

**Part 1 General**

**1.1 REFERENCES**

- .1 CSA Group
  - .1 CSA A23.4, Precast Concrete - Materials and construction
  - .2 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement
- .2 Manitoba Infrastructure and Transportation
  - .1 Manitoba Infrastructure and Transportation Construction Specification 1080 (I) – Specifications for Fabrication and Delivery of Precast Concrete Barriers [May 2010]
  - .2 Manitoba Infrastructure and Transportation Construction Specification 1082 (I) – Specifications for Installation, Relocation and Removal of Precast Concrete Barriers [March 2010]

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for concrete mix and reinforcement and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Precast Units:
  - .1 Concrete Strength: 35 Mpa
  - .2 Mass: 2085 kg
  - .3 Length: 3048 mm
  - .4 Bottom Width: 610 mm
  - .5 Top Width: 150 mm
  - .6 Reinforcement to CSA G30.18, 400W
  - .7 Include 2 – 50 mm diameter lift holes, 600 mm inset from ends
  - .8 Include 254 mm wide, 80 mm deep fork lift block outs along base, 787 mm inset from ends

**Part 3            Execution**

**3.1               CONSTRUCTION**

- .1      Transport
  - .1      During loading, transporting, unloading and storing, the precast concrete barriers shall be protected and maintained in an upright position and shall be supported at the bearing areas. Care of the precast concrete barrier units shall be exercised to avoid twisting, cracking or other distortion that may result in damage to the barrier.
  - .2      The barriers may be stacked to a maximum of two (2) barriers in height.
  - .3      It is the Contractor's responsibility to ascertain the actual weight of the barriers prior to transporting.
- .2      Installation, Relocation and Removal
  - .1      The Contractor shall install, move and re-install the precast concrete barriers for the stages of construction as specified on the Drawings. During all stages, the barriers shall be properly aligned, pinned together and seated firmly to the roadway surface to the satisfaction of the Departmental Representative.
  - .2      The hardware shall be stored in watertight containers.

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

- .1 National Cooperative Highway Research Program (NCHRP)
  - .1 NCHRP Report 350, 1993
- .2 Manitoba Infrastructure and Transportation
  - .1 Figure TSFB50: Sand-filled barrels, 2013

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for the sand filled barrel array and include product characteristics, performance criteria, physical size, barrel array layout, finish and limitations.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Sand filled barrels shall be handled in a careful and workmanlike manner and shall be stored on blocks or built-up platforms
- .2 Sand shall not be stored onsite. The sand shall be delivered and installed directly into the barrels. Manufacture recommends the use of a concrete mixer for the ease of delivery and installation of the sand. The sand shall not have a water content in excess of 5% when installed.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 All sand filled barrels shall be manufactured from High Density Polyethylene plastic with the following specifications:
  - .1 Density: 0.948 g/cm<sup>3</sup>
  - .2 Melt Index: 80 g/min
  - .3 Flex Modules: 1,102 MPa
  - .4 Tensile Strength: 22.4 MPa
  - .5 Heat Distortion Temp: 72°C
  - .6 Low Temp Imp -40°C: 135.58 joules
  - .7 UV Stabilized (Compounded): 1.7 g/Kg
  - .8 Yellow Color (dry blend): 19.8 g/Kg
- .2 Sand for the Sand filled barrels shall contain a minimum of 5% rock salt (NaCl) by weight and should be washed and have less than 5% water content at the time of installation.
- .3 Sand filled barrels shall be installed on a gravel pad constructed out of drainable stable base as described in Section 321123.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sand filled barrel array placement in accordance with manufacturer's written instructions.
  - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied.

**3.2 INSTALLATION**

- .1 Perform sand barrel array installation in accordance with the manufactures recommendations to meet the requirements of NCHRP Report 350 with a posted speed of 50 km/hr.
- .2 Only install the sand barrel array after the foundation for the overhead signal structure has been installed.
- .3 Sand barrel array layout shall conform to the drawings and manufactures recommendations. If the layout varies from MIT Figure TSFB50, provided at the end of this specification, inform the Departmental Representative of the variation and confirm correction before proceeding with the installation.
- .4 Mark out the barrel array prior to installation using the barrel lids to mark the location of the proposed barrels. Confirm that the minimum and maximum dimensions for proper sand barrel array performance are satisfied.
- .5 Assemble the barrels in accordance with the manufactures recommendations.
- .6 Install any required signage to the barrel prior to filling with sand and orientate towards oncoming traffic.
- .7 Fill each sand barrel to the level indicated in the barrels and verify that the correct mass of sand has been provided.
- .8 Secure lids to each sand barrel, verifying that they are fastened securely.

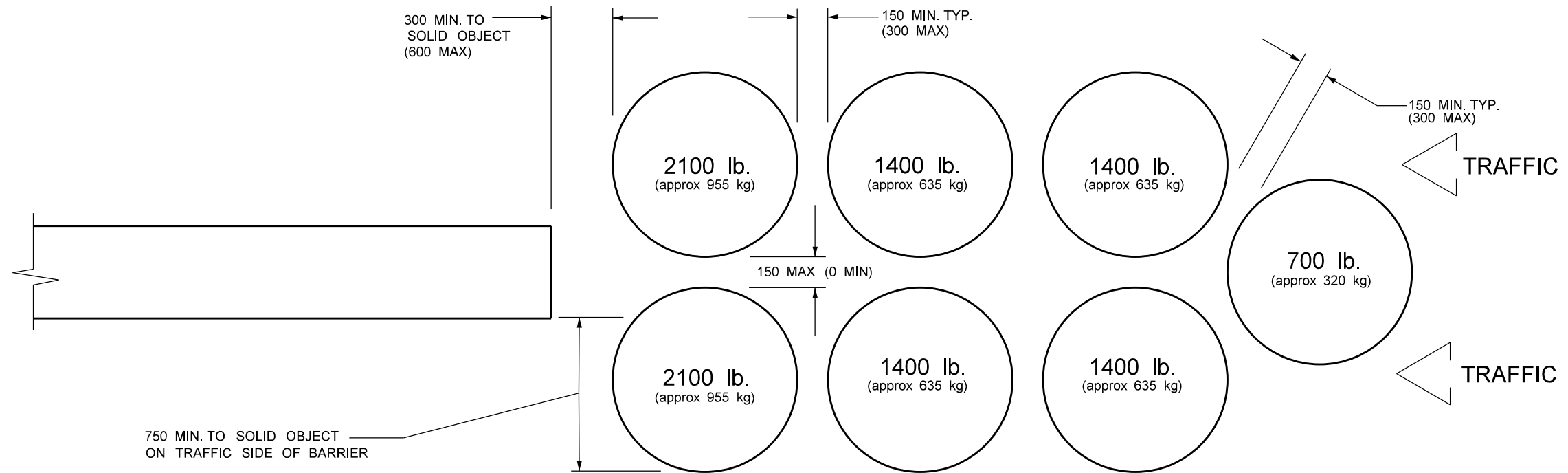
**3.3 CLEANING**

- .1 Remove all excess sand from around the barrel array once the barrels have been filled to the levels recommended by the manufacturer.

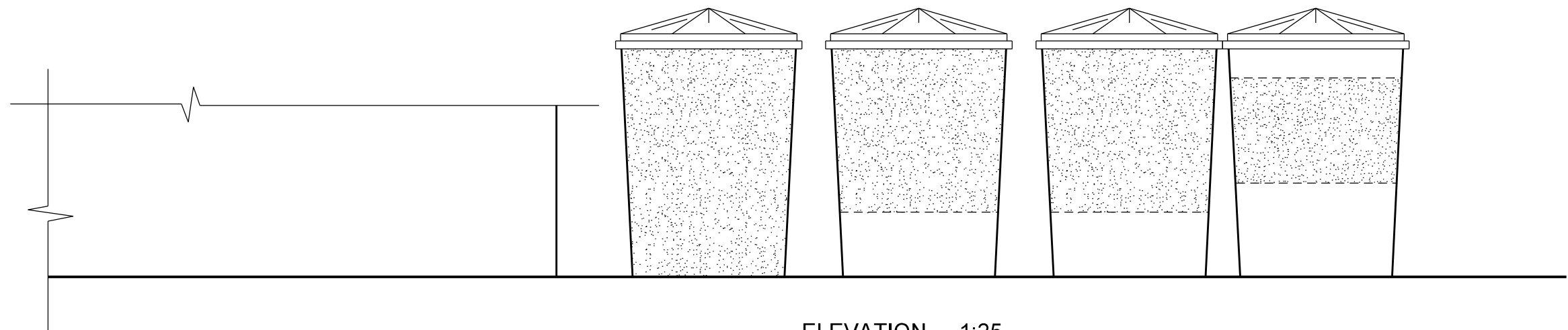
**3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by sand filled barrel array installation.

**END OF SECTION**




PLAN 1:25




ELEVATION 1:25

NOTES:

1. REFER TO THE MANUFACTURER'S MANUAL FOR PERFORMANCE CHARACTERISTICS AND LIMITATIONS OF THIS CRASH ATTENUATOR.
2. THIS SYSTEM IS NOT RECOMMENDED FOR SITES WHERE REDIRECTIVE CAPABILITIES ARE REQUIRED.
3.  - INDICATES RELATIVE LOCATION OF SAND.
4. SAND SHALL CONTAIN A MINIMUM 5% ROCK SALT (NaCl), BY WEIGHT.
5. EXIT VELOCITY  $\leq 15$  km/h;  
DECELERATION  $\leq 12$  g's
6. ALL SCALES ARE APPROXIMATE

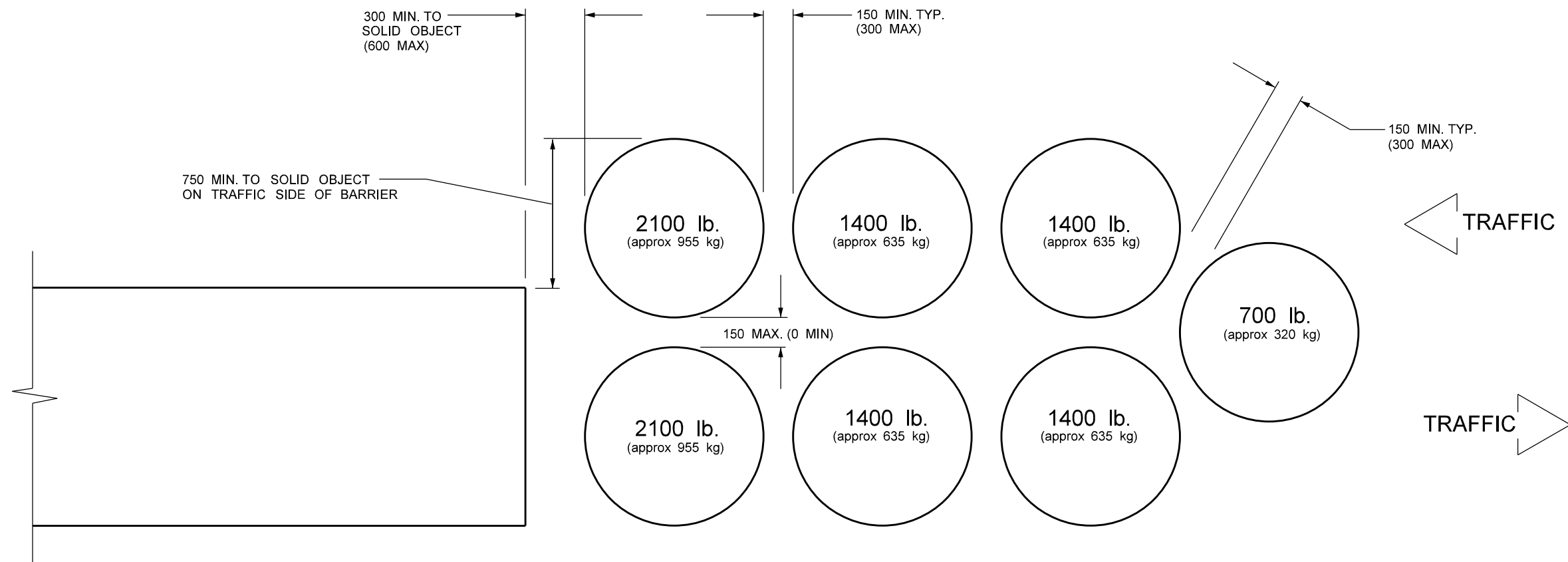
REVISIONS		
DATE	DESCRIPTION	BY
07-2011	T. BLOCK REVISED	DC
07-2013	NOTES ADDED	HPL

**Manitoba**   
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TRAFFIC ENGINEERING



**SAND-FILLED  
BARRELS**  
UNIDIRECTIONAL LAYOUT  
POSTED SPEED  
OF 50 km/h

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PLAN 1:25


DESIGN CALCULATIONS FOR A  
POSTED VELOCITY OF 50 km/h (SEE NOTE 1)

ROW	816.5 kg CAR			2041.2 kg TRUCK		
	SAND WT (lb)	EXIT VEL (km/h)	AVG g's FOR ROW	EXIT VEL (km/h)	AVG g's FOR ROW	
0		50.00		50.00		
1	700	35.98	5.18	43.26	2.70	
2	2800	14.06	4.72	26.64	4.99	
3	2800	5.50	0.72	16.41	1.89	
4	4200	1.65	0.12	8.48	0.85	

NOTES:

1. THE DESIGN CALCULATIONS APPLY ONLY FOR A FRONTAL IMPACT IN EITHER A UNIDIRECTIONAL OR BIDIRECTIONAL LAYOUT.
2. ALL SCALES ARE APPROXIMATE.

REVISIONS		
DATE	DESCRIPTION	BY
07-2011	T. BLOCK REVISED	DC

**Manitoba**   
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**SAND-FILLED  
BARRELS**  
BIDIRECTIONAL LAYOUT  
POSTED SPEED  
OF 50 km/h

SHEET NO	2 OF 2
DATE:	2001 - 09
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