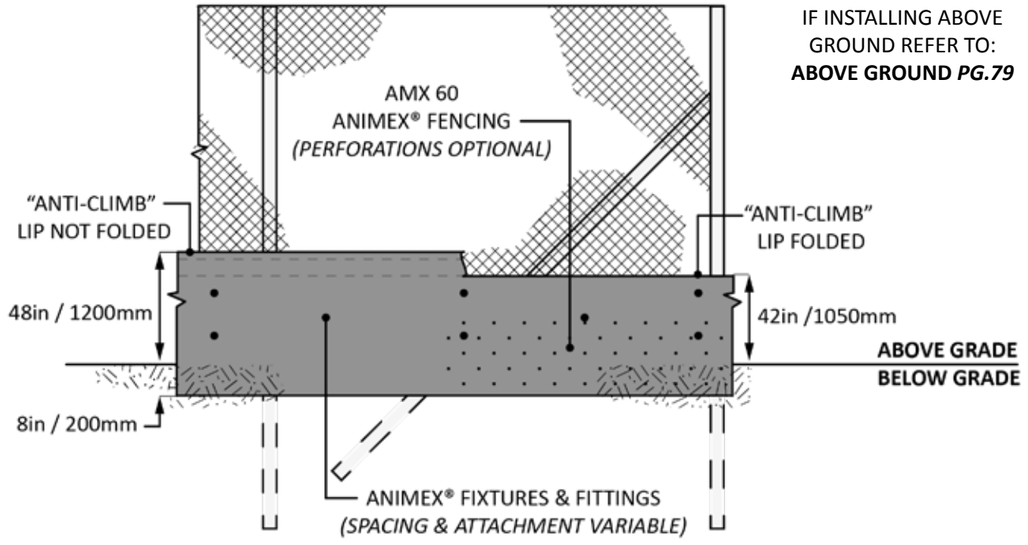
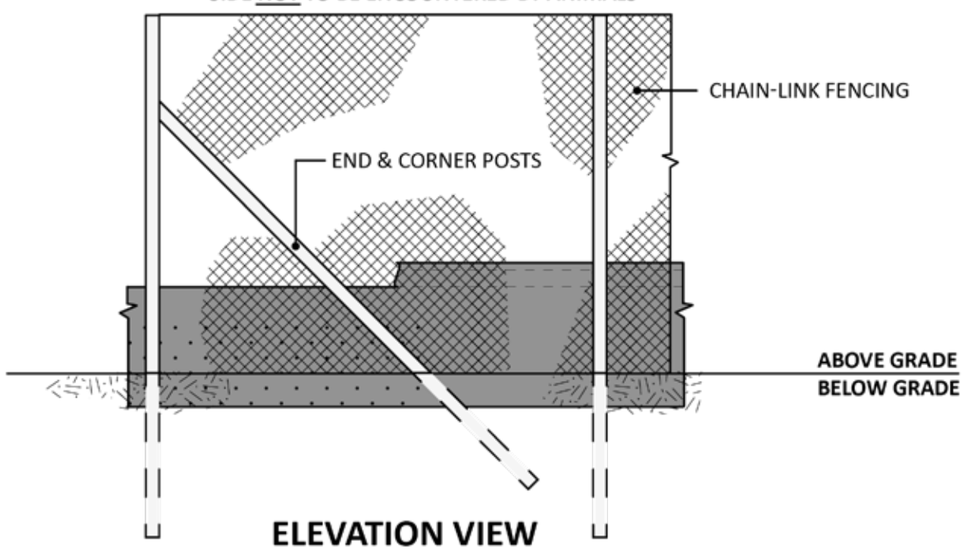
**SIDE TO BE ENCOUNTERED BY ANIMALS**





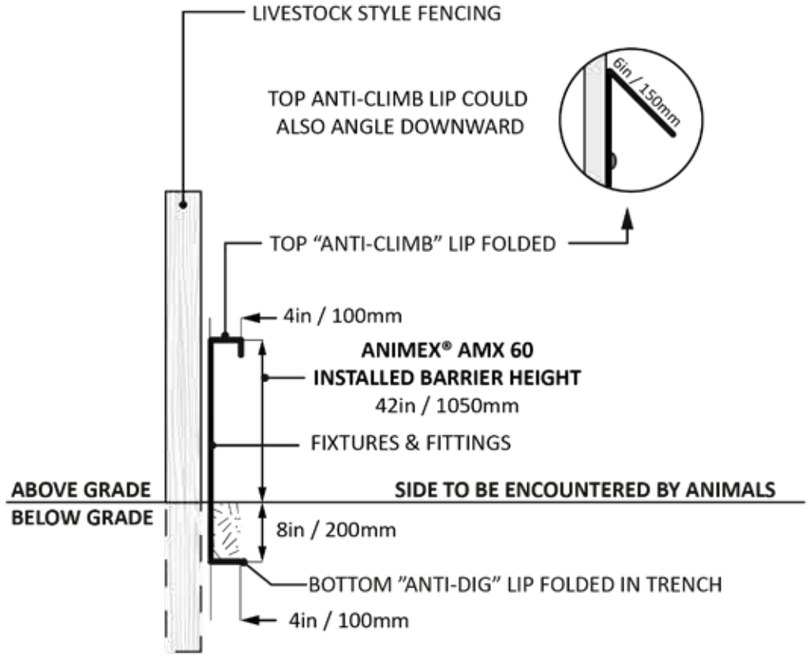
IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND** ***PG.79***


**SIDE NOT TO BE ENCOUNTERED BY ANIMALS**




**ELEVATION VIEW**
NOT TO SCALE

# AMX 60
## Attached Livestock




**SECTION VIEW**
NOT TO SCALE

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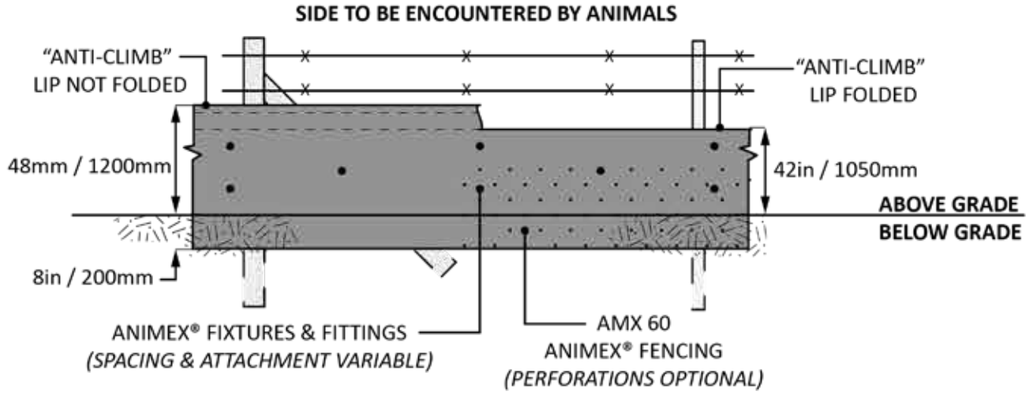
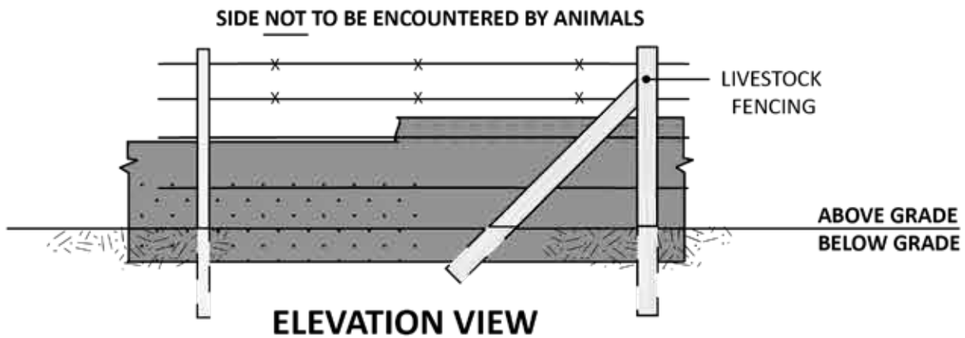
IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND *PG.79***




**ELEVATION VIEW**
NOT TO SCALE

**NOTES:**
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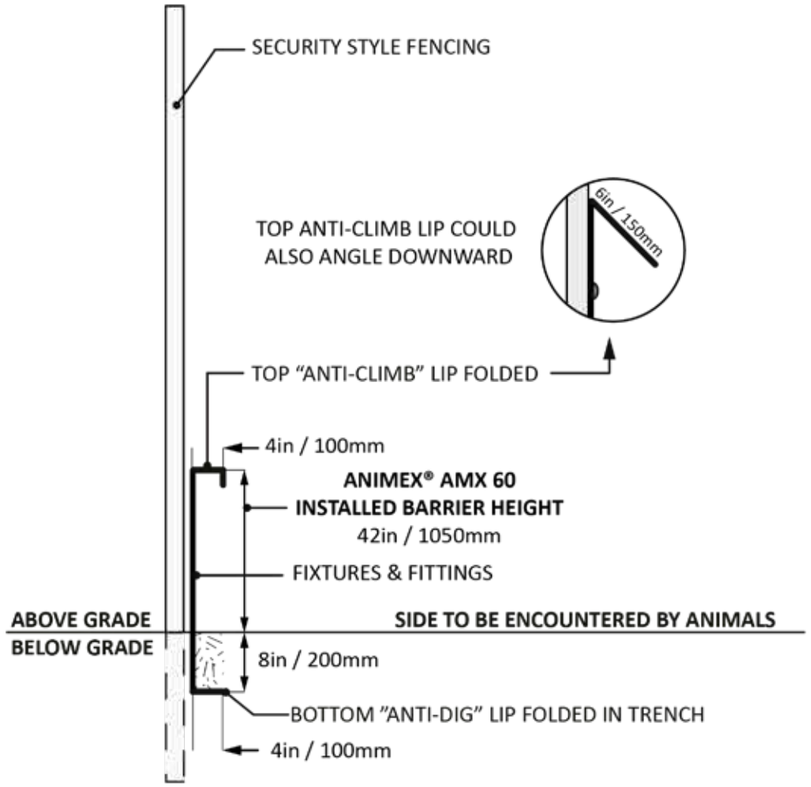
# AMX 60
## Attached Security




**SECTION VIEW**
NOT TO SCALE

**NOTES:**
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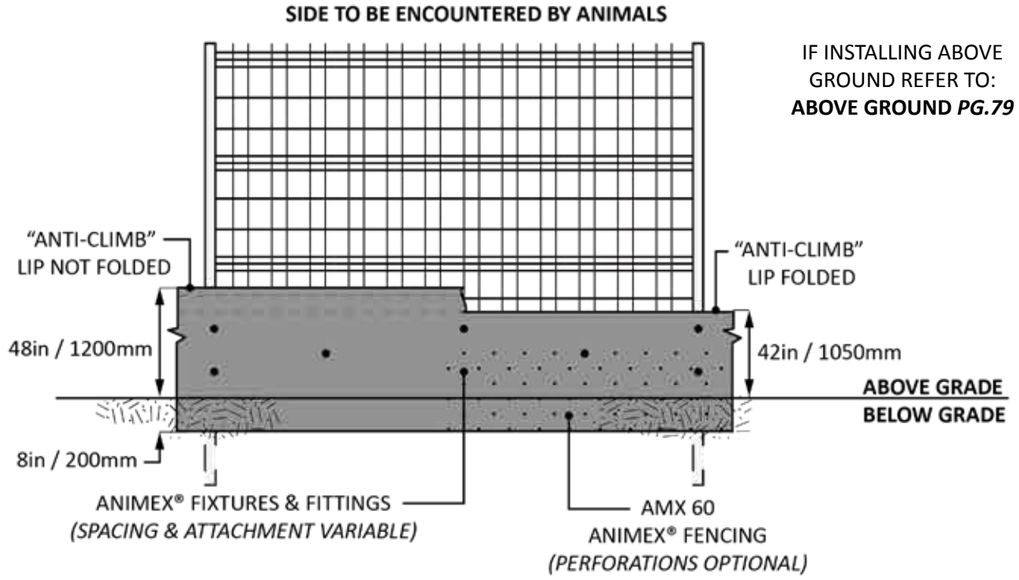
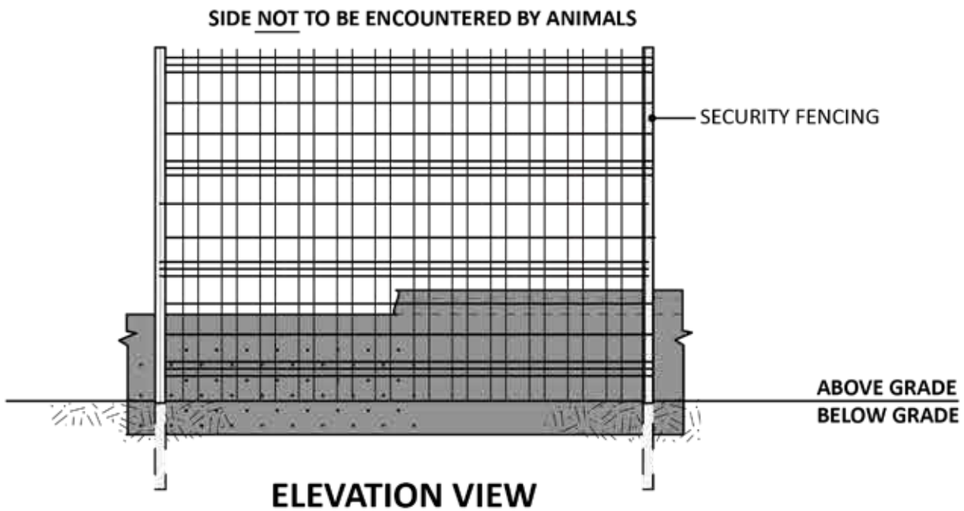
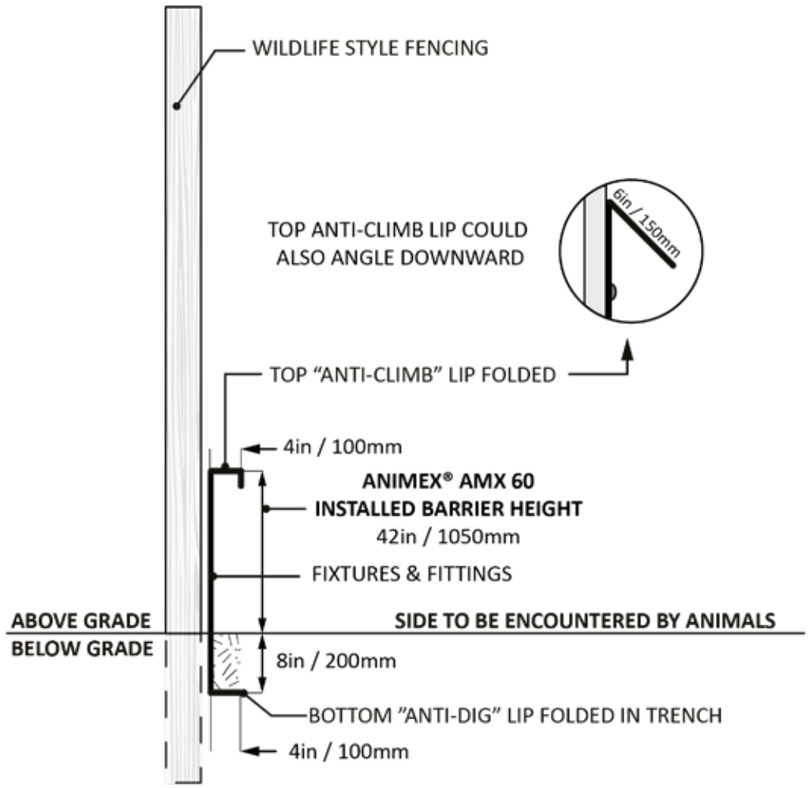



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND *PG.79***




**ELEVATION VIEW**
NOT TO SCALE

# AMX 60
## Attached Large Wildlife




**SECTION VIEW**
NOT TO SCALE

**NOTES:**
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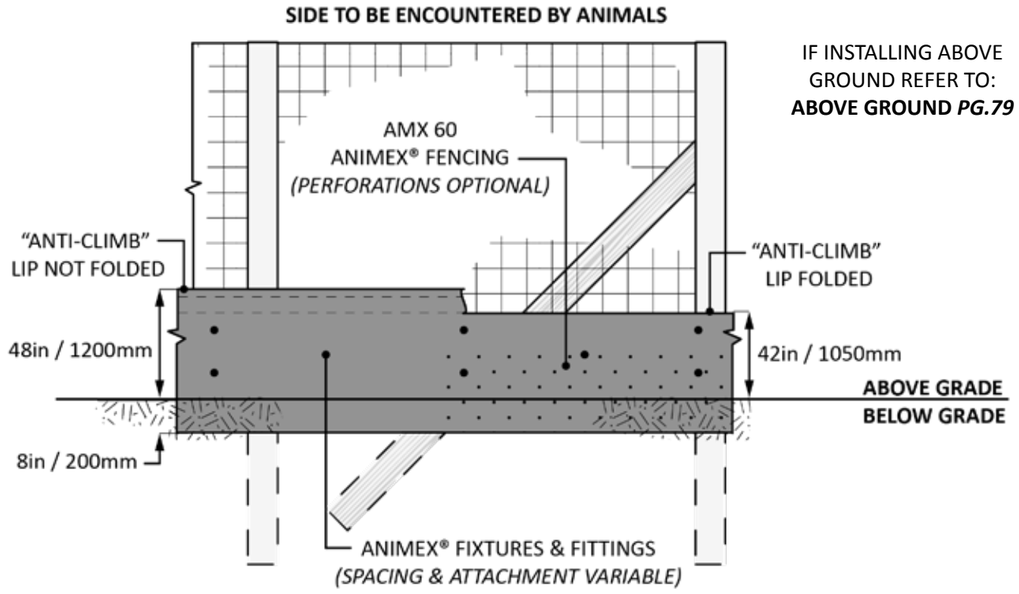
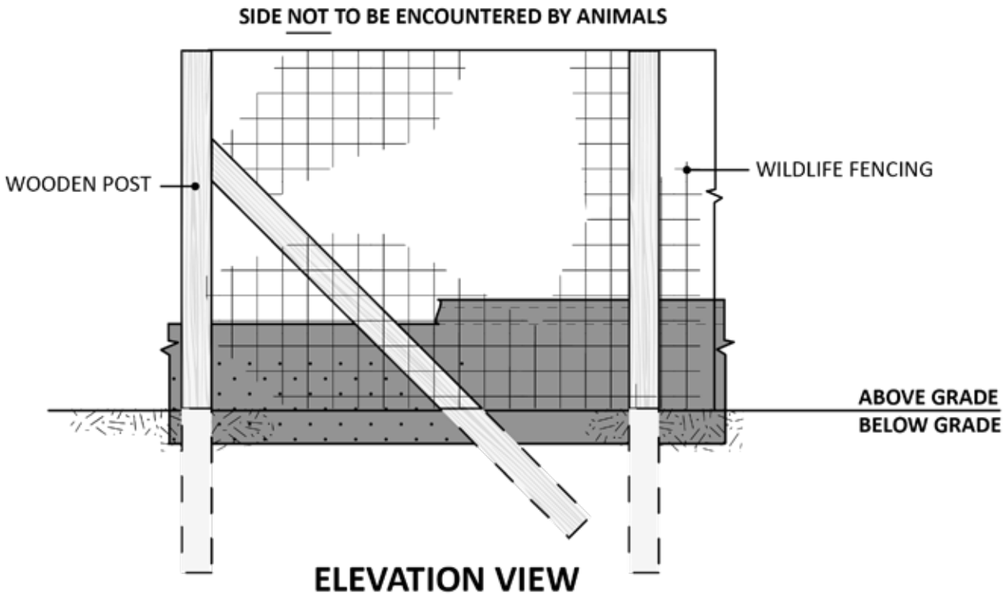



IF INSTALLING ABOVE GROUND REFER TO:
**ABOVE GROUND *PG.79***




**ELEVATION VIEW**
NOT TO SCALE

# Fixings & Fastening
## Scored Plastic HDPE

## AMX-T & AMX-SP

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.

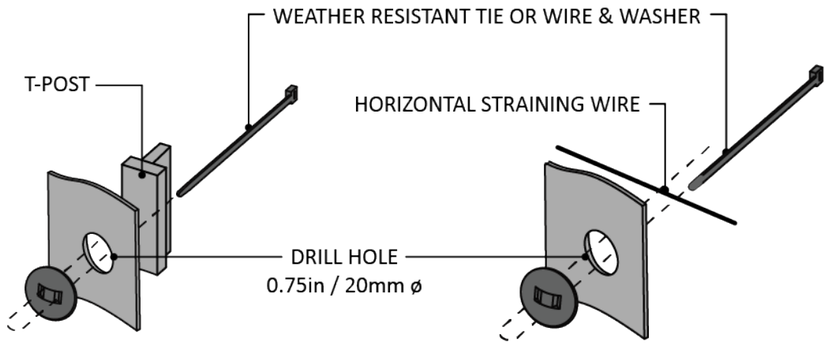
We have prepared some illustrations to demonstrate the best ways to connect and fasten scored plastic (HDPE) rolls and sheets.

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.

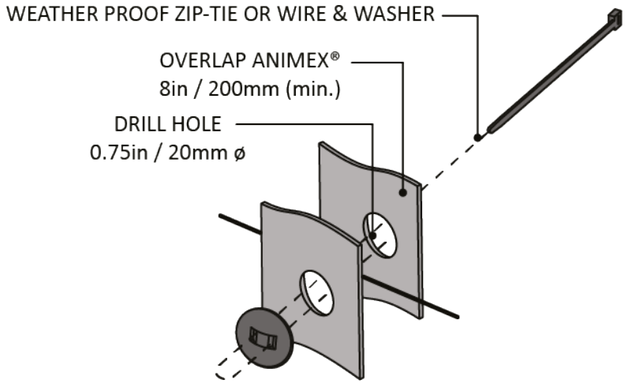



**ATTACH TO POSTS**
NOT TO SCALE

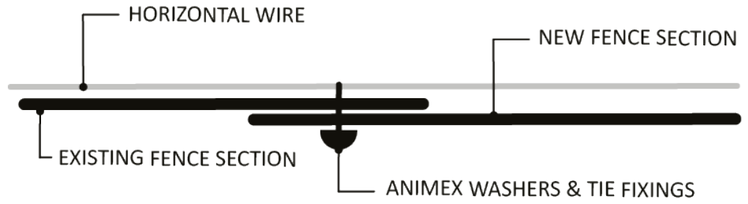
**ATTACH TO WIRE**
NOT TO SCALE

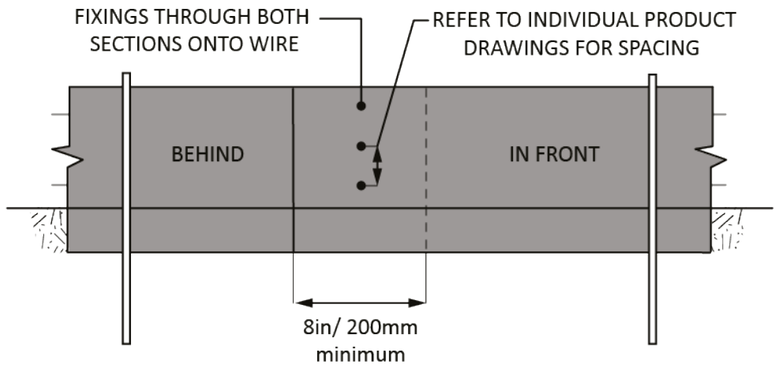


**NOTES:**
This specification should be used to aid installation. Measurements are accurate but may need to be adjusted dependent on location, conditions and local authority recommendations.




JOINING & OVERLAPPING SECTIONS
**NOT TO SCALE**



# AMX-XP

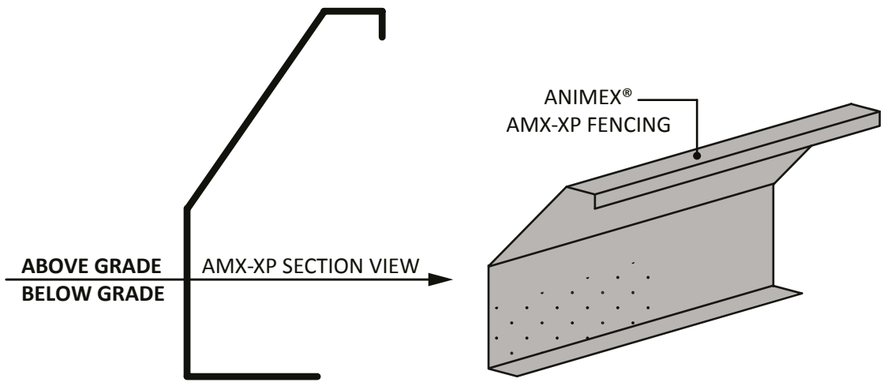
Preformed metal fencing is supplied in sections that are often custom made for your project. The type of metal(s) used will also depend on the demands of your project.

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

Panels are commonly supplied in vertical or angled (one-way) variations.

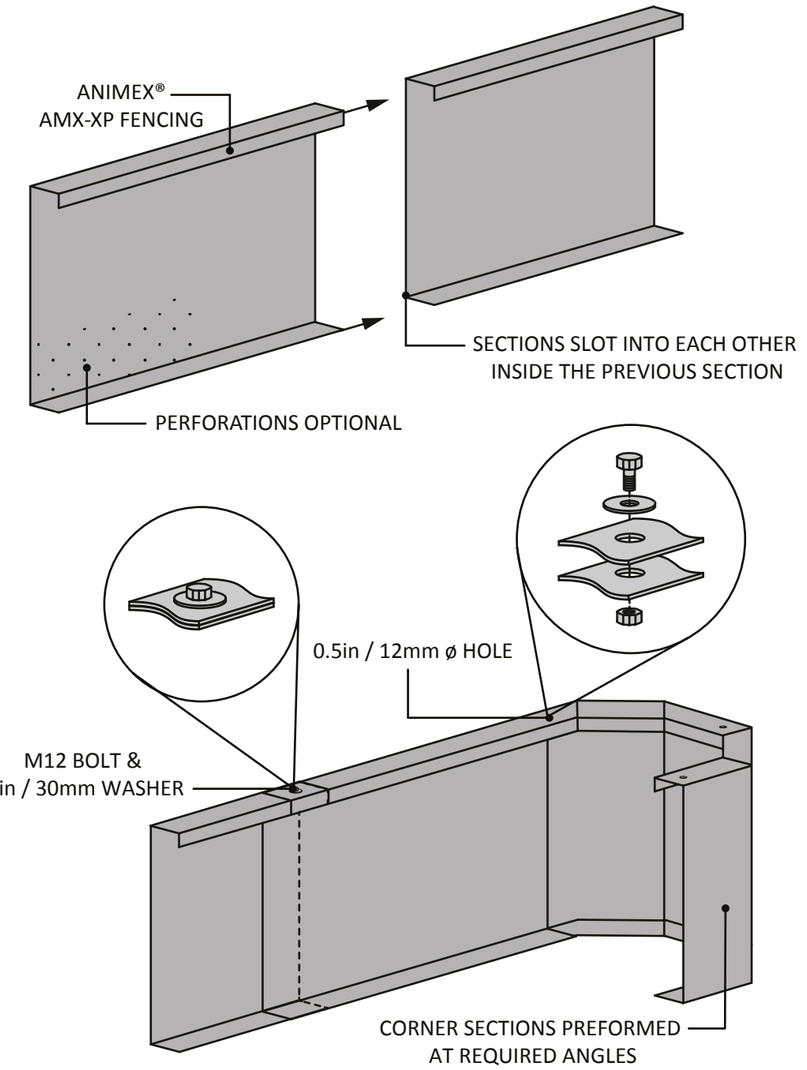
End sections and turn-arounds will also be custom made per project and fitted on site.

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




ANGLED (ONE-WAY) EXAMPLE
**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.




VERTICLE JOINING EXAMPLE
**NOT TO SCALE**

# SECTION IV

## Additional
# Fencing Specifications & Features

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

This is why we have designed some speciality installation methods to suit alternative situations for roadside applications.

We have also provided details on additional features including culvert attachements and one-way escape solutions.

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...

# Additional Fencing Specifications
## Roadside Embankment

**NOTES:**
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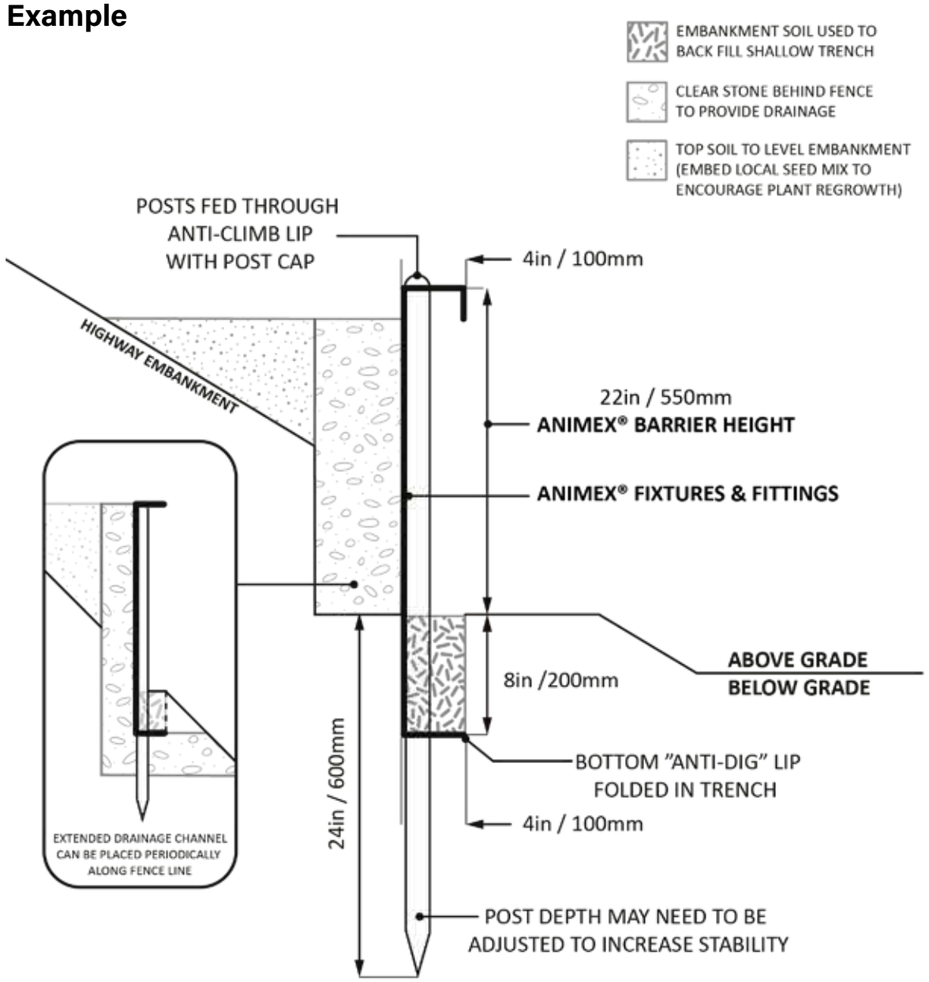
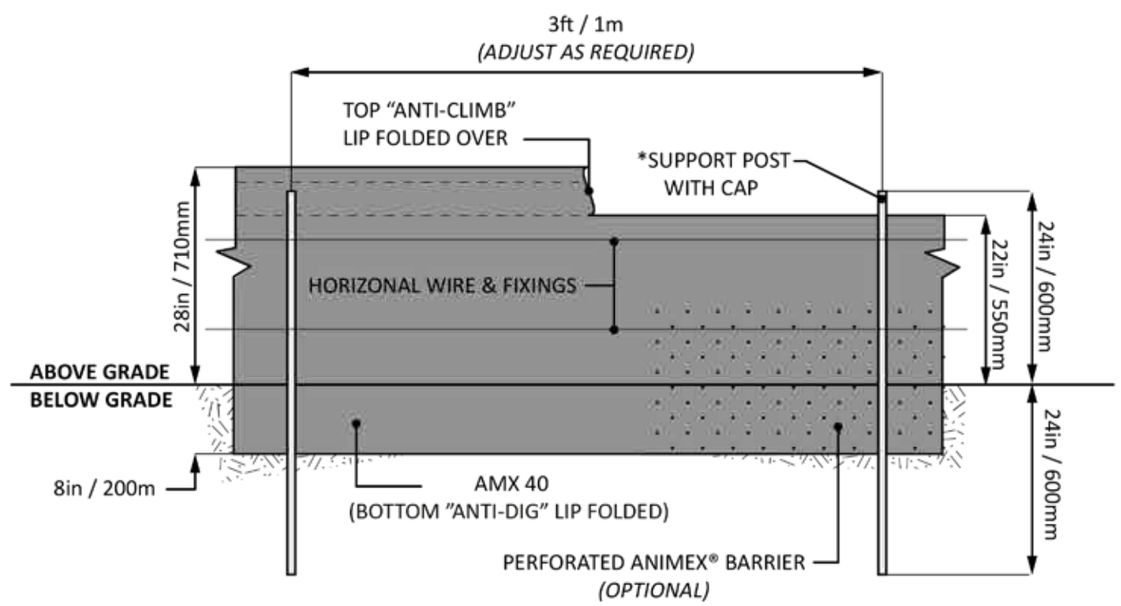
***AMX 40 Example**




SECTION VIEW
**NOT TO SCALE**

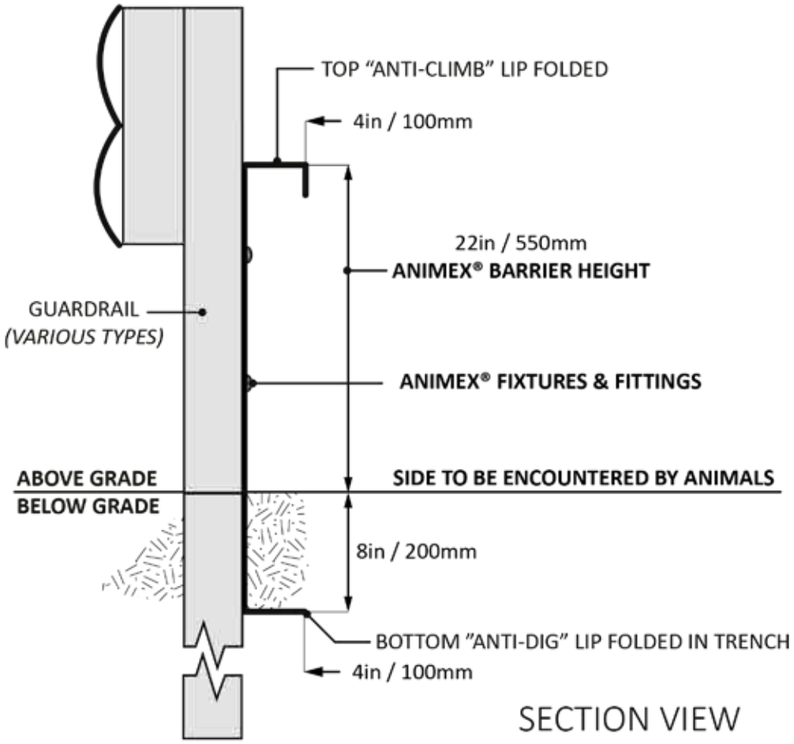
*SUPPORT POSTS MAY NOT BE NEEDED FOR PRE-FORMED METAL (AMX-XP) FENCES




**ELEVATION VIEW**
NOT TO SCALE

# Additional Fencing Specifications
## Roadside Guardrail

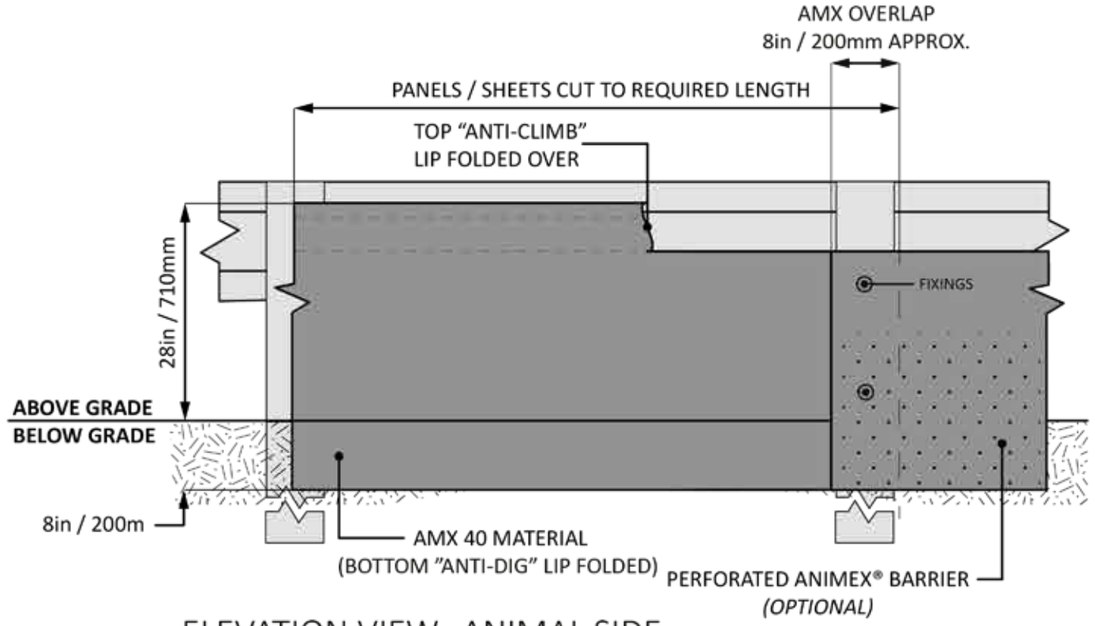
***AMX 40 Example**



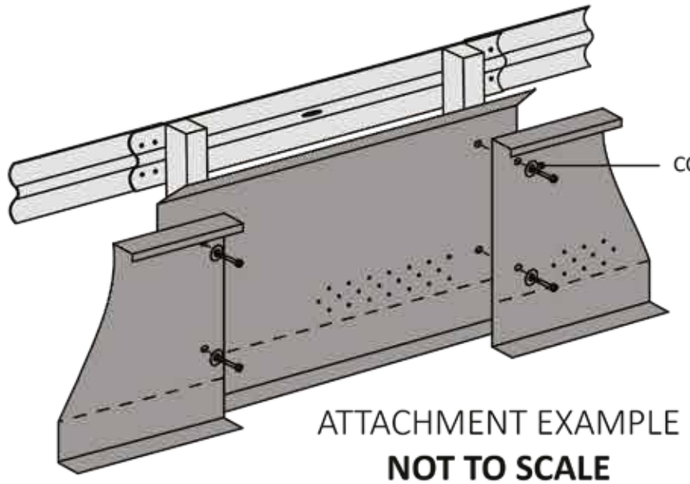

SECTION VIEW
**NOT TO SCALE**

**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.

**ADJUSTMENTS CAN BE MADE TO FIT ALL ROADSIDE GUARDRAILS VARIATIONS**




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




ATTACHMENT EXAMPLE
**NOT TO SCALE**

# Attaching to Crossing Structures
## Various Examples

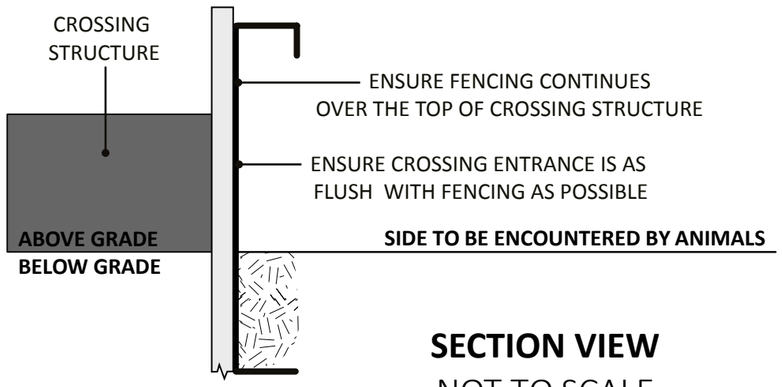
When using fencing to guide wildilfe to a crossing structure is it important to ensure the connection to the crossing structure is as sealed and secure as it can be. If there are any gaps there is a risk wildlife will be able to move around or over the crossing structure and the purpose of the fencing will be undermined at a vital location.

It is useless having fencing if the connections to crossing strutures are not secure.

We recommend starting fencing installations at the crossing structure and working outwards. This will ensure the connection is secure. If fencing installations start away from crossing structures and work towards them there is a risk of material shortage and misaglignment, often creating difficulties that lead to patchy, problematic connections.

**Key points to consider:**

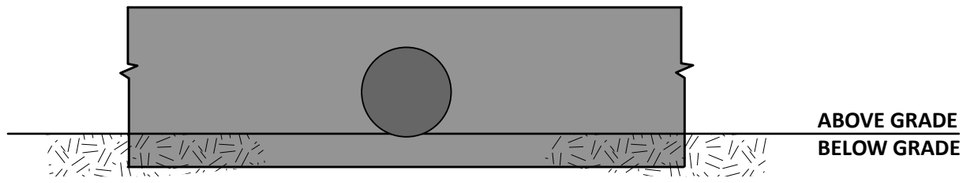
- Continue fencing over the top of structure
- Attach to inside of wingwalls
- Ensure no gaps



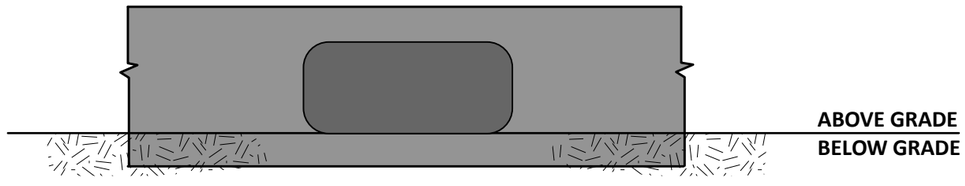

**SECTION VIEW**
NOT TO SCALE

**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.

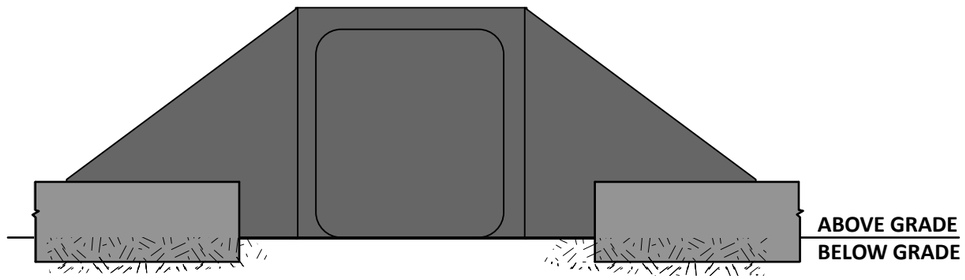





**CIRCULAR EXAMPLE**
NOT TO SCALE




**BOX EXAMPLE**
NOT TO SCALE




**WINGWALL EXAMPLE**
NOT TO SCALE

# One-way Escapes
## Various Examples

One way escapes are commonly used in temporary fencing applications to allow animals to passively escape areas before construction as part of surveys and translocations. Escapes are also used on permanent projects, especially linear infrastucture projects to mitigate the impacts of the fence end effect.

Unfortunately on linear projects fences often come to an end. Although we can design turn-arounds and fence layouts to mitigate this (details coming in a future chapter) there are frequent instances where animals are able to enter and encounter the wrong side of the fence and need a way to return to safety.

There are various ways one-way escapes have been used successfully and new methods are being developed and tested continually. Here we have presented some popular examples that have been successfully for reptiles, amphibians and small mammals across the world to date.

The exact location, frequency, size and type will need to be pro-actively considered and adjusted to suit each project. There isn't a one size fits all solution.

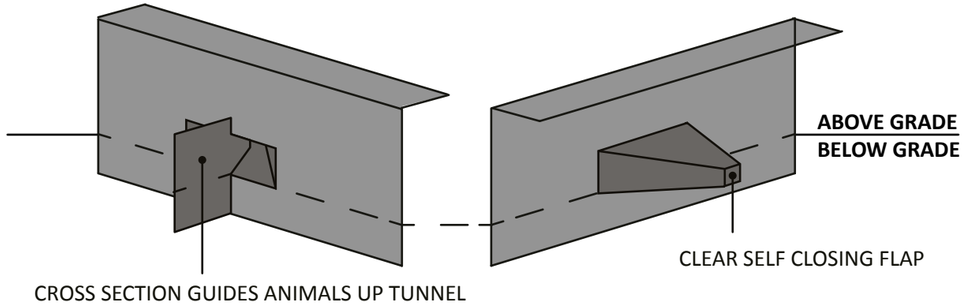
**Key points to consider:**

- Size of opening / suitability / type used for differnet species & situations
- Adding a cross-section to encourage movement through or over
- Using different types / variety on same fence line may help
- Keep flaps / doors clear of debris

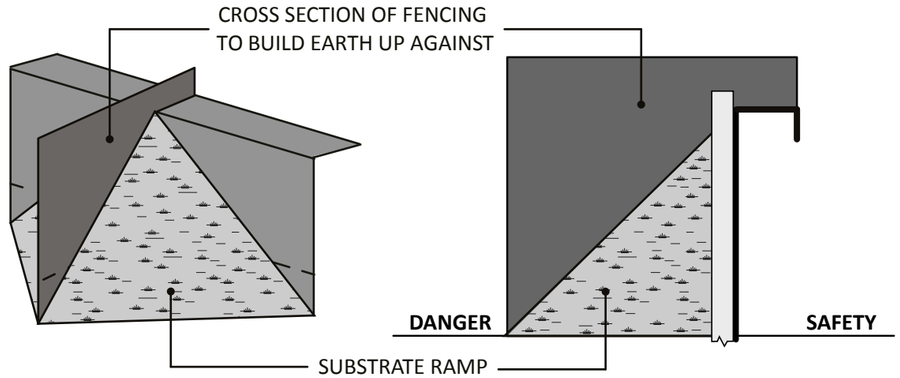


**NOTES:**
This specification should be used to aid installation. Measurements are NOT TO SCALE and may need to be adjusted dependent on location, conditions and local authority recommendations.

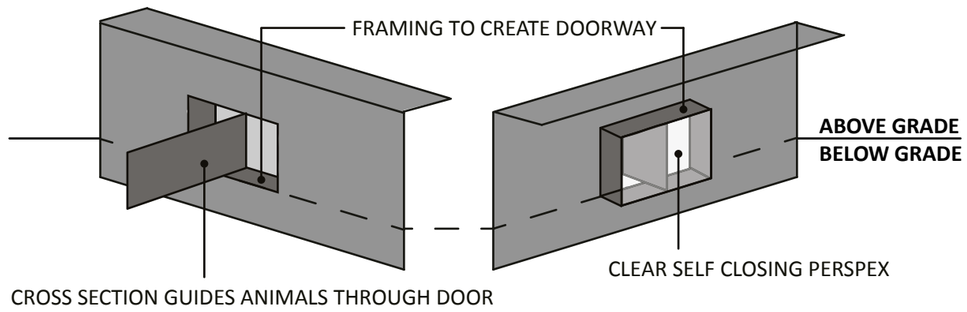





**UPWARD SLOPED TUNNEL EXAMPLE**




**NATURAL SUBSTRATE RAMP EXAMPLE**




**CLEAR DOORWAY EXAMPLE**

# One-way Escape Examples

CLEAR DOORWAY
**Roadside view in AMX-SP**

Royal Botanic Gardens Cranbourne

CLEAR DOORWAY
**Habitat side view in AMX-SP**

Royal Botanic Gardens Cranbourne

RAMP
**Log ramp over AMX-SP**

Kari Gunson

RAMP
**Gravel ramp over AMX-SP**

Kari Gunson


CLEAR DOORWAY
**Koala escaping roadway**

Royal Botanic Gardens Cranbourne


CLEAR DOORWAY
**Echidna escaping roadway**

Royal Botanic Gardens Cranbourne

ANGLED INSTALLATION
**AMX-SP one-way installation**

Joe Carter

TUNNEL
**Habitat side in AMX-T**

Steve Béga

# SECTION V

# Installation Maintenance Bibliography

This section provides guidence on how to install and maintain fences along with a list of some of the documentation we have referenced to produce this fencing guide.

**INFORMATION TO BE ADDED TO FUTURE EDITIONS**

- Detailed shelter design
- Monitoring protocol
- Fence-ends / Turn-aroun design
- Pitfall trap-line / Fence layouts

If you have anything to contrubite please get in touch:
**info@wildlifefencing.com**

# Installation.

These basic step-by-step installation instructions are suitable for **AMX-T** & **AMX-SP** materials. AMX-XP may require a customized approach but the general principals are similar.

**1)** Clear vegetation along the fence line and work area.

**2)** Mark out the Animex fence line.

**3)** Below Ground: Excavate trench. Ensure the trench is level and clear of large clumps or rocks.
Above Ground: Clear Ground. Ensure the ground is level and clear of large clumps or rocks.

**4)** Free-Standing: Lay out posts and roll out Animex barrier (Fold bottom lip if required).
Attached to exisiting fences: Roll out Animex barrier along fence (Fold bottom lip if required).

**5)** Install posts at the back of the trench using manual or machine powered post driver (Install horizontal wire if required and secure to end braces).

**6)** Place the Animex fence material into the trench with the lips facing towards the area that animals will encounter the fence.

**7)** Fasten the Animex to straining wire, posts or exisiting fence starting at the top and work down.

**8)** When attaching rolls overlap them following details on installation drawings. A minimum of 4 ties should be used on any joins in the fence.

**9)** Back fill the trench. Ensure the backfill is compact to eliminate gaps for animals to crawl through. Do the same on the back side of the fence.

**10)** Fasten the top lips and install any additional features such as one-way escapes or pitfall traps (if required).

## MATERIALS

***Required***
- Animex Fencing
- Animex Washers
- UV Resistant Zip-ties or Fencing Wire
- Fence Posts

***Optional***
- 12 Gauge Straining Wire
- Fence end braces & wire strainers
- Gripple Wire Joiners (or similar)
- Fence Post Safety Caps

## TOOLS & EQUIPMENT

***Required***
- Weed wacker / Whipper
- String Line & Marker Pain
- Box Cutter / Stanley Knife
- Trencher / Excavator
- Spade / Trench / Shovel
- Post Diver / Sledge Hammer
- Battery Powered Drill
- Spade Drill Bit 3/4 (20mm)
- Cutting Pliers

***Optional***
- Shear Attachment For Drill (Trim Fence)
- Battery Powered Reciprocating Saw (Trim Posts)
- Drill Bit For Drainage Holes 1/8in (3mm)
- Gripple Tensioning Tool

**AMX-SP attached to cattle fencing**

Joe Carter

**Excavating trench for AMX-T**

Jerry Roe

# Maintenance.

For all **Semi-Permanent** and **Permanent** fencing we recommend an annual walk over (preferably in the spring soon after the thaw in areas with heavy snow fall) followed by additional visits to conduct vegetation maintenance as required. For **Temporary** fencing more frequent visits may be required based on site conditions, disturbance and seasonal animal movements.

Looking out for the following:

**Vegetation**
We suggest 1 or 2 vegetation cuts every year on both sides of the fence (Give priority to the side encountered by animals) using a weed whacker and wire (not blade). Increase the frequency if the fencing is used for temporary drift fencing or project area suffers from severe vegetation growth and particular seasonal movements of animals. This will prevent any animals from being able to use the vegetation as a ladder over the fences.

**Gaps between fence sections**
Tighten or add additional fixings to prevent the potential for animals to move through and breach fencing.

**Horizontal wire tension**
Check for any sagging or slack in the wire and tighten / re-fasten fence when required.

**Post heave**
Force fence posts back to correct depth using post rammer or hammer. If problem persists and heave was not accounted for during installation replace with longer posts.

**Broken Fixings**
Replace any broken fixings / ties. Stainless steel bilts or ties are recommended for long term installations.

**Washout / Scouring**
Replace any backfill and consider digging drainage channels and / or manually adding additioanl drainage holes in fencing. If gaps are allowed to from under the fence animals will be able to use this to breach.

**Tie-ins with culverts**
Ensure no debris or damage has occurred to hinder the connections. This may result in animals being able to get onto the road.

**Damage**
If sections of fencing are damaged beyond repair (eg. vehicle collision) sections can be cut out and replaced at required intervals. It may be advantageous to have a couple of fence sections in storage so repairs can be made quickly. This will avoid prolonged periods where there is no fence in place leaving wildlife vulnerable.

**Vegetation growing & entangled in plastic mesh**
Jerry Roe

**Vegetation growing over AMX-SP**
Joe Carter

**Vegetation cut in spring on both sides of AMX-SP**
Kari Gunson

**Animal burrow under plastic mesh**
Jerry Roe

**Gap between chainlink fencing & culvert wing wall**
Steve Béga

**Clean AMX-SP connection to an under-road crossing**
Kari Gunson

**Gap opening between 2 sections of AMX-SP**
Caroline Zank

**Washer and plastic tie connecting AMX-T sections tightly**
Steve Béga

**Additional metal strip added to sandwich AMX-SP sections**
Royal Botanic Gardens Cranbourne

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