Proposed Wood Composite Road Traffic Sign Support.

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Povitrax (PTY) Ltd
FOR TRAFFIC RELATED PRODUCTS
ECOPOLE
Traffic sign supports & poles

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Proposed Wood PVC Polymer Road Traffic Sign Support Motivational Report.

1. INTRODUCTION

AnFab Consult is appointed to provide an overview of the possibility for the replacing of wood or steel road traffic sign supports as specified in the National Road Traffic Regulations, 2000, with a recycled material manufactured from a wood and PVC polymer material.

Theft and veld fires are a big issue in South Africa when wood or steel are used as road traffic sign supports for the display of road traffic signs as specified in legislation and the SADC Road traffic Signs manual.

A new product has been developed to replace solid wood or steel with a product with no theft or resale value or to be used as fire wood.

The new products were tested and comply as an alternative for a road traffic sign support and may have a positive influence on the budget and is also a product that may enhance road safety.

1.1 Introduction to the Wood Composite Road Traffic Signs Support

COMPANY BACKGROUND

Agriligna is the longest operating wood polymer composite manufacturer in South Africa with the most experience in the use of the technology for African conditions. The company has been in operation out of its Nylstroom/Modimolle plant in the Limpopo Province since 2002. It started the **ECOWOOD®** decking range after stringent field testing and 2 years of development. There are already **ECOWOOD®** decks that have been installed for more than 8 years, and therefore the company can back up its 10 year guarantee on the decking with confidence. This same technology has been used in the development of the ECOPOLE wood composite traffic pole range.

BEE CERTIFICATION

Agriligna is a Level 4 BEE contributor.

ECOPOLE PRODUCT BENEFITS

- A viable replacement for steel/ wood
- Better crash worthiness than steel/wood/concrete poles
- Will not rust
- Cannot be used for firewood – will not burn
- Available in a variety of colours
- No resale or scrap value

- Easily brandable
- Recyclable by ECO POLE
- Use of recycled polymer and wood – Green Product
- Price comparable to steel

MATERIAL

The material of the traffic pole consists of a homogenous blend of waste natural fibre, polyvinylchloride (PVC) and additives, with a PVC content of not less than 45%. Additives are non-toxic. The material is UV stabilised for a minimum lifespan of 20 years.

PROFILES

Profiles for 76mm poles (Round and D-Shaped) have a wall thickness of not less than 6mm, and 50mm square profiles will have a wall thickness of not less than 4mm. Profiles are designed to accommodate a screw sleeve attachment system.

CAP AND BASE

The pole is provided with a welded PVC cap to form a watertight seal with a shape similar to the pole section.

Similarly, the poles will be fitted with a base pin to prevent removal of the pole after installation.

TESTING

Traffic poles have been tested according to and passed the requirements of US NCHRP Report 350.

1.2 Proudly South African Product.

ECO POLE is proudly South African developed and manufactured.

2. MANUFACTURING PROCESS

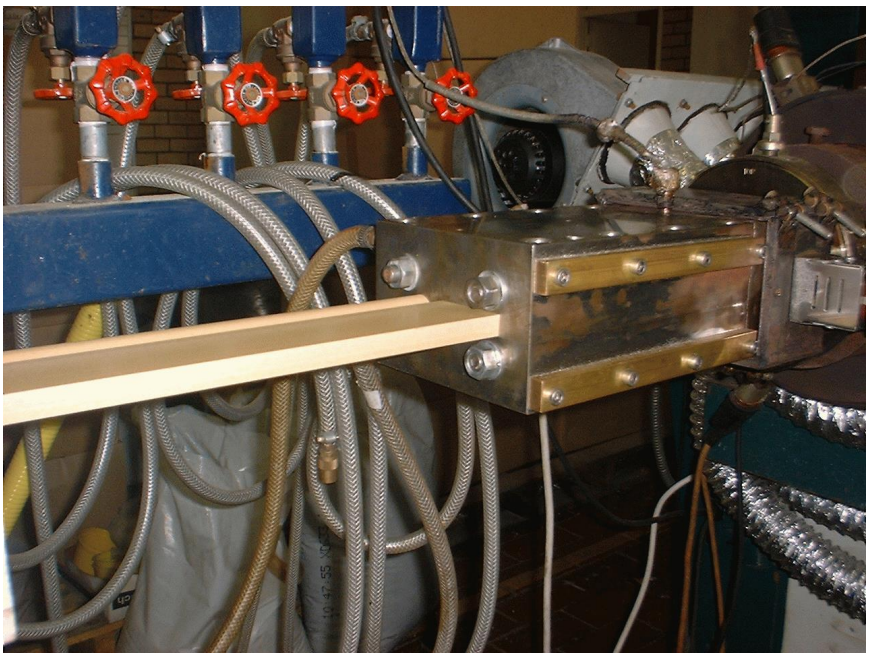
2.1 Wood, Polymer & Additives

2.2 Mixing

2.3 Compounding in a twin screw extruder

3. PRODUCT PRODUCTION

3.1 Profile extrusions from pellets



4. ROAD TRAFFIC SIGN SUPPORT

4.1 A Viable replacement for steel / wood

- ✓ 4.1.1 Safer
- ✓ 4.1.2 Anti corrosion
- ✓ 4.1.3 Cannot be used for firewood – cannot burn during veld fires
- ✓ 4.1.4 Available in grey color to comply with National Road Traffic Regulations – other colors available when required
- ✓ 4.1.5 No scrap resale value
- ✓ 4.1.6 Recyclable
- ✓ 4.1.7 Use of recycled polymer and wood
- ✓ 4.1.8 Up to 20% cheaper than steel

5. TESTING

5.1 Pole tests

- ✓ 5.1.1 Poles are weaker than steel
- ✓ 5.1.2 Strength is adequate for traffic sign support
- ✓ 5.1.3 Less damage to vehicles and road users

- ✓ 5.1.4 Lower loss of life
- ✓ 5.1.5 Weather ability
  - ❖ 5.1.5.1 Weathering tested up to 2 years
  - ❖ 5.1.5.2 Material turns grey
  - ❖ 5.1.5.3 Outside 100 micron affected by UV, whilst strength is retained
  - ❖ 5.1.5.4 Waterproof

5.2 Poles 6 year natural weathering tested at CSIR:

40

40

40

STOP

40

5.1 Poles 5 year natural weathering tested at BAKWENA N4:

6. IMPACT TESTING

6.1 Poles tested according to US NCHRT Report 350:

- ✓ 6.1.1 Structural Adequacy - PASS
- ✓ 6.1.2 Vehicle Occupant Risk - PASS
- ✓ 6.1.3 Vehicle Trajectory - PASS

Testing was performed independently by Accident Specialist – KZN at 70km/h

Before

After

7. MATERIAL DATA SHEET.

Product Name: ECOWOOD® MSD N° 01

Effective Date: 1 January 2010

1. INGREDIENTS: (% w/w, unless otherwise noted)

Polyvinyl Chloride	45 to 48 %
Pine Wood Flour	35 to 40 %
Titanium Dioxide	3 to 5 %
Iron Oxide Pigments	3 to 5 %

2. PHYSICAL DATA:

Boiling Point:	Not Applicable
VAP Press:	Not Applicable
VAP Density:	Not Applicable
Solubility in Water:	Insoluble
Specific Gravity:	1.35
Appearance:	Gray to brown in colour. Solid with particleboard
Odour:	None

3. FIRE AND EXPLOSION HAZARD DATA:

Flash ignition temperature: 260°C

Hazardous combustion products: Burning liberates HCL gas

Extinguishing Media: Water spray, foam, CO_2, dry chemical

Fire and explosion Hazards: Product will not continue to burn after ignition without an external fire source.

Fire-Fighting Equipment: Full protective clothing, including positive pressure, self-contained breathing apparatus in any closed space.

4. REACTIVITY DATA:

Stability: (Conditions to avoid) – Temperatures over 260°C will release combustible gases.

Incompatibility: None

Hazardous Decomposition Products: HCL gas when exposed to temperatures of 300°C

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

Action to Take for Spills: Sweep up and discard.

Disposal Method: Bury in landfill, burn in an adequate incinerator in accordance with applicable local regulations, or recycle.

6. HEALTH HAZARD DATA:

Eye: Solid or dust may cause irritation or corneal injury due to mechanical action.

Skin Contact: Essentially non-irritating to skin. Mechanical injury only.

Skin Absorption: A single prolonged skin exposure is not likely to result in the material being absorbed through skin in harmful amounts.

Ingestion: May cause choking if swallowed. Single dose oral toxicity is believed to be very low. Considered physiologically inert.

Inhalation: Vapours are unlikely due to physical properties. Single exposure to dust is not likely to be hazardous.

Chronic Effects: Cancer hazard – This material contains vinyl chloride, which is a listed human carcinogen.

7. FIRST AID:

Eyes: Irrigate immediately with water for at lease five minutes. Mechanical irritation only.

Skin: Wash off in flowing water or shower.

Ingestion: No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

8. HANDLING PRECAUTIONS:

Exposure Guidelines: None established

Ventilation: Good general ventilation should be sufficient.

Respiratory Protection: No respiratory protection should be needed.

Skin Protection: No precaution other than clean body-covering clothing should be needed.

Eye Protection: Use safety glasses.

9. ADDITIONAL INFORMATION:

Regulatory Information:

This product contains no known toxic chemicals

Special Precautions To Be Taken In Handling and Storage: Practice reasonable care and caution in handling.

The information set forth herein has been gathered from standard reference materials and /or supplier test data and is to the best knowledge and belief of Agriligna (Pty) Ltd, accurate and reliable. Such information is offered solely for your consideration, investigation and verification, and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones, which exist. Agriligna (Pty) Ltd makes no warranties, expressed or implied, with respect to the use of such information or the use of the specific material identified herein in combination with any other material or process, and assumes no responsibility.

8. IMPACT DAMAGE

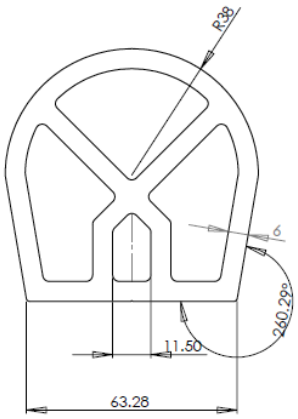
Before

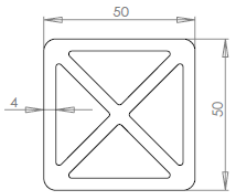
After

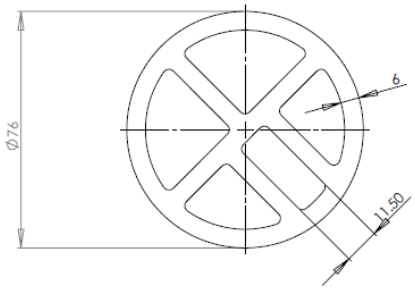
9. POLE TOP CAP

Watertight PVC Weld

10. POLE SECTION PROFILES







D-Section **Square** **Round**

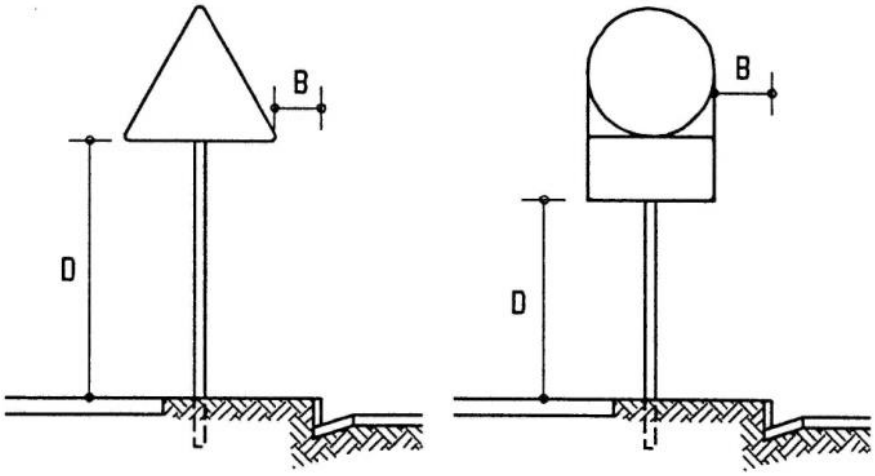
10.1 Pole Weight

The weights are as follows:

Post55	2.54kg/m
D-Shape 76	3.04kg/m
Round 76	2.80kg/m

10.2 Pole Installation and backfilling

Excavations for the erection of road signs shall be at least 250mm x 250mm x 600 for poles less than 3,5m long or according to the dimensions shown on the JRA typical drawings. Where the excavations are to be backfilled with soil, a 1:12 cement: soil mixture shall be made if so required by the engineer. The soil or soil-cement mixture shall then be placed at optimum moisture content in 100 mm thick layers in the excavation and shall be compacted to a minimum of 90% of modified AASHTO density.

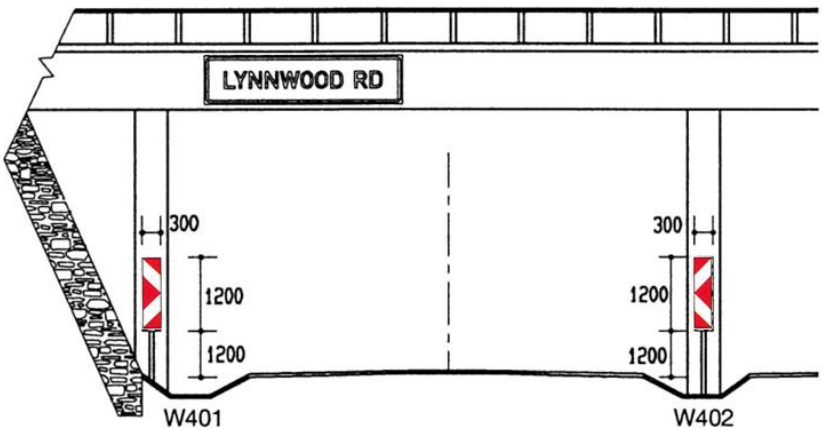


with kerb and sidewalk

SADC RTSM Detail 1.18.1

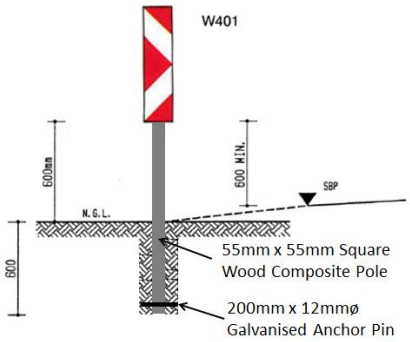
TABLE 1.3	LATERAL AND VERTICAL PERMANENT SIGN PLACEMENT DIMENSIONS				TABLE 1.3
Dimension	Minimum (mm)	Preferred (mm)	Maximum (mm)	Remarks	
B	500	750			
D	2100	2500	3000	See Note (11) below	

(11) Dimension “D” should be used in any situation where pedestrians are likely to walk in close proximity to a road sign OR sign should be mounted at the minimum value of dimension “C” (fig 1.18.1).

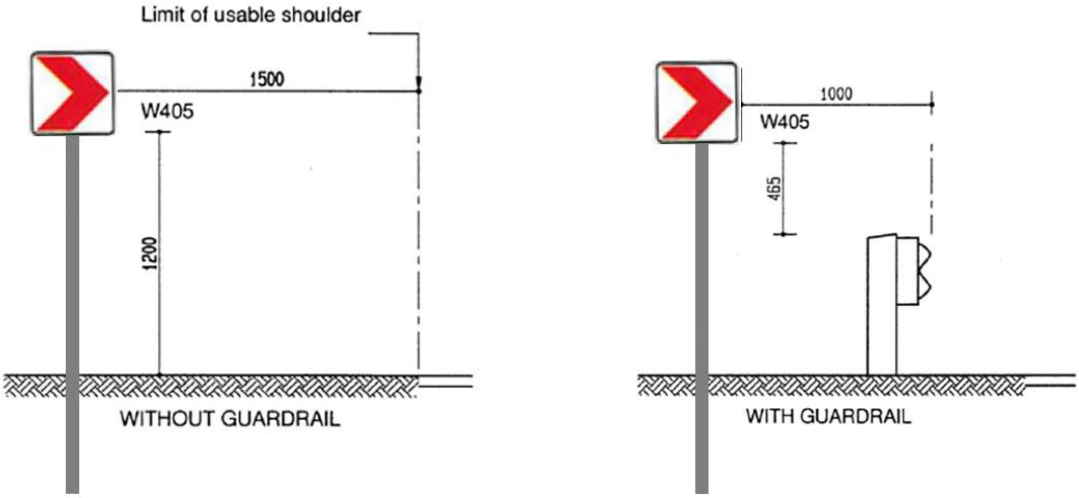


TYPICAL ELEVATION

SADC RTSM



TYPICAL INSTALLATION - MINIMUM SIZE W401 / W402



TYPICAL PLACING DETAILS - SHARP CURVE CHEVRONS
W405 / W406

11. LEGISLATION

All road traffic signs and markings in South Africa shall be displayed in compliance with Legislation.

The legislation pertaining to Road Traffic Signs in South Africa is:

- Sections 56 to 59 of the National Road Traffic Act, 1996.
- Regulations 284 to 291 of the National Road Traffic Signs Regulations, 2000.

Section 56 allows the Minister to prescribe road traffic signs.

Section 57 determines the requirements for the display of road traffic signs and enables the various authorities to display road traffic signs.

Section 57(3) was amended in August 2000 when the new Act became effective. The section now reads:

Section 57

(3) (a) A local authority, or any person in its employment authorised thereto by it either generally or specifically, may in respect of any public road within the area of jurisdiction of that local authority display or cause to be displayed in the prescribed manner any such road traffic signs as such authority or person may deem expedient.

(b) A local authority may in writing authorise any other person or body to display or cause to be displayed within its area of jurisdiction and in the prescribed manner any road traffic sign approved by it prior to the display of such sign.

(c) A local authority referred to in paragraph (b) may determine the conditions for such display and may order the removal of such sign.

In the event that a person makes an accident in an area where the authority is responsible due to the illegal placing of signs, signs not in compliance or signs omitted the autority may be liable, as section 57(3) places a specific duty on it to ensure compliance.

11.1 Regulation 286A – Colours for Manufacturing of Road traffic Signs and Supports

(5) Subject to the provisions of this Part, the colour of the standard or post specifically erected for the display of a road sign shall, where the standard or post is—

(a) of steel, be grey: Provided that if the steel has been treated this requirement shall not apply;

(b) of wood, be the colour of the wood as treated or painted grey or brown; and

(c) of concrete, be the natural colour of the concrete,

12. SADC AND SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL - (UNIFORM SAFETY CONTROL DEVICES)

The Southern African Development Community (SADC) member states decided, at their meeting in Lusaka in June 1995, to enter into a Protocol Agreement to expand and deepen their co-operation in the areas of infrastructure and services.

The SADC Road Traffic Signs Manual (RTSM) Volume 1 and 4 were developed in South Africa to conform to the European signing principles but also to satisfy African requirements and published in 1993.

Volume 1 of the SADC RTSM contains detailed signing policy and design principles. The content provides an in depth and working detail on the use of each individual component of the system.

Volume 4 of the SADC TRSM gives complete dimensional details, together with accurate scalable drawings, of all signs, markings and signals including details of all letter types used on direction signs.

The South African RTSM Volume 2 (18 Chapters) does not comply with SADC requirements but is used by practioners in South Africa. Volume 2 deals with the collective application of signs, markings and signals for specific subject areas such as traffic accommodation at road works, freeway signing, toll route signing, traffic calming, pedestrian safety, public transport signing, and signing for the control of heavy vehicles and other related areas.

The SADC RTSM covers the meaning and application of individual traffic control devices available to authorities having the necessary jurisdiction to place or erect such devices in a public road.

Traffic control devices include all road traffic signs, road traffic markings, road studs, guardrails, crash cushions, concrete barriers, truck mounted alternators and other devices, including delineation devices, used to regulate, warn, guide or inform road users. Traffic control devices are thus used to achieve an acceptable level of road safety by providing for the orderly and predictable movement of all traffic, vehicular and pedestrian, throughout all levels of the road network.

Road traffic signs, by legal definition, include all prescribed road signs, road markings and traffic signals and are to be used solely for the purpose of traffic control. The meanings given to traffic control devices in the SADC RTSM are in accord with the meanings given in the relevant road traffic Legislation. The meanings given in the Legislation have legal precedence.

Guideline documents like the SADC RTSM will normally be applicable to tort liability cases.

NDoT is in the process to negotiate with The South African Road Federation (SARF) for the possibility to review SARTSM Volume 2 Chapter 13 for Road Works Signing.

Volume 3 of SARTSM provides in depth detail on the selection, installation operation and control methods for traffic signals.

13. LIABILITY

13.1 Criminality Liability

Prescriptive legislation compels the use of a specific procedure, form, standard, etc. If such procedure is not followed a penalty clause makes the illegal action an offence. The legislation prescribes a maximum fine or imprisonment term for the illegal action. This is applicable to all levels of legislation, national, provincial and local. Any actions stemming from such offences are criminal actions and must be addressed by the criminal process.

In terms of the Road Traffic legislation, a criminal liability was created in the legislation in 1990. This liability did not exist in the days of the Road Traffic Ordinances from 1966 to 1990 and authorities could not be charged for displaying incorrect signs, etc.

The legislation now contains a general Offences section that makes all actions required or obliged within the legislation an offence if it is not complied with or contravened.

Section 89(1) reads as follows:

Section 89: Offences and penalties

(1) Any person who contravenes or fails to comply with any provision of this Act or with any direction, condition, demand, determination, requirement, term or request thereunder, shall be guilty of an offence.

(2) Any person convicted of an offence in terms of subsection (1) read with section 42 (1) or (2), 44 (1), 45 (2), 46 (1) or 65 (1), (2), (5) or (9) shall be liable to a fine or to imprisonment for a period not exceeding six years.

(3) Any person convicted of an offence in terms of subsection (1) read with section 17 (4), 18 (5), 59 (4), 61 (2), 66 (3) or 68 (1), (2), (3), (4) or (6) shall be liable to a fine or to imprisonment for a period not exceeding three years.

(4) Any person convicted of an offence in terms of subsection (1) read with Section 61 (1) shall be liable:

(a) in the case of the death of or serious injury to a person where it is proved that the person convicted has failed to comply with paragraph (a), (b), (c) or (f) of section 61 (1), to a fine or to imprisonment for a period not exceeding nine years;

(b) in the case of damage in respect of any property or animal of another person where it is proved that the person convicted has failed to comply with paragraph (a), (d) or (f) of section 61 (1), to a fine or to imprisonment for a period not exceeding three years; or

(c) where it is proved that he or she has failed to comply with paragraph (e) or (g) of section 61 (1), to a fine or to imprisonment for a period not exceeding one year.

(5) Any person convicted of an offence in terms of subsection (1) read with Section 63 (1) shall be liable:

(a) in the case where the court finds that the offence was committed by driving recklessly, to a fine or to imprisonment for a period not exceeding six years; or

(b) in the case where the court finds that the offence was committed by driving negligently, to a fine or to imprisonment for a period not exceeding three years.

(6) Any person convicted of an offence in terms of subsection (1) read with any other provision of this Act shall be liable to a fine or to imprisonment for a period not exceeding one year.

(7) Notwithstanding anything to the contrary in any law contained, a magistrate's court shall be competent to impose any penalty provided for in this Act.

- Currently one-year imprisonment is equal to a R20 000 fine.

- The effect of this is that, if a specific sign is permitted and prescribed in the legislation and a sign, which do not conform to the legislation, is displayed, it is illegal in terms of section 89 and is technically an offence. A person would be able to lay a criminal charge against an authority that does not comply with the legislation.

Section 332 of the Criminal Procedure Act, 1977 allows for juristic persons to be criminally prosecuted. A director or servant of such a juristic person must then represent the legal person in court. The Roads Agency is a private company and the directors would be responsible. A director is normally charged and not the servants, although it is possible to charge a servant as well.

The maximum fine for transgressing any of the sections and regulations relevant to the authority is R20 000 or 6 years imprisonment.

13.2 Tort liability

Tort liability arises when there is a legal duty to perform a certain task and the task is not performed or performed incorrectly. In situations where a person or authority does not act according to the norm acceptable for the circumstances and situation and due to the actions or negligence of its directors or servants cause damage and are accountable for their actions.

The law of delist determines that a person or organization is accountable for damage caused to another person due to its negligence.

Negligence can be due to a commission or omission.

Section 58 and regulation 287 give a very general discretion to practitioners to display road traffic signs. Authorities must control employees strictly. Due to the fact that employers are liable for actions of employees that are executed in the course of their duties it is necessary to ensure that the discretion they exercise is such that they are not considered reckless or negligent.

Guideline documents like the SADC RTSM will normally be applicable to tort liability cases.

13.3 Vicarious liability

Vicarious liability basically means that authorities are responsible for actions of employees, if the employee was:

- Acting on behalf of the employer.
- Not acting outside the scope of his employment.

Unfortunately the display <u>or omitting</u> of road traffic signs can easily be the cause of an accident, and specifically where temporary signs are used, a dialectal claim can arise.

14. PROPOSED ROAD TRAFFIC SIGN AND MARKING MANAGEMENT SYSTEM

14.1 Design Phase

- Technical Guidelines for Road Traffic Signs and Markings.
- Traffic Impact Assessment.
- Traffic Lanes Layout.
- Geometric Design.
- Site Sign and Marking Inventory (GPS Camera).
- Road Traffic Marking Detail Design.
- Road Traffic Sign Design.
- National Road Traffic Act and Regulations.
- Road Traffic Signs Manual.
- Road Works Constructability and Phases.
- Accommodation of Traffic Design.
- Contract Specifications.
- Independent Design Audit.
- Approval of Drawing for Tender Purposes.

14.2 Execution Phase

- Approval of drawings for construction purposes.
- Appointment of Contractor.
- Approval of construction phases and programme.
- Approval of Site Traffic Safety Officer.
- Approval of Accommodation of Traffic Drawings for Construction Purposes.
- Approval of Temporary Signs and Markings Materials - SABS Certificates.
- Approval of temporary sign location.
- Approval of temporary marking pre-marking.
- Temporary closure of permanent signs.
- Approval to Proceed with Road Closures, Deviations and Detours. (See Appendix A).
- Start of Road Construction.
- Independent Temporary Sign and Marking Audit by Competent Person.
- Road Works Traffic Management.
- Site Sign Traffic Management System.
- Order of Permanent Signs.
- Quality Management on Permanent Signs Delivered - SABS certificates.
- Marking and Approval of Permanent Sign Locations.
- Approval of Road Traffic Marking Pre-Markings.
- Safety Control Device Audit and Approval.
- Completion Certificate.
- Opening of Road to Public.
- Compile “As-Built” Drawings and Inventory.

15. RECOMMENDATIONS AND CONCLUSION

The information available for the use of the wood polymer road traffic sign supports are sufficient motivation for road authorities to consider the replacement of the existing wood and or steel road traffic sign supports. The omitting of road traffic signs due to theft and veld fires make the risk very high for authorities during tort liability cases and have a positive effect on the maintenance budget. It is recommended for authorities to consider this new product and enhance road safety. The ***"Proudly South African"*** product is "user friendly" and may reduce damage to property and minimise injury to drivers of vehicles, pedestrians and cyclists.

Authorities can expect the following advantages with the replacement of wood and/or steel sign supports with wood polymer recyclable composite:

- ✓ Viable replacement of steel and or timber
- ✓ Better crash worthiness than steel, wood or concrete sign supports
- ✓ No theft – no resale value or scrap value
- ✓ Cannot be used for firewood – will not burn
- ✓ Anti-corrosion
- ✓ Green product – use of recycled polymer and wood
- ✓ Recyclable material
- ✓ Reduced maintenance costs
- ✓ Reduced weight on maintenance vehicles
- ✓ Easier pole installations
- ✓ Reduced installation time due to smaller excavations and soil-crete backfilling and compaction
- ✓ Less stacking space required in store

The new technology wood composite traffic sign pole passed all the tests and performed in the weathering test to expectation and may therefore be considered by authorities to replace the current conventional timber and or steel road traffic sign supports as indicated in the figures under item 10.2.

APPENDIX A: CONTRACTOR’S REFERENCE

BASELLA
maintenance

01 Sept 2016

To: Povitrax

Attention: To whom it my concern

RE: Replacement of all Galvanised posts with YELLOW Eco posts.

Herewith confirming that all Galvanised post for Hazard markers / Danger plates have successfully been replaced on the N4 with the New Eco Posts.

(Total replaced 2901no, from Doompoort Plaza until Skilpadhek Border Post)

Please keep stock on hand for monthly maintenance.

(1.8m, 2m, 2.1m + 3m)

Sincerely,

Riaan De Groot

Quantity Surveyor

Basella Maintenance cc

083 453 0402

rdgconsultandscc@gmail.com

APPENDIX B: IMPACT TESTING REPORT OF WOOD PLASTIC COMPOSITE (WPC) ROAD TRAFFIC SIGN SUPPORTS (electronic copy)