

Fencing Standard Details

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TII Fencing Retrofit Programme Seminar

Tullamore Court Hotel

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Introduction and Background

- Collision stats highlighted the degree of injuries and fatalities caused due to collisions with road boundary fencing.

December
2014

- SCD's for Timber Post and Tension Mesh published

November
2015

- DN-REQ-03034 Safety Barrier Design designated timber post and rail as a hazard within the Clear Zone

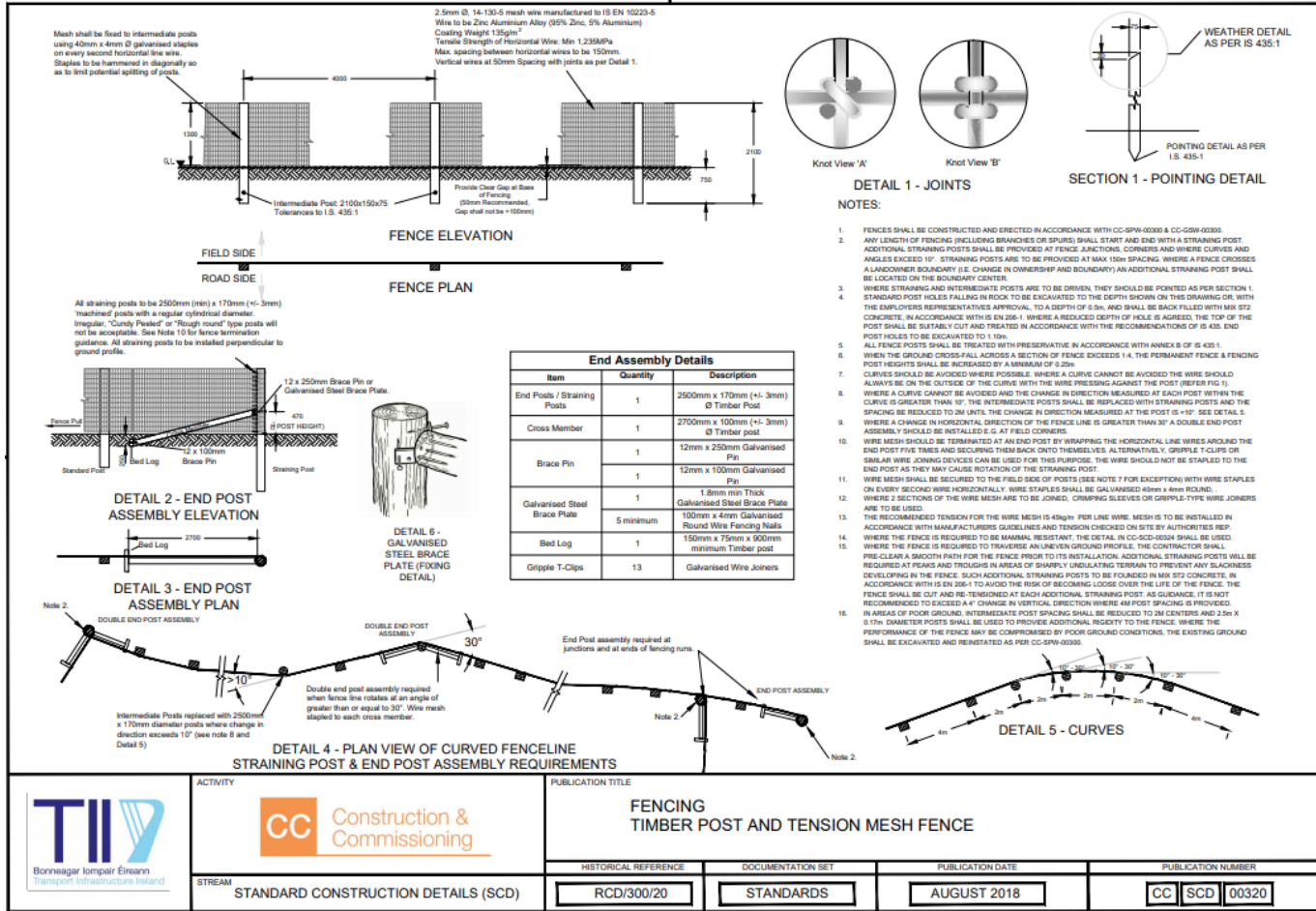
Post 2015

- Implementation of the Timber Post and Tension Mesh detail on projects
- *Varying degrees of success*



Standard Construction Details Overview

• CC-SCD-00320 – Timber Post and Tension Mesh Fence



Standard Construction Details Overview

• CC-SCD-00321 – Timber Post and Tension Mesh Stud Fence

Mesh shall be fixed to intermediate posts using 40mm x 4mm Ø galvanised staples on every second horizontal line wire. Staples to be hammered in diagonally so as to limit potential splitting of posts.

2.5mm Ø, 14-130-5 mesh wire manufactured to BS EN 10223-5
Wire to be Zinc Aluminium Alloy (95% Zinc, 5% Aluminium)
Coating Weight 135g/m²
Tensile Strength of Horizontal Wire: Min 1.233MPa
Max. spacing between horizontals to be 150mm.
Vertical Wires at 50mm Spacing with joints as per Detail 1.

120mm wide flexible plastic rail with a minimum of 3 embedded wires (see notes 19-21 and CC-SPW-00300).

Remove Clear Gap at Base of Fencing (50mm Recommended. Gap shall not be >100mm)

Intermediate Post: 2100x150x75
Tolerances to I.S. 435-1

4000

1270

2100

750

GL

ROAD SIDE

FIELD SIDE

FENCE ELEVATION

FENCE PLAN

Notes:

- FENCES SHALL BE CONSTRUCTED AND ERECTED IN ACCORDANCE WITH CC-SPW-00300 & CC-GSW-00300.
- ANY LENGTH OF FENCING (INCLUDING BRANCHES OR SPURS) SHALL START AND END WITH A STRAINING POST. ADDITIONAL STRAINING POSTS SHALL BE PROVIDED AT FENCE JUNCTIONS, CORNERS AND WHERE CURVES AND ANGLES EXCEED 90°. STRAINING POSTS ARE TO BE PROVIDED AT MAX 150m SPACING. WHERE A FENCE CROSSES A LANDOWNER BOUNDARY (I.E. CHANGE IN OWNERSHIP AND BOUNDARY) AN ADDITIONAL STRAINING POST SHALL BE LOCATED ON THE BOUNDARY CENTER.
- WHERE STRAINING AND INTERMEDIATE POSTS ARE TO BE DRIVEN, THEY SHOULD BE POINTED AS PER SECTION 1.
- STANDARD POST HOLES FALLING IN ROCK TO BE EXCAVATED TO THE DEPTH SHOWN ON THIS DRAWING OR, WITH THE EMPLOYERS REPRESENTATIVES APPROVAL, TO A DEPTH OF 0.5m, AND SHALL BE BACK FILLED WITH M8 ST2 CONCRETE, IN ACCORDANCE WITH IS EN 206-1, WHERE A REDUCED DEPTH OF HOLES IS AGREED. THE TOP OF THE POST SHALL BE SATISFACTORILY TREATED IN ACCORDANCE WITH THE RECOMMENDATIONS OF IS 435. END POST HOLES TO BE EXCAVATED TO 1.10m.
- ALL FENCE POSTS SHALL BE TREATED WITH PRESERVATIVE IN ACCORDANCE WITH ANNEX B OF IS 435-1.
- WHEN THE GROUND CROSS FALL ACROSS A SECTION OF FENCE EXCEEDS 1:4, THE PERMANENT FENCE & FENCING POST HEIGHTS SHALL BE INCREASED BY A MINIMUM OF 0.2m.
- CURVES SHOULD BE AVOIDED WHERE POSSIBLE. WHERE A CURVE CANNOT BE AVOIDED THE WIRE SHOULD ALWAYS BE ON THE OUTSIDE OF THE CURVE WITH THE WIRE PRESSING AGAINST THE POST (REFER FIG 1).
- WHERE A CURVE CANNOT BE AVOIDED AND THE CHANGE IN DIRECTION MEASURED AT EACH POST WITHIN THE CURVE IS GREATER THAN 10°, THE INTERMEDIATE POSTS SHALL BE REPLACED WITH STRAINING POSTS AND THE SPACING BE REDUCED TO 2M UNTIL THE CHANGE IN DIRECTION MEASURED AT THE POST IS <10°. SEE DETAIL 5.
- WHERE A CHANGE IN HORIZONTAL DIRECTION OF THE FENCE LINE IS GREATER THAN 30° A DOUBLE END POST ASSEMBLY SHOULD BE INSTALLED (E.G. AT FIELD CORNERS).
- WIRE MESH SHOULD BE TERMINATED AT AN END POST BY WRAPPING THE HORIZONTAL LINE WIRES AROUND THE END POST FIVE TIMES AND SECURING THEM BACK ONTO THEMSELVES. ALTERNATIVELY, GRIPPLE T-CLIPS OR SIMILAR WIRE JOINING DEVICES CAN BE USED FOR THIS PURPOSE. THE WIRE SHOULD NOT BE STAPLED TO THE END POST AS THEY MAY CAUSE NOTATION OF THE STRAINING POST.
- WIRE MESH SHALL BE SECURED TO THE FIELD SIDE OF POSTS (SEE NOTE 7 FOR EXCEPTION) WITH WIRE STAPLES ON EVERY SECOND WIRE HORIZONTALLY. WIRE STAPLES SHALL BE GALVANISED 45mm x 4mm ROUND.
- WHERE 2 SECTIONS OF THE WIRE MESH ARE TO BE JOINED, CRIMPING SLEEVES OR GRIPPLE-TYPE WIRE JOINERS ARE TO BE USED.
- THE RECOMMENDED TENSION FOR THE WIRE MESH IS 40kg/m PER LINE WIRE. MESH IS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS GUIDELINES AND TENSION CHECKED ON SITE BY AUTHORITIES REP.
- WHERE THE FENCE IS REQUIRED TO BE MAXIMALLY RESISTANT THE DETAIL IN CC-SCD-00321 SHALL BE USED.
- WHERE THE FENCE IS REQUIRED TO TRAVERSE AN UNEVEN GROUND PROFILE, THE CONTRACTOR SHALL PRE-CLEAR A SMOOTH PATH FOR THE FENCE PRIOR TO ITS INSTALLATION. ADDITIONAL STRAINING POSTS WILL BE REQUIRED AT PEAKS AND TROUGHS IN AREAS OF SHARPLY UNDLATING TERRAIN TO PREVENT ANY SAGGINESS DEVELOPING IN THE FENCE. SUCH ADDITIONAL STRAINING POSTS TO BE FOUND IN M8 ST2 CONCRETE, IN ACCORDANCE WITH IS EN 206-1 TO AVOID THE RISK OF BECOMING LOOSE OVER THE LIFE OF THE FENCE. THE FENCE SHALL BE CUT AND RE-TENSIONED AT EACH ADDITIONAL STRAINING POST AS GUIDANCE. IT IS NOT RECOMMENDED TO EXCEED A 4° CHANGE IN VERTICAL DIRECTION WHERE 4M POST SPACING IS PROVIDED IN AREAS OF POOR GROUND. INTERMEDIATE POST SPACING SHALL BE REDUCED TO 2m CENTERS AND 2.5m x 0.17m DIAMETER POSTS SHALL BE USED TO PROVIDE ADDITIONAL RIGIDITY TO THE FENCE. WHERE THE PERFORMANCE OF THE FENCE MAY BE COMPROMISED BY POOR GROUND CONDITIONS, THE EXISTING GROUND SHALL BE EXCAVATED AND REINSTATED AS PER CC-SPW-00300.
- FLEXIBLE RAIL TO BE CONNECTED TO STRAINING POSTS USING COMBINED GALVANISED TENSIONER AND END BUCKLE FORED TO STRAINING POSTS WITH 1x HOT DIPPED GALVANISED 100mm x M12 COACH SCREW.
- FLEXIBLE RAIL TO BE BLACK IN COLOUR UNLESS OTHERWISE STATED.
- WHERE LENGTHS OF FLEXIBLE RAIL ARE TO BE JOINED, THE CONNECTION IS TO BE MADE WITH A GALVANISED JOININGSPLICING BUCKLE OR BY JOINING INTERNAL WIRES WITH 3x CRIMPING SLEEVES REFER TO CC-SPW-00300.

End Assembly Details

Item	Quantity	Description
End Posts / Straining Posts	1	2500mm x 170mm (+/- 3mm) Ø Timber Post
Cross Member	1	2700mm x 100mm (+/- 3mm) Ø Timber post
Brace Pin	1	12mm x 250mm Galvanised Pin
	1	12mm x 100mm Galvanised Pin
Galvanised Steel Brace Plate	1	1.8mm min Thick Galvanised Steel Brace Plate
	5 minimum	100mm x 4mm Galvanised Round Wire Fencing Nails
Bed Log	1	150mm x 75mm x 900mm minimum Timber post
Grippler T-Clips	13	Galvanised Wire Joiners

DETAIL 2 - END POST ASSEMBLY ELEVATION

DETAIL 3 - END POST ASSEMBLY PLAN

DETAIL 4 - PLAN VIEW OF CURVED FENCELINE STRAINING POST & END POST ASSEMBLY REQUIREMENTS

DETAIL 5 - CURVES

ACTIVITY

CC Construction & Commissioning

PUBLICATION TITLE

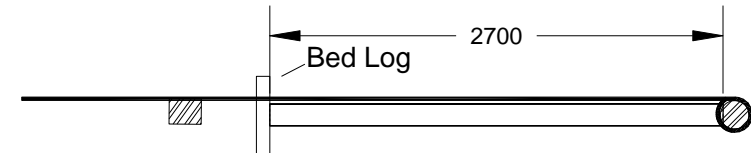
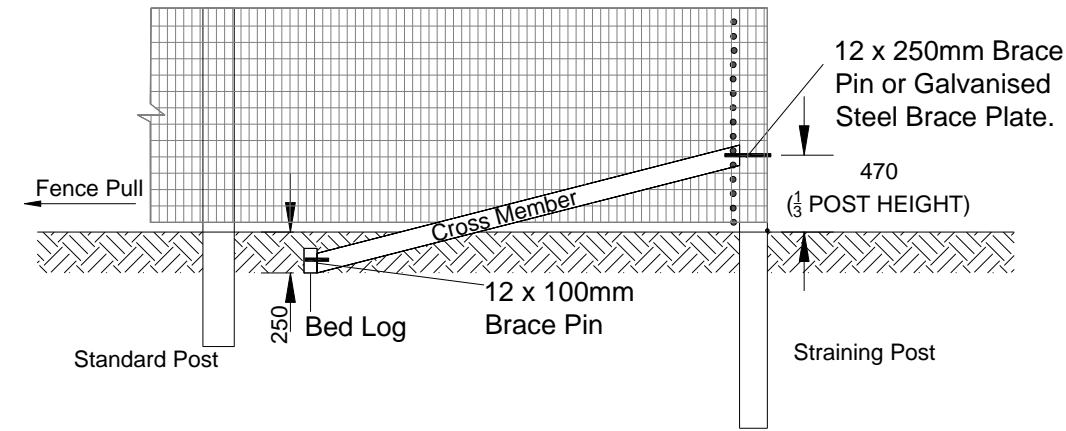
**FENCING
TIMBER POST AND TENSION MESH FENCE**

STREAM	HISTORICAL REFERENCE	DOCUMENTATION SET	PUBLICATION DATE	PUBLICATION NUMBER
STANDARD CONSTRUCTION DETAILS (SCD)	RCD/300/21	STANDARDS	AUGUST 2018	CC SCD 00321



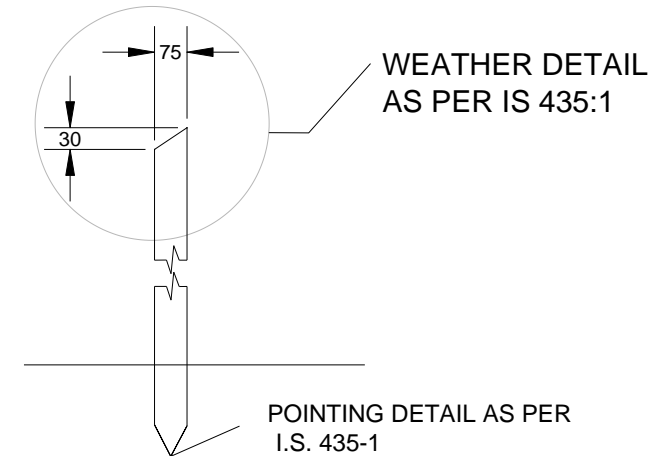
Key Requirements - Construction

- All runs of fencing must start and end with a straining post as per the end post assembly detail.
- Maximum spacing between straining posts is 150m, in-line straining posts to be as per double end post assembly.
- Additional straining posts are required at fence junctions, corners and curves and angles $>10^{\circ}$ *
- Additional straining posts to be provided at landowner boundaries.
- Intermediate Posts provided at 4m centres between straining posts*.



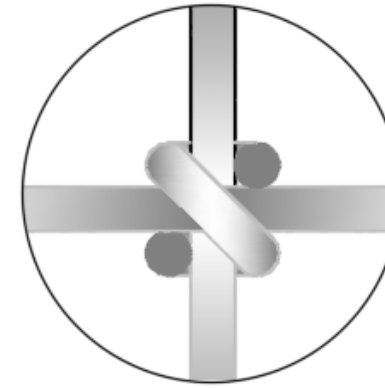
Key Requirements - Timber

- Timber for permanent fencing shall fully comply with IS 435-1 with the exception of straining posts, cross members and bed logs.
- Timber Species, Timber Grading, Moisture Content, Geometry of posts and Timber Preservation.
- Straining posts for Timber Post and Tension Mesh Fencing shall be 2500mm x 170mm (+/- 5mm) ‘machined’ posts with a regular cylindrical diameter.
- Irregular, “Cundy Peeled” or “Rough round” type posts are not permitted.
- Intermediate posts are as per timber post and rail fencing in accordance with IS 435-1.

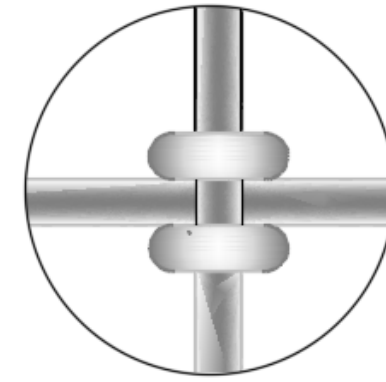


Key Requirements – Tensioned Mesh

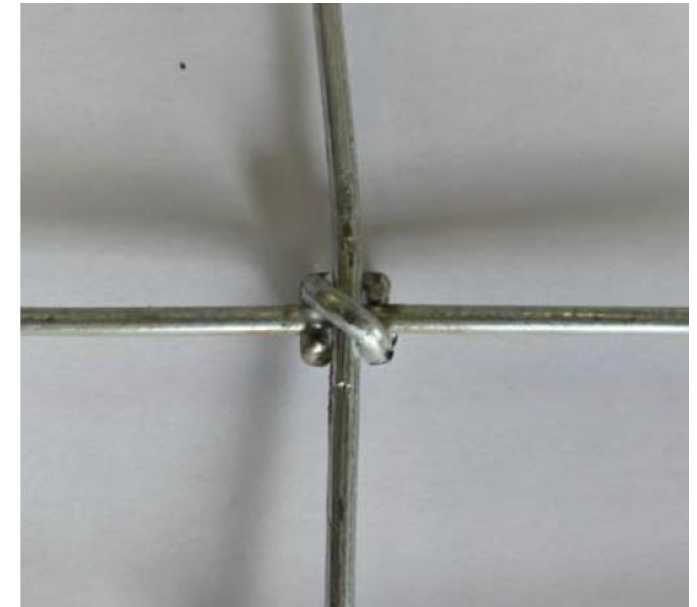
- “X-Fence” mesh detail with knotted joint.
- Manufactured using high tensile line wires and medium tensile stay wires.
- Knotted joint stronger than conventional tied knots.
- 2.5mm Ø high tensile mesh wire manufactured to IS EN 10223-5.
- Wire to be Zinc Aluminium Alloy - 95% Zinc, 5% Aluminium (Galfan).
- Coating Weight 135g/m².
- Min Tensile Strength of Horizontal Wire: 1,235MPa.



Knot View 'A'



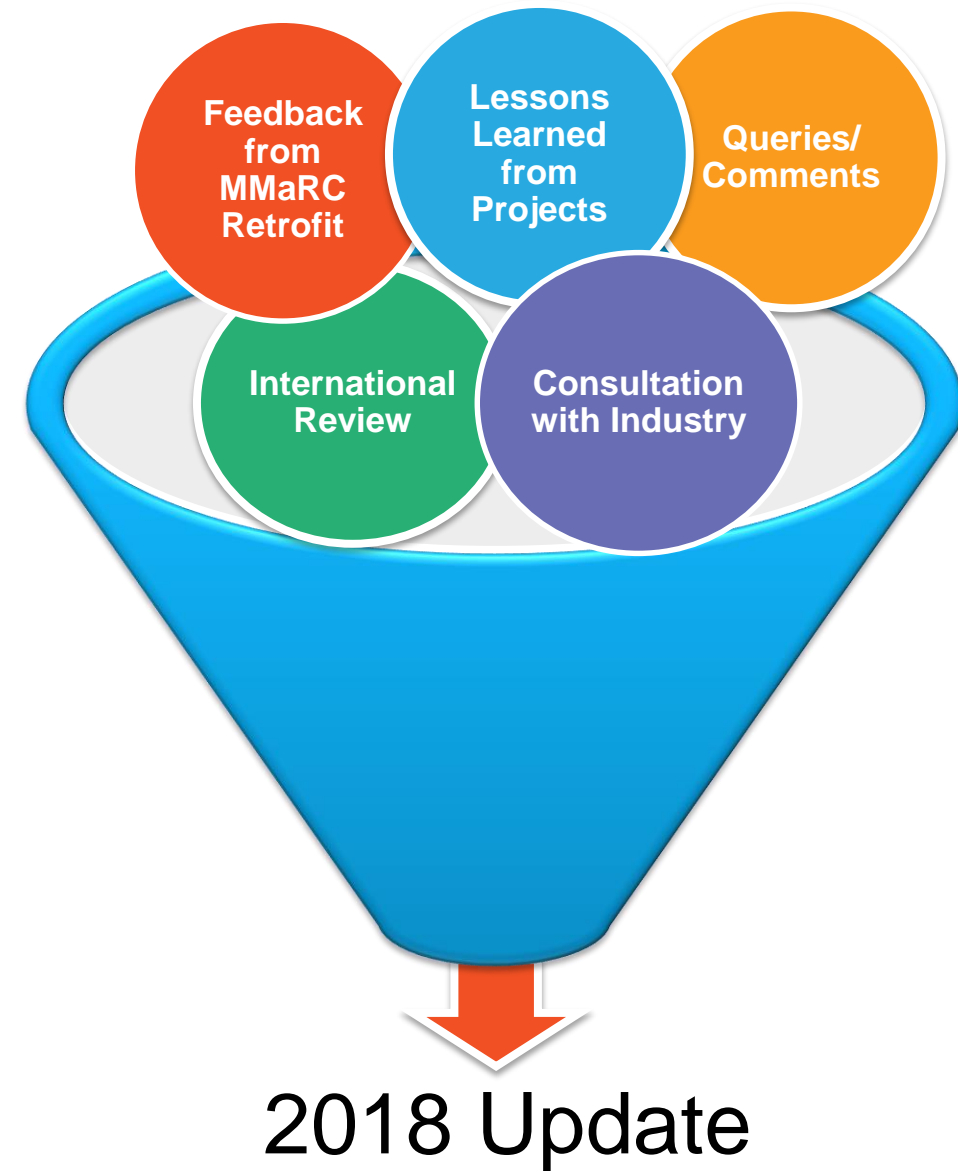
Knot View 'B'



Issues Encountered

- Standard Construction Details published – no update to Fencing Specification (CC-SPW-00300).
- Mammal Proofing – SCDs referred to detail for timber post and rail (CC-SCD-00319), not practical.
- Ground conditions - very difficult to achieve tension in poor or undulating ground conditions, further guidance needed.
- Horizontal Alignment – very difficult to achieve tension with changes in direction, further guidance needed.
- Material specification (timber and mesh).
- Installers/ designers not experienced.

➔ Concerned Landowners.



Issues Identified – CC-SPW-00300

- SPW and GSW Updated to account for Timber Post and Tension Mesh Fence types
- Key Updates:
 - Timber quality section updated.
 - Spec for Flexible Rail for Timber Post and Tension Mesh Fence added.
 - Changes in Vertical Alignment updated.
 - Changes in Horizontal Alignment added.
 - Mammal Resistant Fencing updated.
 - Installation of Fencing on Undulating Ground added.
 - Installation of Fencing in Soft/Poor Ground Conditions updated.
 - Retrofitting of Existing Timber Post and Rail Fencing added.



Undulating Ground

- Guidance added undulating ground:
 - Contractor shall trim and level the ground along the line of the fence.
 - Where a loss of tension to the top or bottom of the mesh in timber post and tension mesh fence occurs, the Contractor shall install additional straining posts located at the peaks of high and troughs of low points and cut and re-tension fencing at the straining posts to maintain consistent tension in the fence.
 - Alternatively, the Contractor may reduce spacing of the intermediate posts to 2m.



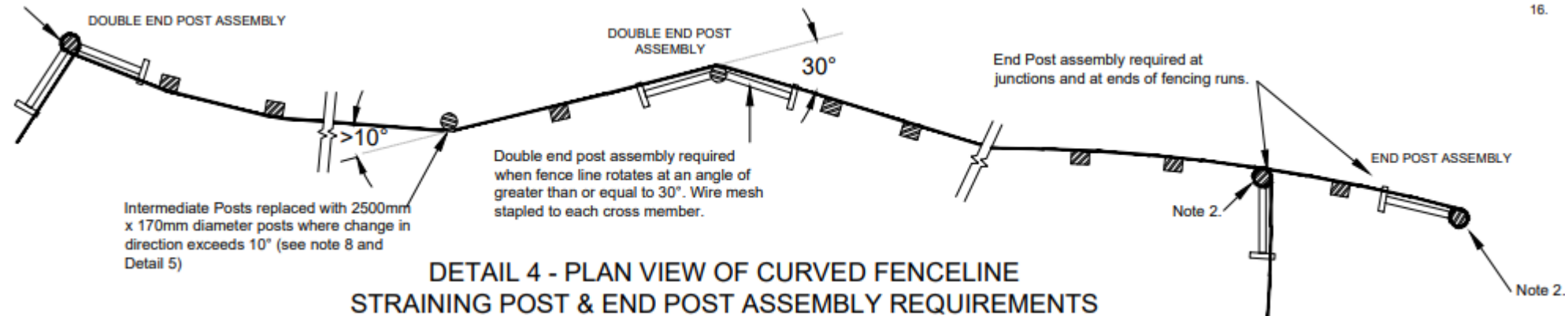
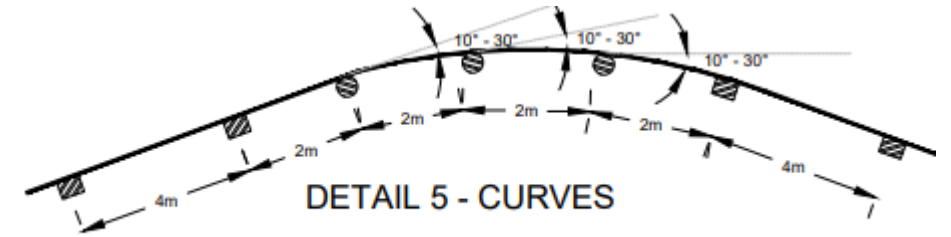
Poor Ground Conditions

- Guidance added poor ground:
 - Reduce the spacing of intermediate posts from 4m to 2m.
 - Replace the intermediate posts with straining posts until ground conditions allow for regular intermediate posts to support the tension within the fence.
 - Excavate a 1m wide x 1m deep trench along the line of the fence through the poor ground conditions and reinstate with acceptable fill material.
 - Install intermediate posts within the reinstated material.
 - Concrete footings as per Series 2600 if required.



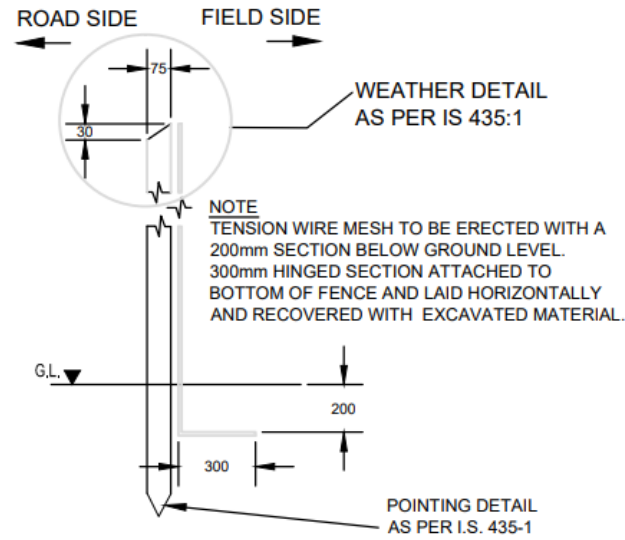
Changes in Horizontal Alignment

- Guidance added horizontal alignment:
 - Change exceeds 10° , replace intermediate post with straining post.
 - Change exceeds an angle of 30° , a Double End Post Assembly will be required.

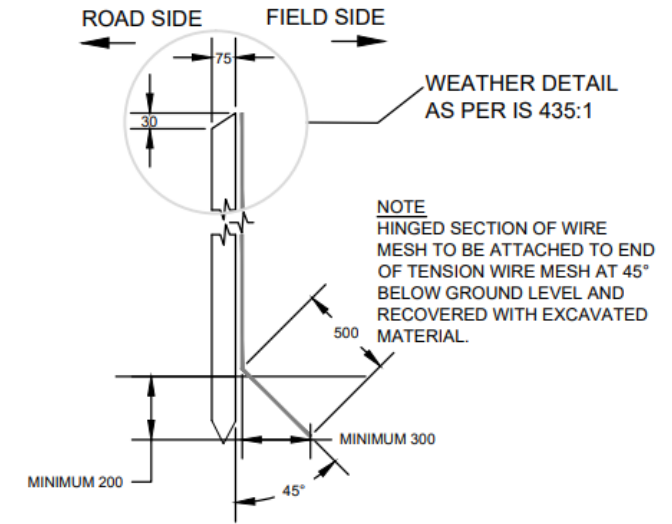


Mammal Proofing

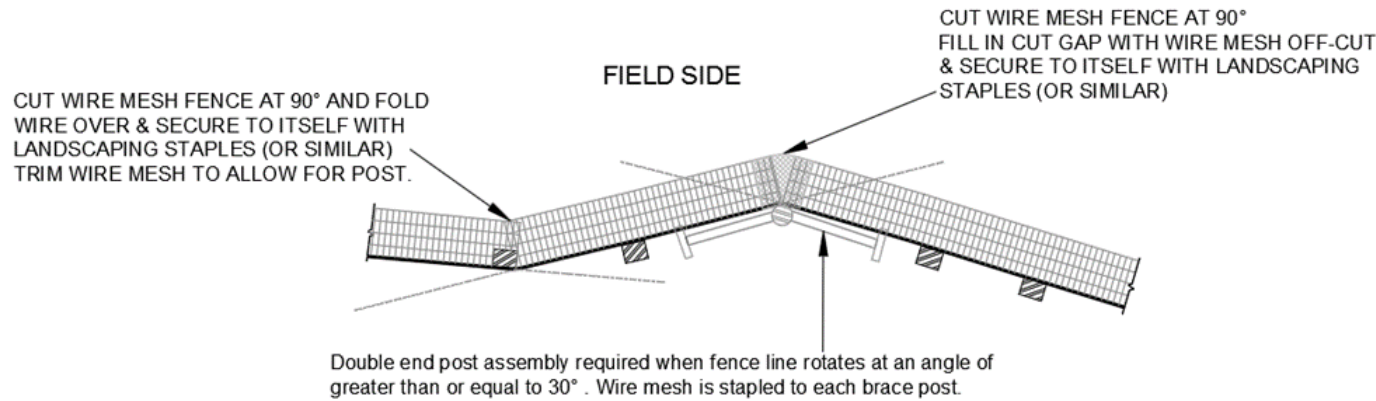
- New SCD introduced (CC-SCD-00324)
 - 2 Options available.
 - Requirement to cut and fix around posts where changes in direction.



OPTION A



OPTION B

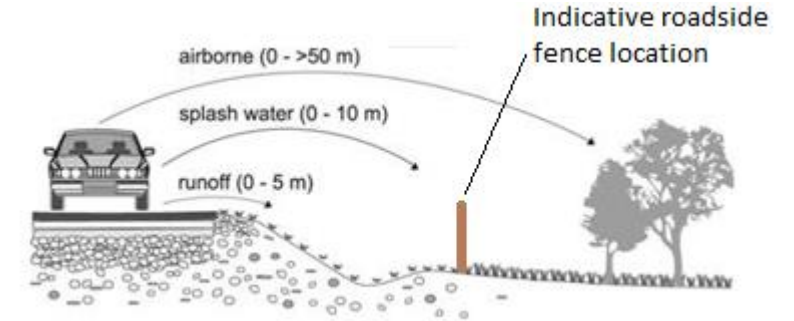


MAMMAL RESISTANT FENCING AT CHANGE IN DIRECTION



Materials – Wire Mesh Specification

- Zinc only versus Zinc Alloy coating?
- Review finding:
 - no reason to change existing requirement.



Re-use of Materials

- Retrofitting Timber post and rail:
 - If timber posts are deemed to have a residual life of 10 years or greater and are well founded on suitable ground, a tolerance of +/- 100mm may be applied to the required spacing posts to allow reuse of the existing posts.
 - The residual life of the posts shall be subject to the approval of the Employer's Representative
- Re-use of existing mammal proofing details
 - Not included in specification but see MMaRC retrofit programme experience



Notes for Designers

- Need to identify areas where additional details may be required when retrofitting:
 - Changes in horizontal alignment (additional straining posts etc.).
 - Curved sections of road boundary fencing (e.g. reduced post spacing).
 - Changes in vertical profile (minor earthworks may be required).
 - Poor ground conditions (concrete and/ or reduced spacing)
 - Reuse of timber posts or mammal proofing.
 - Mammal proofing - additional corrosion protection may be required if highly corrosive ground conditions.



Items to Consider

- Tie-in to gates
- Tying into existing fences/ structures
- Detail at mammal underpasses
- Pedestrian Protection at Culverts



Questions?

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Thank you for listening