

Ontario Vehicle Weight & Dimension (VW&D) Reforms Phase 3

Safe, Productive,
Infrastructure-Friendly Vehicles

VW&D in Ontario

- Ontario allows:
 - heavy axle and gross weights
 - unlimited axles (including lift-axles)
- Resulting vehicles:
 - extremely productive
 - safety concerns
 - excessive road and bridge damage

VW&D Reforms

- 4-phase project:
 - different group of vehicles addressed in each
 - Phases 1 and 2 already implemented
- Purpose is to:
 - identify vehicles that are *Safe, Productive and Infrastructure-Friendly* (SPI F)
 - cause a migration to SPI F vehicles
 - deal fairly with existing vehicles

VW& D Reforms - Phases

Phase 1 – non-dump semi-trailers (3 axles)

Phase 2 – dump semi-trailers (all axle configurations)

Phase 3 – non-dump semi-trailers (4+ axles)
- all double trailers

Phase 4 – tractors, straight trucks, pony/pup trailers

Phase 3 – SPI F Vehicles

- Alternatives to 4+ semi-trailers:
 - Self-Steer Quad – already in place
 - Self-Steer 5+ axles – to be determined
- Alternatives of Double Trailers:
 - A, B and C-Train – apply Reg 32/94 across the board

Consultant Assignment

- NRC contracted to:
 - assess state of self-steer axle technology
 - identify SPI F candidates to replace 5+ axle
 - undertake computer simulations
 - existing multi-axle
 - candidate alternatives
 - propose any necessary full-scale tests to:
 - validate simulations
 - address performance issues
- Final Report is available at: www.comt.ca

State of Self-Steer Axles

- Used successfully for many years in a relatively narrow range of operations.
- More recently, used in much broader applications and issues have surfaced.
- Issues are being resolved:
 - improved installer / operator understanding
 - technical improvements
- Drivers generally happy with handling.

Computer Simulations

- Based on CCMTA/RTAC tests. Included:
 - Static Rollover Threshold (SRT)
 - High Speed Offtracking (HSOT)
 - Load Transfer Ratio (LTR)
 - Transient High Speed Offtracking (TOT)
 - Low Speed Offtracking (LSOT)
 - Rear Outswing (RO)
 - Friction Demand in Tight Turn (FD)
 - Lateral Friction Utilization (LFU)

Existing Vehicles Tested

- More than 30 configurations identified with 5 to 8 axle trailers (10 most common tested)
- Self-Steer Quad was also tested to provide a benchmark

Results – Existing Vehicles

- Existing 5+ axle configurations fail multiple performance measure targets – even with lift axles ‘properly’ used
- Self-Steer Quad meets all targets except:
 - HSOT – marginally over target
 - FD – similar to wide spread tridem

SPI F Candidates to Replace 5+ Axle Semi-Trailers

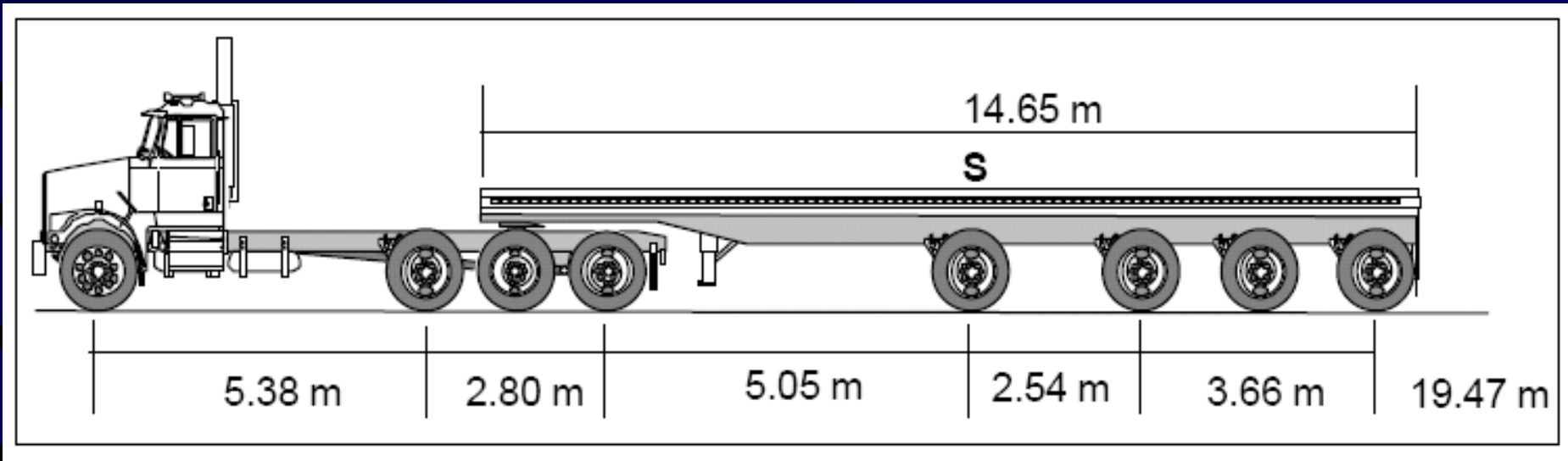
- Seven candidate vehicles were examined
- Four semi-trailers
 - two 5-axle / two 6-axle
 - all with two self-steer axles
- Three 4-axle Tractors + Self-Steer Quad
 - Tri-Drive
 - Self-Steer Pusher
 - Twin Steer

Simulation Results - Candidates

Three candidates emerge:

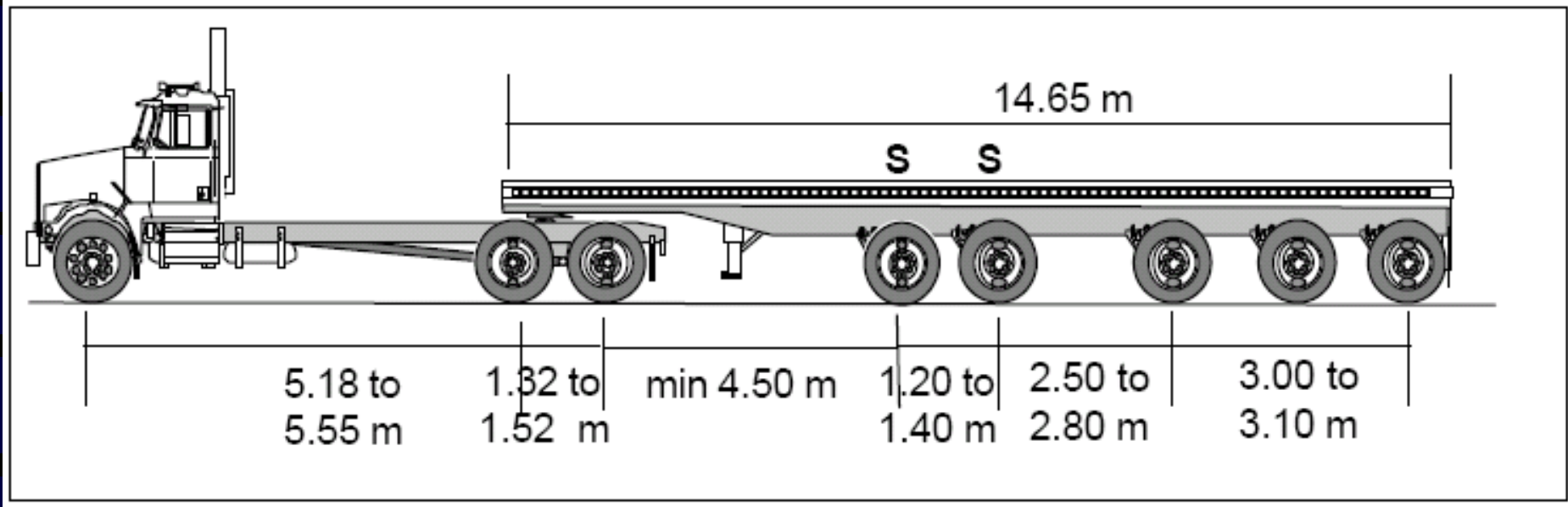
- Tri-Drive Tractor / SS Quad Trailer
 - better than Tandem / SS Quad
- Two 5-Axle Semi-Trailers:
 - meet performance targets, except
 - HSOT
 - FD
 - full-scale testing needed
 - validate simulations
 - determine significance of missing targets

Tri-Drive Tractor / Self-Steer Quad



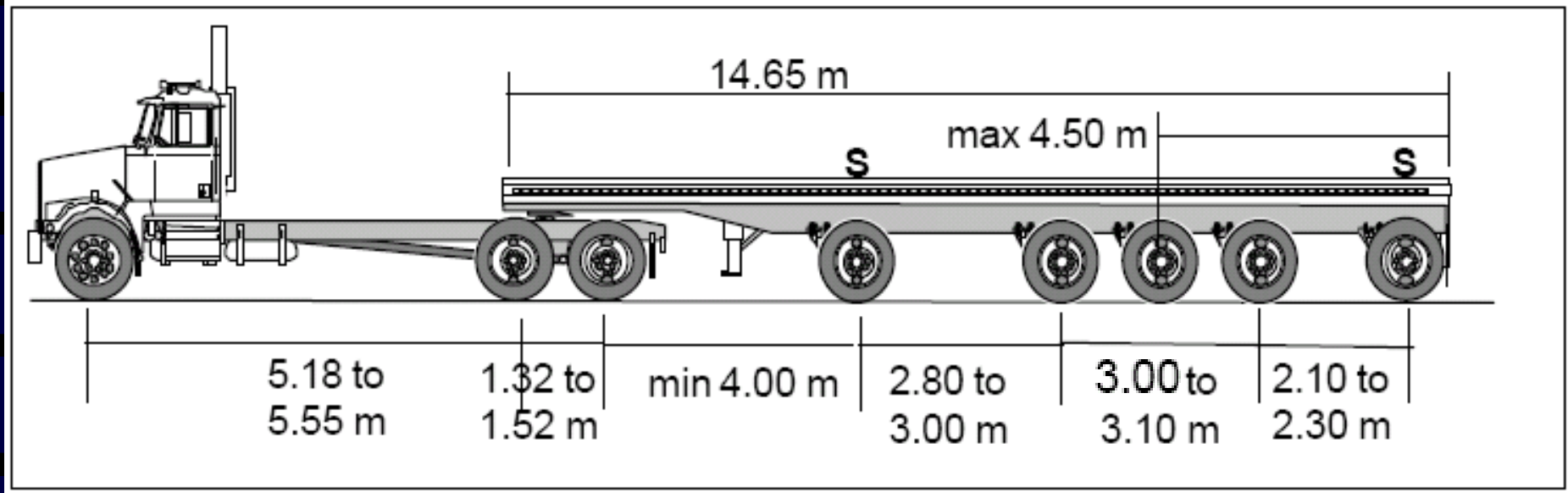
- GVW ~ 61,300 kg
- Tractor:
 - tridem spread: 2.4 – 2.8m (21,300 kg)
 - wheelbase: 6.6 – 6.8m
 - front axle: min 27% tridem weight

5-Axle Semi-Trailer (1-1-3)



- GVW ~ 61,500 kg
- Trailer:
 - 5 axles load-equalize (7,500 kg each)
 - tridem spread 3.0 – 3.1m
 - forward self-steer axle minimum 25° cut

5-Axle Semi-Trailer (1-3-1)



- GVW ~ 61,500 kg
- Trailer: (axle weights same as 1-1-3)
 - tridem shifted back to address rear outswing
 - minimum steer angle both axles is 20°
 - rear axle lock at highway speed

Next Steps

- Discussion Paper - proposed changes
 - opportunity for stakeholder feedback
- Full-scale testing of 1-1-3 and 1-3-1 trailers
 - NRC outline of test program complete
- Review of performance measures
- Results of above to be evaluated mid-2004