23/09/15

INNOVATIVE VMS DEPLOYMENT ON RURAL MOTORWAYS

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Overview

In 2013 the National Roads Authority, now Transport Infrastructure Ireland, sought to investigate how they would accommodate large scale Variable Message Sign deployments in the future, particularly on rural sections of the national road network.

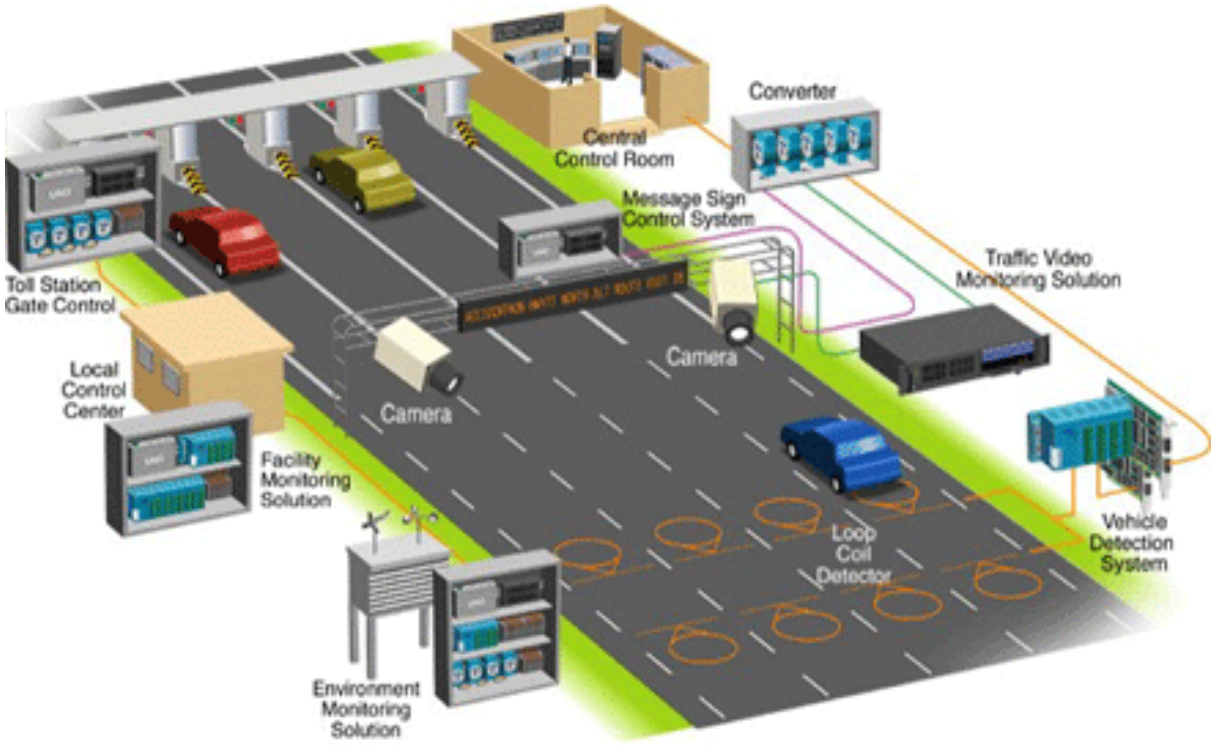
The Pilot focused on;

- Current EU and national policy requirements
- Providing cost effective solutions for VMS deployment
- Evaluation of the pilot
- Recommendations going forward

What are Intelligent Transport Systems – ITS?

It’s Being Better Informed

It’s Smart Information

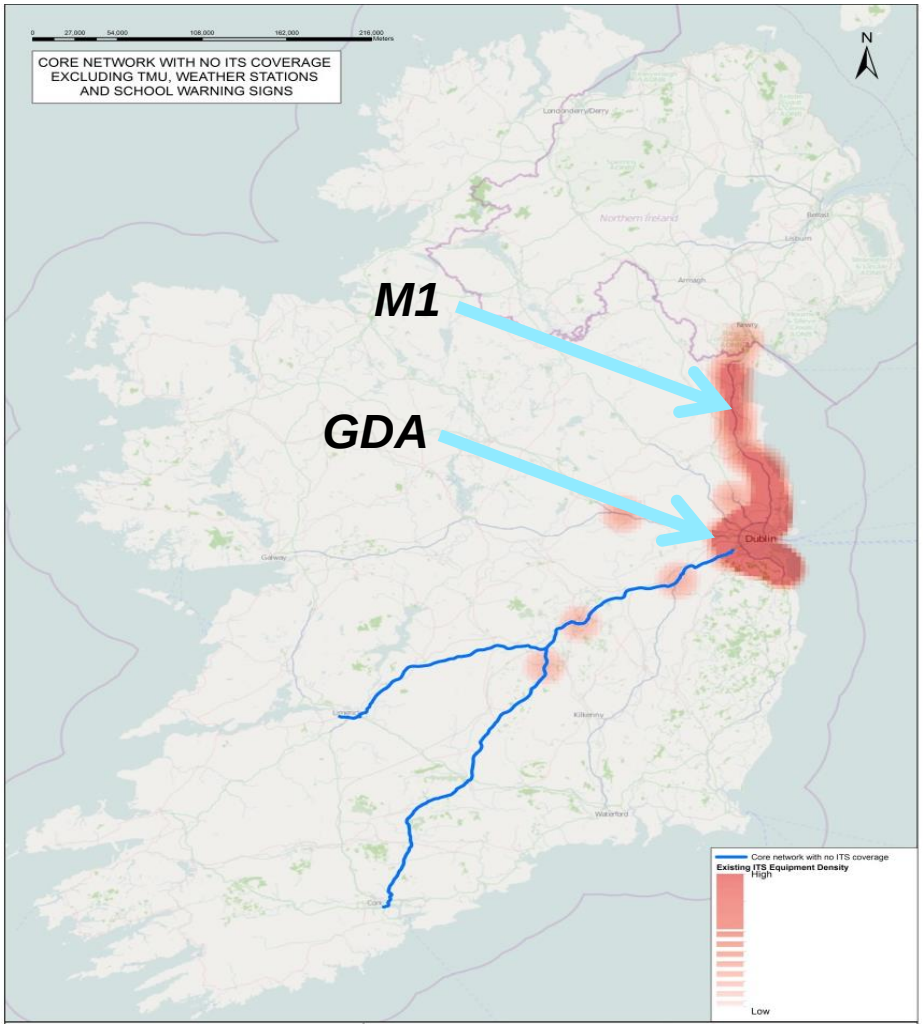


It’s Making Journeys Safer

It’s Providing Innovative solutions

Picture Reverence - http://www.tech-faq.com/intelligent-transportation-systems.html

ITS Deployment on the National Road Network

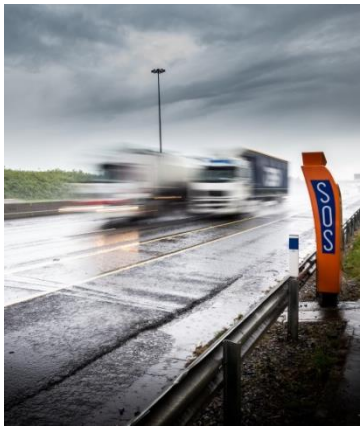


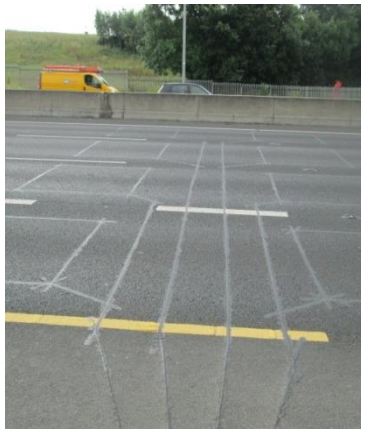
The TII owns and operates a considerable network of ITS equipment.

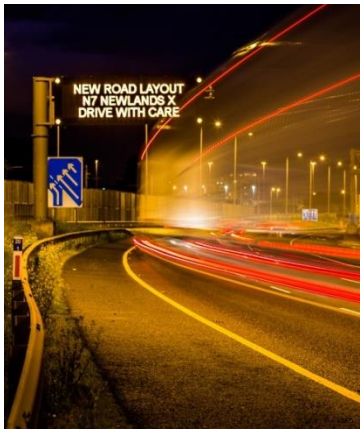
- The primary deployment has been around the Greater Dublin Area(GDA) .
- Significant deployment has also been made along the M1 corridor.
- Small number of pockets on key strategic routes outside the GDA.

ITS Deployment on the National Road Network

Equipment type	Currently Operated by NRA
Automatic Number Plate Recognition (ANPR)	124
Closed Circuit Television (CCTV)	67
Emergency Roadside Telephone (ERT)	1,400
Loop Vehicle Detector (LVD)	104
Remote Traffic Microwave Sensor (RTMS)	24
Traffic Monitoring Units (TMU)	285
Weather Stations	85
Variable Message Sign (VMS)	90
School Warning Signs	415
Ghost Driver Signs	12
Fibre Optic Cabling (approximate length)	200km







EU Directives & National Policy

European Policy

- Directive 2010/40/EU "EU ITS Directive"
- EU White Paper (2011) – ''Roadmap to a Single European Transport Area''
- EU Ten – T Regulations

More specifically, two of the three Priority Actions within Priority Area 1 (*Optimal use of road, traffic & travel data*) of the EU ITS Directive are the main drivers for the 2014 VMS Pilot Scheme:

Priority Action (b) Real- time traffic info services
Priority Action (c) Safety related traffic info

National Policy

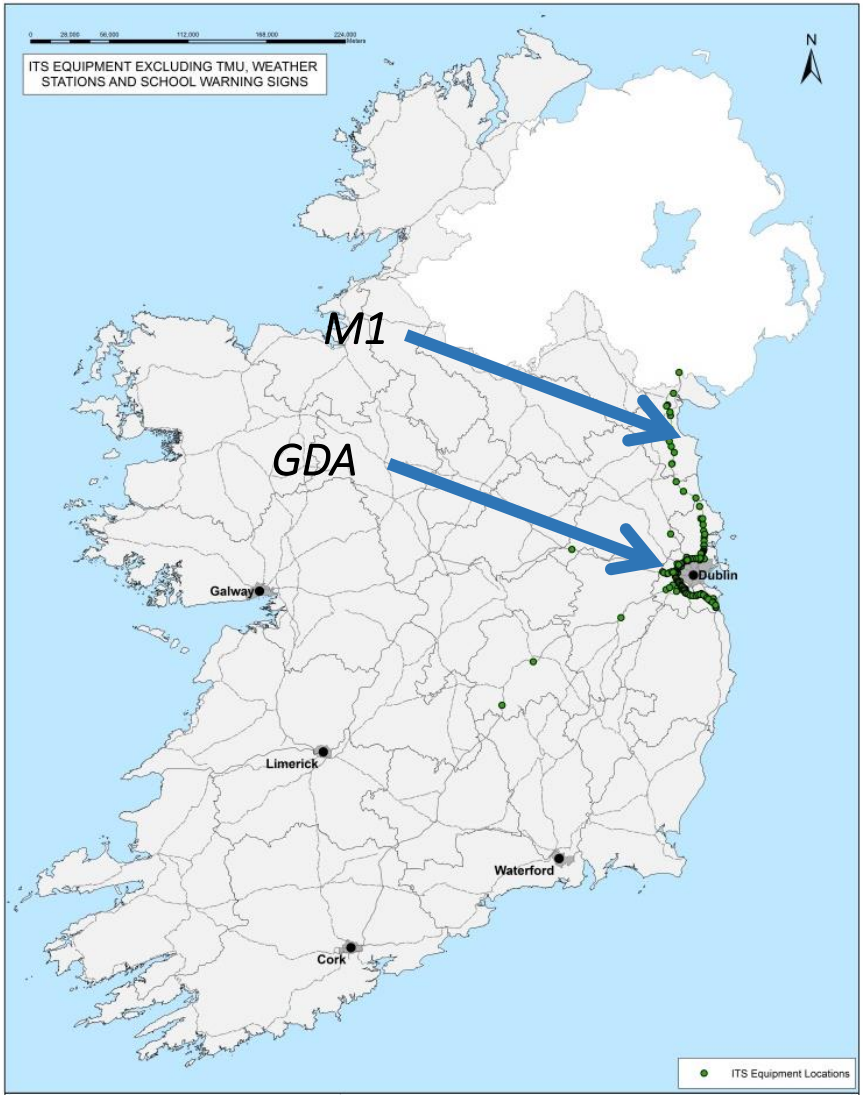
- Ireland: ITS Actions 2012 – 2017 (DTTAS)
- NRA Mission Statement
- NRA National Roads Traffic Management Study;
- NRA Strategy for Research & Development
- NRA Draft ITS Policy 2015 – 2025

European Union Directives

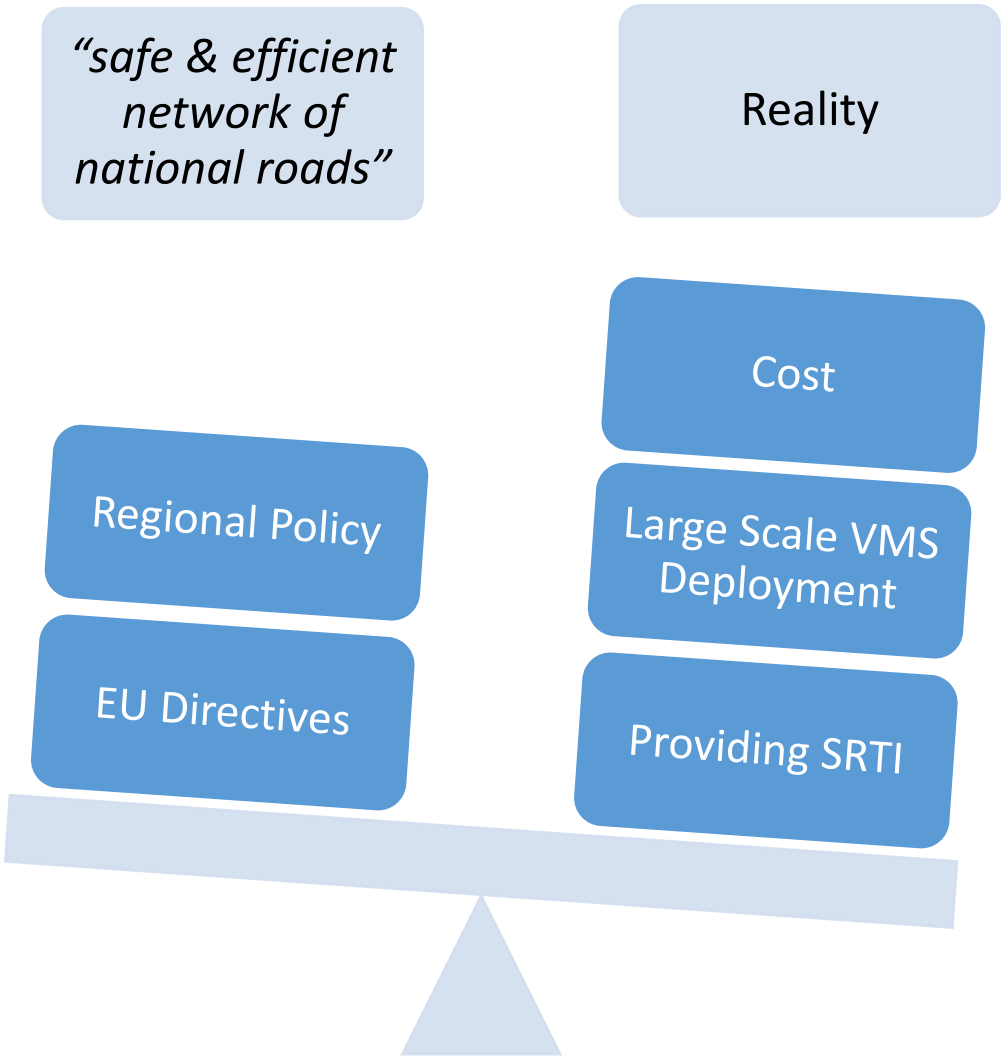
- The National Motorway Network – 917 km (2015)
- Ireland's Core Network is to comprise of approximately 600 km
- Ireland's Comprehensive Ten–T network will be approximately 1,700 km.
- By 2030, TEN –T Core Networks will have a similar ITS deployment to the M1 Motorway.
- N40 South Ring Road in Cork upgraded to match deployment in GDA

VMS and SRTI

- VMS at the roadside will be key to the delivery of Safety Related Traffic Information (SRTI) as required under Action (c).
- 90 VMS Installed across the network prior to the pilot scheme.
- Strategic concentration within the GDA and the M1.
- A number of other remote VMS on approaches to and from the GDA.



Why a Pilot Scheme?



VMS Construction Pre Pilot Scheme

Large Scale Excavations

Long and Complicated Power Connections

Large Reinforced Concrete Foundations

Large Steel Cantilever Structures

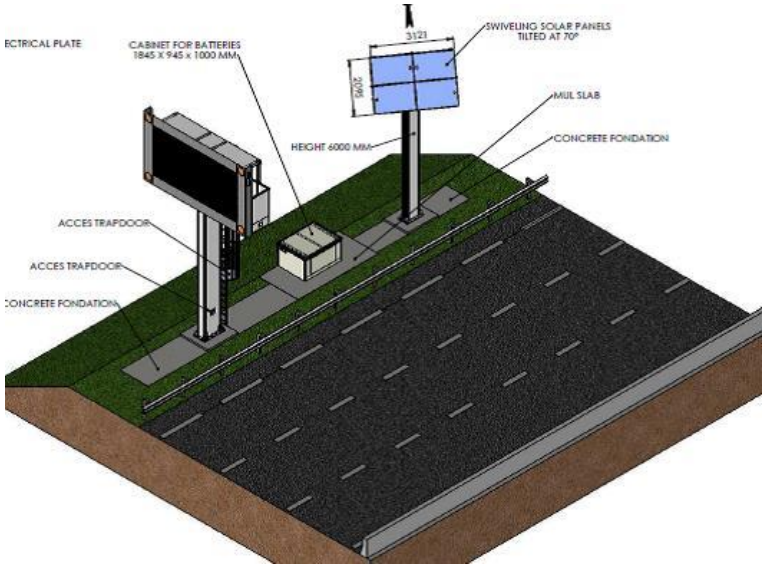
Optioneering

Investigate, Analyse and Assess

- EU and National Policy
- Land Availability
- Power Availability
- Constructability
- Operation and Maintenance
- Future Funding

Option 1 – Utilisation of Existing Structures

Option 2 – Solar Powered Signs



Deployment Strategy

Deployment

3 Solar VMS & 7 Structure Mounted

- Strategic locations
- Microclimates
- Primary and secondary delivery

Sign Types

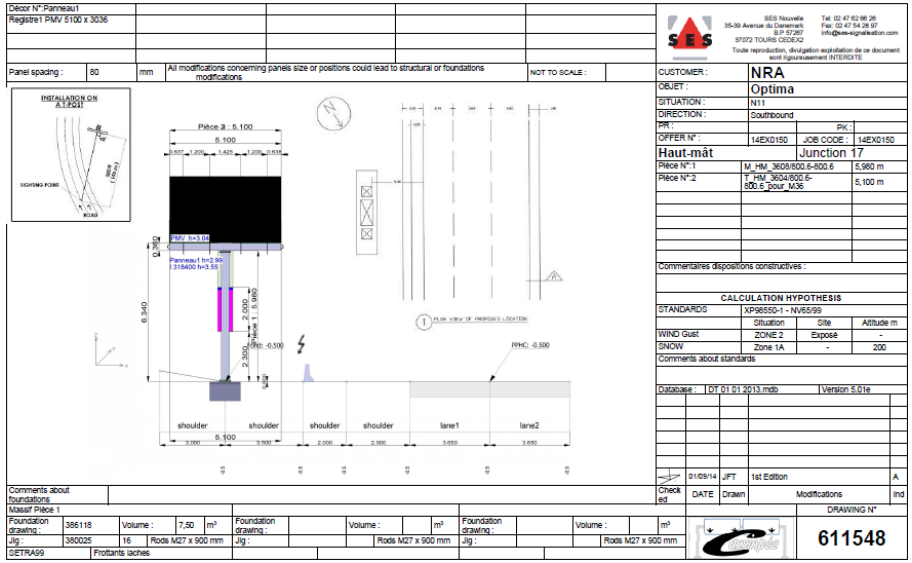
- POWER - Solar-Powered VMS
  - manufactured by Securite & Signalisation (SES)
  - supplied by Rennicks
- STRUCTURE - Full Colour VMS
  - manufactured by Data Display
  - supplied by Imtech

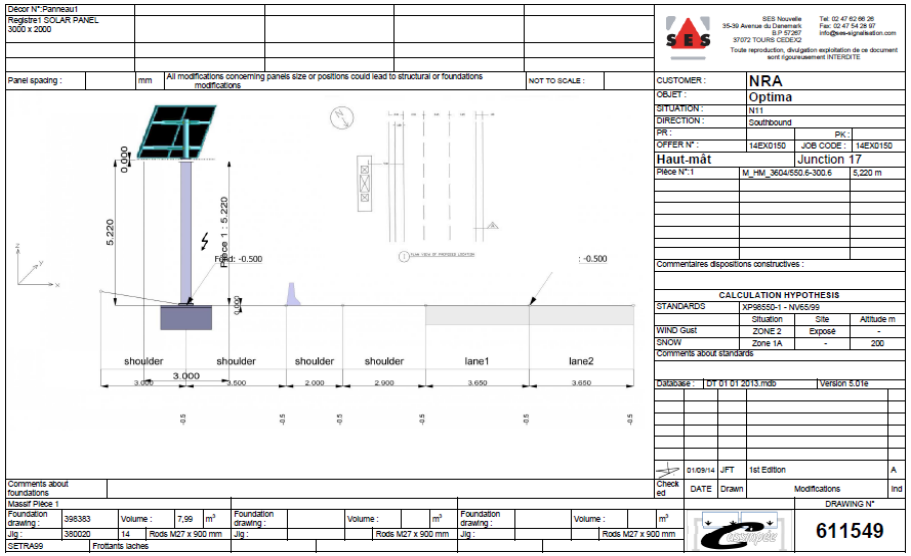
Solar VMS

- 5.0m x 2.9m VMS with red/amber display 4.1m x 2.0m.
- Text height between 200 mm and 250 mm as required by the Traffic Signs Manual.
- 3.0m x 2.0m multicrystalline technology solar panel.
- Twelve 2V DC lead gel batteries to provide power for an minimum of six hours operation.

Solar VMS Design

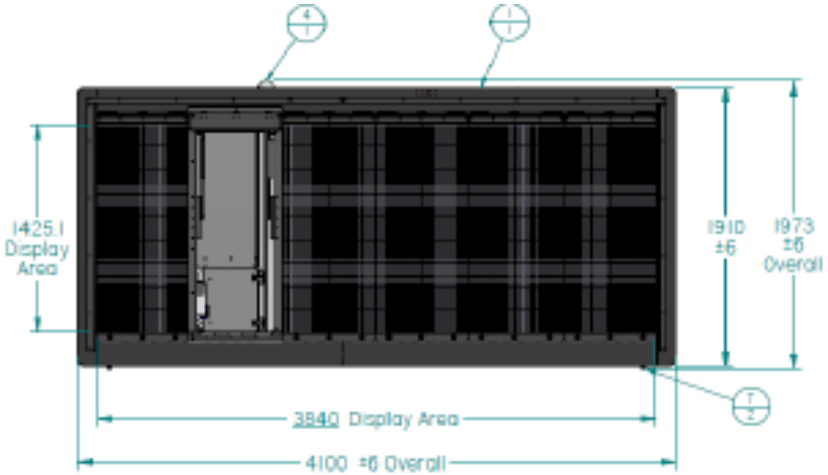
- Structures and foundations designed by SES based upon their specific location.
- Two separate aluminium supports with maintenance access provided to the VMS.
- Category 3 checks undertaken on SES designs.
- No design of power connections required.
- Maintenance vehicle and personnel access designed to Series 1500 Road Construction Details

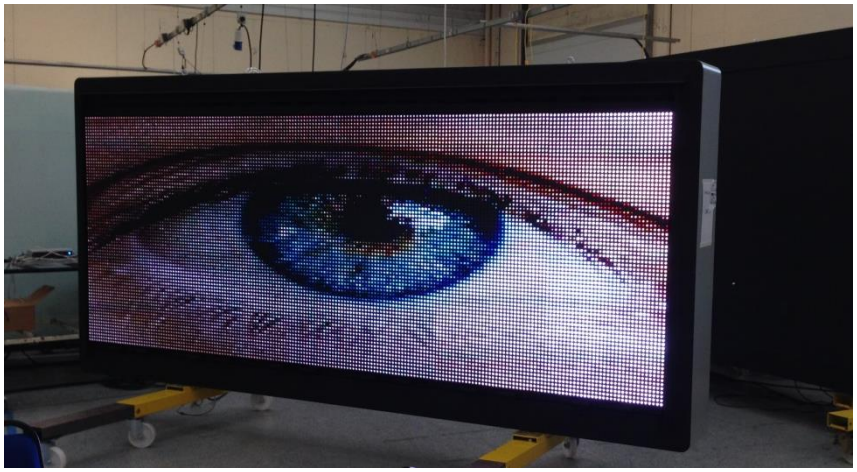


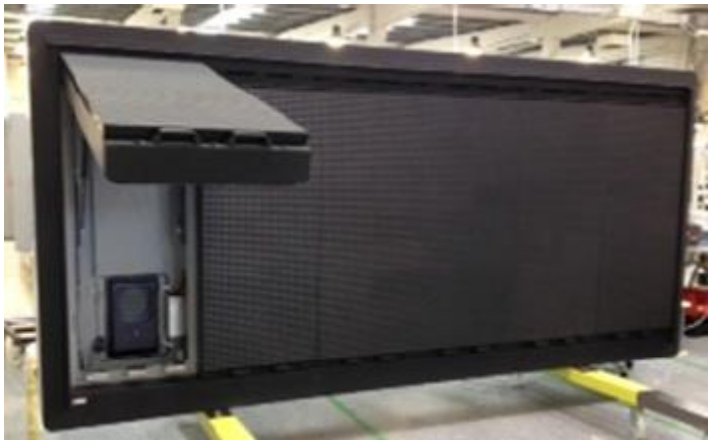


Full Colour VMS

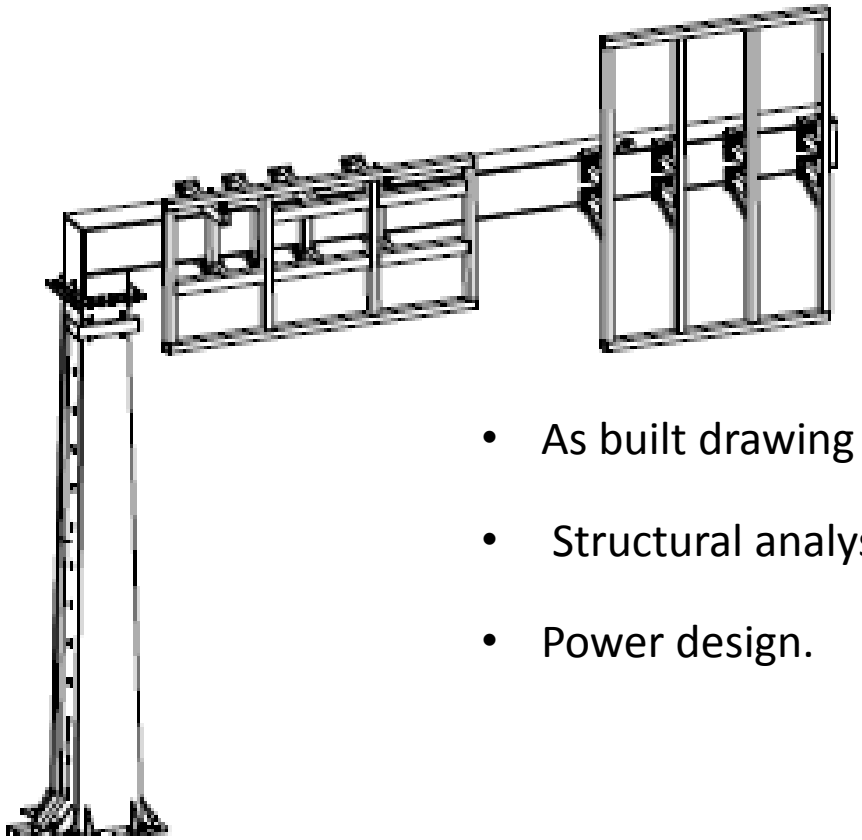
- 4.1m x 1.9m VMS with 3.8m x 1.4m display area
- Red/green/blue LEDs provide a full colour display
- Powered by 5kVA mains supply.



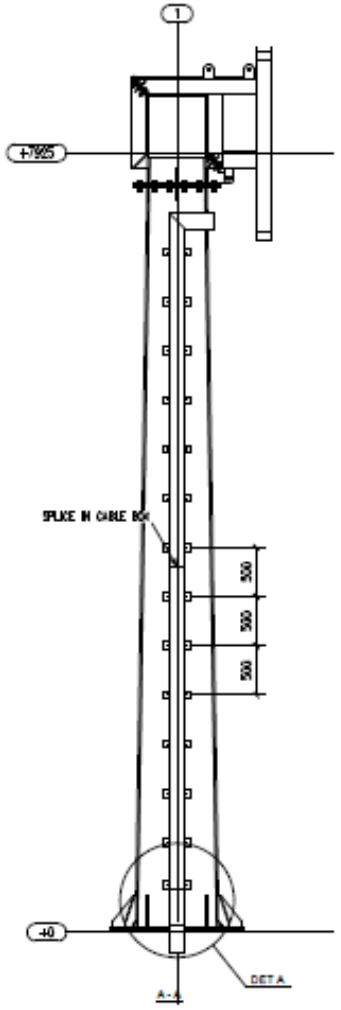




Full Colour Design



- As built drawing records.
- Structural analysis.
- Power design.



Solar Powered Construction

- Similar reinforced concrete foundation to an MS3-Type VMS
- No external ducting or chambers required
- No power connection required

Full Colour - Construction

Operational Effectiveness

How effective will the signs be?

Motorway Traffic Control Centre (MTCC) is responsible for operation

- Major Incidents
- Planned Diversions
- Maintenance Works
- Safety Campaigns
- Child Rescue Ireland (CRI) Alerts

Other considerations

- Reliability & Availability
- Effectiveness

Lifetime Cost Analysis

To compare the pilot scheme, the signs where compared to standard MS3 Type and MS4 Type VMS over a 10 year lifetime.

Analysis Included;

- Capital costs (Signs, structures and installation)
- Construction of civil engineering work (including electrical connection and cabling)
- Electrical consumption
- Operation and maintenance
- Cost saving options

Cost Saving Options

The pilot scheme identified areas where improvement and cost savings could be made to create additional saving and possibly improve the potential solutions going forward.

- Relocation of more control equipment from sign to cabinet to reduce maintenance requirements.
- Investigate providing vehicle access platform on verge to reduce requirements for lane closures.
- Install solar VMS and solar panel on one structure to reduce capital costs and maintenance.

Lifetime Cost Analysis

Solar VMS Comparison – 10 Year Lifetime Cost		Most Economical Option	% Comparison
Solar VMS	MS3 Type VMS	Solar VMS	- 30%
Solar VMS	MS4 Type VMS	Solar VMS	- 2%
Solar VMS (Single Structure)	MS3 Type VMS	Solar VMS	- 29%
Solar VMS (Single Structure)	MS4 Type VMS	Solar VMS	- 1%

Sign Gantry VMS Comparison – 10 Year Lifetime Cost		Most Economical Option	% Comparison
Sign Gantry VMS	MS3 Type VMS	MS3 Type	- 5%
Sign Gantry VMS	MS4 Type VMS	MS4 Type	- 46%
Sign Gantry VMS (With Access)	MS3 Type VMS	Sign Gantry With Access	- 34%
Sign Gantry VMS (With Access)	MS4 Type VMS	Sign Gantry With Access	- 8%

Pilot Scheme Comparison – 10 Year Lifetime Cost		Most Economical Option	% Comparison
Pilot Scheme	MS3 Type VMS	Pilot Scheme	- 5%
Pilot Scheme	MS4 Type VMS	MS4 Type	- 32%
Pilot Scheme (With Alternatives)	MS3 Type VMS	Pilot Scheme	- 32%
Pilot Scheme (With Alternatives)	MS4 Type VMS	Pilot Scheme	- 6%

Conclusion

The pilot scheme has been a success and Transport Infrastructure Ireland are now more informed regarding future VMS deployment.

However, at this early stage the pilot scheme is leaning towards deploying either MS4 Type VMS or gantry mounted VMS with maintenance access provided.

However, to continue learning from the pilot;

- Continue to monitor the signs performance and functionality over the next 12 months.
- Further investigate maintenance of the signs to refine the assumption made for the 10 Year profiles.
- Further investigate issues relating to the recommendations.
- Expand on the pilot to implement the lessons learned and possible solutions.

THANK YOU