



भारत सरकार - रेल मंत्रालय  
अनुसंधान अभिकल्प और मानक संगठन  
लखनऊ - 226 011  
EPBX (0522) 2451200  
Fax (0522) 2458500

Government of India-Ministry of Railways  
Research Designs & Standards Organisation  
Lucknow - 226 011  
DID (0522) 2450115  
DID (0522) 2465310



No. SD.WDG4G.11

dated: 18.10.2018

महाप्रबन्धक (इंजीनियरिंग),

1. मध्य रेलवे, छत्रपति शिवाजी टर्मिनस मुम्बई - 400 001
2. पूर्व रेलवे, फेयरली प्लेस, कोलकाता - 700 001
3. उत्तर रेलवे, बडौदा हाऊस, नई दिल्ली - 1100 01
4. पूर्वोत्तर रेलवे, गोरखपुर - 27 3001
5. पूर्वोत्तर फ्रन्टियर रेलवे, मालीगाँव गुवाहाटी- 781 011
6. दक्षिण रेलवे, एनेक्सी, पार्क टाऊन, चेन्नई - 600 003
7. दक्षिण मध्य रेलवे, रेल निलायम, सिकन्दराबाद - 500 071
8. दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता - 700 043
9. पश्चिम रेलवे, चर्च गेट, मुम्बई - 400020
10. उत्तर मध्य रेलवे, इलाहाबाद - 211 001
11. उत्तर पश्चिम रेलवे, जयपुर - 302 006
12. पूर्व मध्य रेलवे, हाजीपुर - 844 101
13. पूर्व कोस्ट रेलवे, रेलवे कॉम्पलेक्स, भुवनेश्वर - 751 023
14. दक्षिण पश्चिम रेलवे, हुबली - 580 023
15. पश्चिम मध्य रेलवे, जबलपुर - 482 001
16. दक्षिण पूर्व मध्य रेलवे, बिलासपुर - 495 004

Sub: Final speed certificate for operation of WDG4G class of locomotive up to a maximum speed of 100 kmph over Indian Railway.

\*\*\*\*\*

Railway Board has signed an agreement for setting up Diesel Locomotive Factory at Marhorwra, Saran District Bihar (India) and procurement and Maintenance of Diesel Electric Locomotive with M/s GE Diesel locomotive Pvt. Ltd. M/s GE Diesel Locomotive Pvt. has been awarded contract by Railway Board to Design, manufacture & supply and Maintenance of 700 Nos Diesel Electric Locomotive as per RDSO specification no. MP.0.08.00.74. These Locomotives will be powered with 4500hp and based on IGBT Technology. WDG4G class of locomotive shall be fitted with two nos. three axle (Co-Co) bogies. Compact modular microprocessor controlled air brake system with advance has been fitted in the locos. These locomotives manufacture and supply by M/s GE shall be known as WDG4G (4500hp) for Freight services.

To establish the speed potential of WDG4G locomotive on track maintained to C&M-I Vol.-I standard, detailed oscillation trials have been conducted over Lucknow - Fazabad - Shahganj (LKO-FD-SHG) section of Northern Railway up to a maximum test speed of 110 kmph on tangent track and station yard. The test results as contained in RDSO Report no. RDSO/2018/TG/MT-1554/F/Rev.0 dated 06/09/2018, amendment Nil, indicate that WDG4G locomotive has exhibited satisfactory riding characteristics up to a maximum test speed of 110 kmph on tangent track and station yard. The brief design parameters are mentioned as below.

- 1.1 The General arrangement of the locomotive is as per M/s GE drawing no. PAE5180-100 sheet-1.

- 1.2 The locomotive has been provided with Co-Co bogies as per M/s GE Truck General Arrangement drawing no. 84A238791AD and & spring rigging arrangement drawing no. 84A238791BT.
- 1.3 Provision of twin cab enables clear visibility for crew.
- 1.4 The locomotive is fitted with 12 cylinder diesel engine model General Electric Evolution Series V-12 (GEVO 12), type V-12, 4 –stroke, fully turbocharged & intercooled with AC-AC transmission and six AC Traction Motors have been provided.
- 1.5 The nominal axle load of locomotive is 22.00t.
- 1.6 Compact modular microprocessor controlled air brake system with advance feature has been provided on WDG4G loco as per specification no. MP.0.01.00.24, (Rev. 01), Jan 2010.
- 1.7 Parking brakes have been provided.
- 1.8 AAR type E coupler with F shank provided as specified in RDSO specification MP.0.08.00.74. coupler capacity – 409 tons.
- 1.9 Dynamic brake has been provided in WDG4G locomotive.
- 1.10 Flasher light has been provided in the locomotive.
- 1.11 Wheel Diameter:
  - a) New: 1092mm.
  - b) Condemned: 1016mm.
- 1.12 Tractive effort limiting switch has been provided in the driver cabs of the locomotive and may be operated by the crew whenever required.
- 1.13 Two crew members are required for operation of the locomotive.
- 2.0 On the basis of satisfactory oscillation trial results, it is certified that single/double headed WDG4G class of Diesel locomotives may be permitted to run up to a maximum speed of 100 kmph on IR track subject to that following condition:

## **2.1 Track:**

### **2.1.1 (a) Up to 100 kmph**

The track shall be to a minimum standard of 60 kg (90 UTS) rail on PSC sleepers with 1660 density and minimum depth of ballast cushion below sleeper of 300mm, which may consist of at least 150mm clean and the rest in caked up condition on compacted and stable formation.

### **(b) Up to 90 kmph**

The track shall be to a minimum standard of 52kg (90UTS) rail on PSC sleepers with 1540 density and minimum depth of ballast cushion below sleeper of 250mm, which may consist of at least 100mm clean and the rest in caked up condition on compacted and stable formation.

### **(c) Up to 60 kmph**

The track shall be to a minimum standard of 52kg (72UTS) rail on PSC sleepers with 1540 density and minimum depth of ballast cushion below sleeper of 250mm, which may consist of at least 100mm clean and the rest in caked up condition on compacted and stable.

- 2.1.2 For track maintained to lower standard than that mentioned above, the Chief Engineer of Railways shall decide the lower maximum permissible speed on the basis of maintenance condition. In this connection, Railways letter no. 65/WD/SR/26 dated 19/20.10.1966 may be seen. When Chief Engineer considers that the roadbed is not compacted or there is improper drainage, he may suitably restrict the maximum permissible speed, depending upon the local conditions.

- 2.1.3 The welds shall be protected by joggled fish plates as per provision of para 6.4 and para 8.14 of USFD Manual and para 6.3 of AT welding manual and other policy instructions of Railway Board. The maintenance of Rails and Rail joints shall be ensured as per para 250 & 251 of IRPWM. In addition, wherever condition warrants on account of correction on rail/weld collar, wear on rail, cupping of welds etc., necessary precautions shall be taken for fish plating/joggled fish plating.
- 2.1.4 Zonal Railways may ensure further detailed examination of track as deemed fit based on age cum condition basis, overdue renewal and condition of formation etc. as per provisions of chapter –III of IRPWM-2004 regarding permanent way renewals and may suitable restrict maximum speed of operation based on such examination.
- 2.15 The maximum permissible speed on curves shall be decided on the basis of the existing provisions of the Indian Railways Permanent Way Manual, second reprint–2004.

## 2.2 Bridges:

- 2.2.1 The clearance refers to bridges of “Standard Spans” with standard design of girders, slabs, pipe culverts, piers and abutments etc. issued by RDSO for BGML, RBG and MBG-1987 standard loadings. However, the bearings of span 76.2 m (clear) designed for BGML standard loading as per RDSO’s drawing no. BA-11154 should be strengthened by providing two additional anchor bolts.
- 2.2.2 Superstructures & bearings of “Special Spans” (designed and constructed by Zonal Railways based on site requirements) including Arches and sub-structures of all bridges (all Standard & Special Spans) are to be examined under the directions of the Chief Bridge Engineer concerned and certified safe with respect to current Indian Railway standard codes with up to-date correction slips.
- 2.2.3 The clearance is subject to the following parameters of WDG4G locomotive:

Stock	Nominal axle load	Maximum tractive effort	Maximum braking effort	Maximum CG height from rail level
WDG4G	22 t	55.45 t	27.52 t	not exceeding 1830mm

### 2.2.3.1 In single headed condition the following restrictions will be applicable:-

- All Standard spans up to 63.0m (all effective) of BGML Loading Standards are found fit for proposed speed of 100 kmph except 78.8m span is restricted to 95 kmph.
- Standard spans up to 31.9m (effective) of RBG Loading Standards are found fit for proposed speed of 100 kmph and 47.3m is restricted to 90 kmph, span 63.0m is restricted to 70 kmph and 78.8m is restricted to 50 kmph.
- All standard span of MBG loading (all effective) are restricted found fit for proposed speed of 100 kmph.
- Track on bridges and approaches of BGML spans of 2.0m, 2.5m, 3.0m, 3.7m, 4.3m, 5.3m, 6.9m, 19.4m, 25.6m, 31.9m & 78.8m (all effective) RBG spans of 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 4.3m, 5.3m, 6.9m, 10.0m & 19.4m (all effective) and MBG spans of 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 4.3m & 5.3m (all effective) shall be strengthened or modified in such a way so as to allow for dispersion of longitudinal force as per clause 2.8.3.2 of IRS Bridge Rules. In cases where dispersion cannot be allowed as per clause 2.8.3.2 such as due to provision of SEJ in bridges etc., the bridge superstructure including bearings and sub-structure shall be checked for longitudinal force without dispersion and certified safe by the Chief Bridge Engineer concerned.

2.2.3.2 In double headed condition the following restriction will be applicable:-

- (a) Standard spans of BGML loading 13.1m, 25.6m, 31.9m, 47.3m, 63.0m and 78.8m (all effective) are prohibited for operation while other standard spans of BGML loading are fit for proposed speed of 100 kmph.
- (b) Standard spans of RBG loading 13.1m and 47.3m (all effective) are prohibited for operation.
- (c) Standard spans up to 31.9m except 13.1m (effective) of RBG loading standards are found fit for proposed speed of 100 kmph and span 63.0m is restricted to 70 kmph and 78.8m is restricted to 50 kmph.
- (d) All standard span of MBG loading (all effective) are restricted found fit for proposed speed of 100 kmph.
- (e) Track on bridges and approaches of BGML spans 2.0m, 2.5 m, 3.0 m, 3.7m, 4.3 m, 5.3m, 6.9m, 10.0m & 19.4m, RBG spans of 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 3.7m, 4.3m, 5.3m, 6.9m, 10.0m, 19.4m, 25.6m, 31.9m & 63.0m and MBG spans 1.0m, 1.5m, 2.0m, 2.5m, 3.0m, 4.3m, 5.3m, 13.1m, 47.3m & 63.0m (all effective) shall be strengthened or modified in such a way so as to allow for dispersion of longitudinal force as per clause 2.8.3.2 of IRS Bridge Rules. In cases where dispersion cannot be allowed as per clause 2.8.3.2 such as due to provision of SEJ in bridges etc., the bridge superstructure including bearings and sub-structure shall be checked for longitudinal force without dispersion and certified safe by the Chief Bridge Engineer concerned.

2.2.4 Location of bridges on which speed restrictions have been imposed shall be notified by the Railways and incorporated in the working timetable.

2.2.5 The above clauses have been arrived considering bridges are in physically sound condition. In case the bridges are not in satisfactory physical condition, necessary speed restriction to be imposed by concern Chief Bridge Engineer of Zonal Railway.

2.2.6 Specific restriction are applicable as mentioned in relevant speed certificate of hauling single/multiple locomotives/ attached wagons issued by RDSO.

### **2.3 Traction Installation:**

2.3.1 In '25kV AC traction area', the CEE of the Railway shall have to ensure that the minimum height of contact wire and electrical clearances as stipulated in provisions of chapter -V and V-A, Electric Traction 'Schedule of Dimension of 1676 mm gauge (BG) revised 2004' with latest addendum & corrigendum slip is not violated and strictly followed to ensure its safe running.

2.3.2 In addition to above, the Chief Electrical Engineer of the concerned Railway may impose any temporary speed restriction on the basis of personal knowledge, experience of the sectional OHE and the field conditions prevailing on the particular section.

### **2.4 Signaling:**

2.4.1 Provisions of GR, SR, SEM & all extant instructions issued time to time shall be complied with.

2.4.2 While running through a station, speed of the locomotive shall be restricted to the maximum permissible speed as per standard of interlocking provided at the station.

2.4.3 On the sections where EBD of more than 1 km is to be catered for, double distant signal or automatic signaling should be provided failing which suitable speed restriction is to be imposed.

## 2.5 Rolling Stock:

2.5.1 Before starting the operation, the PCEE of the concerned Railway will certify the track worthiness and safety of the rolling stock. He will also ensure proper maintenance of the rolling stock.

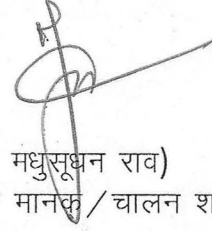
2.5.2 Brake of the locomotive shall be in good working order during the operation.

## 2.6 General:

2.6.1 All the permanent and temporary speed restrictions in force and those that may be imposed from time to time due to track, bridges, curves, signaling and interlocking etc. shall be observed.

2.6.2 Locomotive clearance diagram of 4500hp, WDG4G locomotive is given in M/s GE drawing no. PAE5180-100 sheet-4, the ground clearance from the rail level of locomotive is 95mm which infringes clause 17 of chapter IV(C) of B.G. Schedule of Dimension, Revised 2004. These infringements have been condoned by Railway Board vide their letter no. 2017/CEDO/SD/RS/02 dated 21.02.2017 & 07.03.2017.

- संलग्नक: (i) Loco GA drg no. PAE5180-100 sheet-1  
(ii) Truck GA drg no. 84A238791AD  
(iii) Spring rigging arrg drg no. 84A238791BT

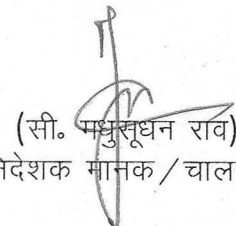


(सी. मधुसूदन राव)  
कार्यकारी निदेशक मानक/चालन शक्ति

### प्रतिलिपि:

1. सचिव, मैकेनिकल/इंजीनियरिंग (जी.), रेलवे बोर्ड, रेल भवन, नई दिल्ली - 110001
2. मुख्य रेल संरक्षा आयुक्त, अशोक मार्ग, लखनऊ-226001
3. महाप्रबन्धक (यांत्रिक/संचालन/संकेत एवं दूरसंचार)
  - i) मध्य रेलवे, छत्रपति शिवाजी टर्मिनस मुम्बई - 400 001
  - ii) पूर्व रेलवे, फेयरली प्लेस, कोलकाता - 700 001
  - iii) उत्तर रेलवे, बडौदा हाऊस, नई दिल्ली - 1100 01
  - iv) पूर्वोत्तर रेलवे, गोरखपुर - 27 3001
  - v) पूर्वोत्तर फ्रन्टियर रेलवे, मालीगाँव गुवाहाटी- 781 011
  - vi) दक्षिण रेलवे, एनेक्सी, पार्क टाऊन, चेन्नई - 600 003
  - vii) दक्षिण मध्य रेलवे, रेल निलायम, सिकन्दराबाद - 500 071
  - viii) दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता - 700 043
  - ix) पश्चिम रेलवे, चर्च गेट, मुम्बई - 400020
  - x) उत्तर मध्य रेलवे, इलाहाबाद - 211 001
  - xi) उत्तर पश्चिम रेलवे, जयपुर - 302 006
  - xii) पूर्व मध्य रेलवे, हाजीपुर - 844 101
  - xiii) पूर्व कोस्ट रेलवे, रेलवे कॉम्प्लेक्स, भुवनेश्वर - 751 023
  - xiv) दक्षिण पश्चिम रेलवे, हुबली - 580 023
  - xv) पश्चिम मध्य रेलवे, जबलपुर - 482 001
  - xvi) दक्षिण पूर्व मध्य रेलवे, बिलासपुर - 495 004
4. मैनेजिंग डायरेक्टर, कोंकण रेलवे कार्पोरेशन लिमिटेड, बेलापुर, नवी मुम्बई - 400614

- संलग्नक: (i) Loco GA drg no. PAE5180-100 sheet-1  
(ii) Truck GA drg no. 84A238791AD  
(iii) Spring rigging arrg drg no. 84A238791BT

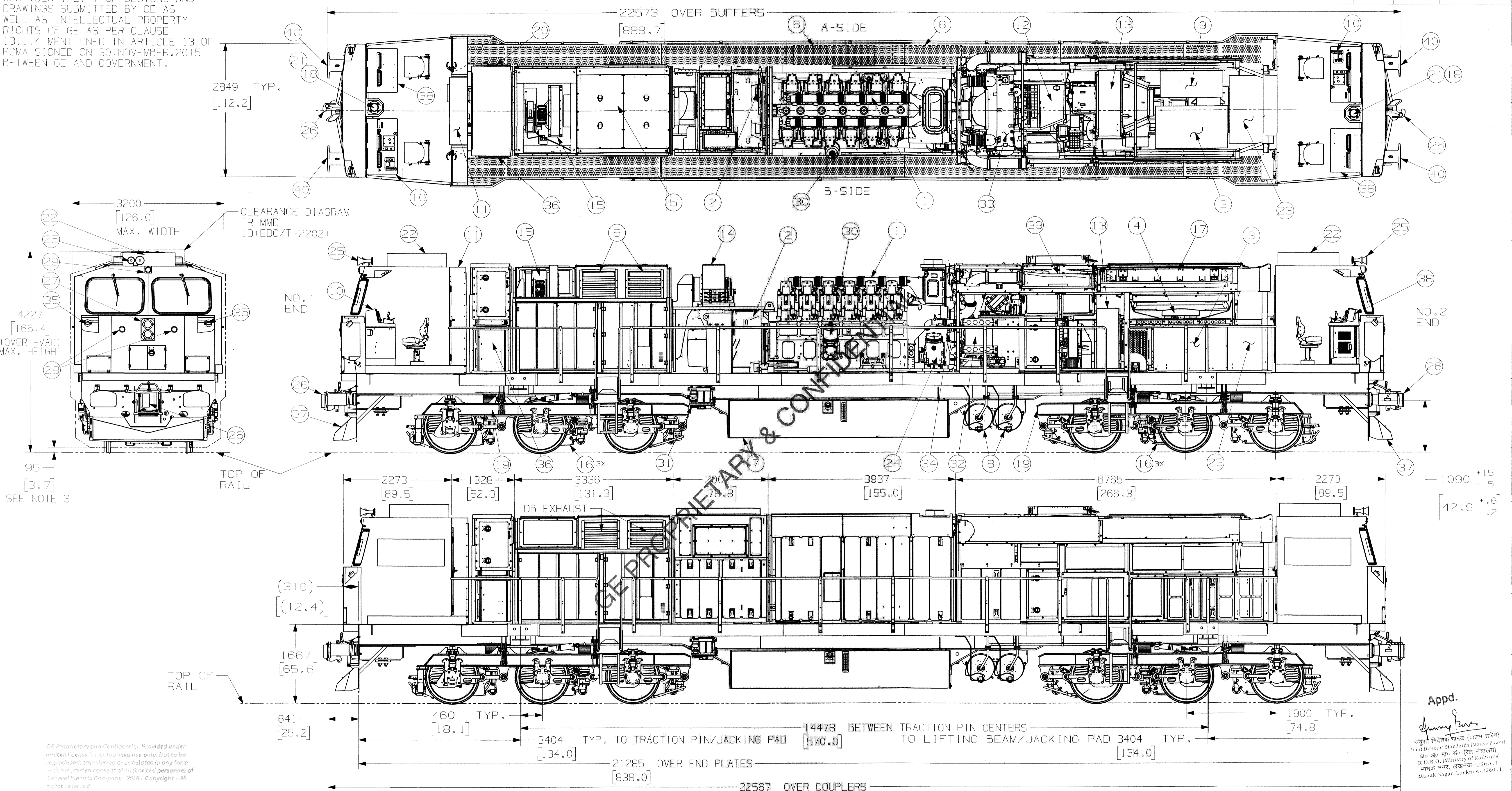


(सी. मधुसूदन राव)  
कार्यकारी निदेशक मानक/चालन शक्ति

NOTE:  
GOVERNMENT SHALL MAINTAIN THE CONFIDENTIALITY OF DESIGNS AND DRAWINGS SUBMITTED BY GE AS WELL AS INTELLECTUAL PROPERTY RIGHTS OF GE AS PER CLAUSE 13.1.4 MENTIONED IN ARTICLE 13 OF PCMA SIGNED ON 30.NOVEMBER.2015 BETWEEN GE AND GOVERNMENT.

THIS DRAWING, WHICH CONTAINS PROPRIETARY INFORMATION, IS THE PROPERTY OF GENERAL ELECTRIC COMPANY. IT SHALL NOT BE REPRODUCED IN ANY MANNER NOR DISCLOSED TO THIRD PARTIES WITHOUT WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

REVISION HISTORY			
REV	DATE	DRAFTER ENGINEER	CO. #, IN # DESCRIPTION
-	-	-	-



NOTES:-  
1. VERTICAL DIMENSIONS ARE WITH 1092mm(43") WHEELS AND FULL SERVICE CONDITIONS  
2. ALL DIMENSIONS AND VALUES ARE NOMINAL AND SUBJECT TO DOCUMENTED MANUFACTURING TOLERANCES  
3. MINIMUM CLEARANCE OF 95 MM ABOVE RAIL LEVEL WITH THE LOCOMOTIVE FULLY LOADED AND WHEELS IN FULLY WORN CONDITION PER SPECIFICATION No. MP- 0.08.00-74 (Revision - 02) UNDER SECTION 5.13.6

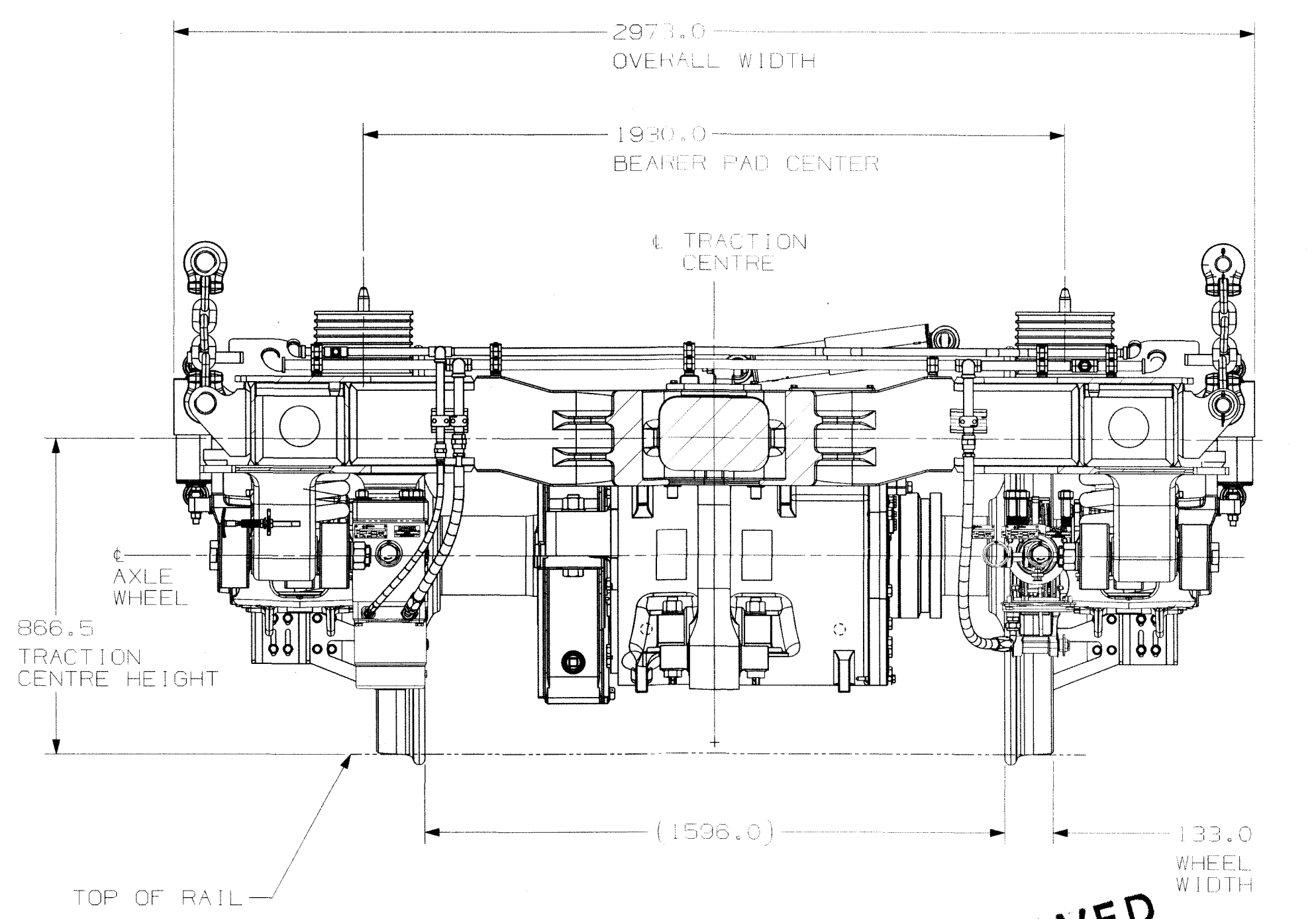
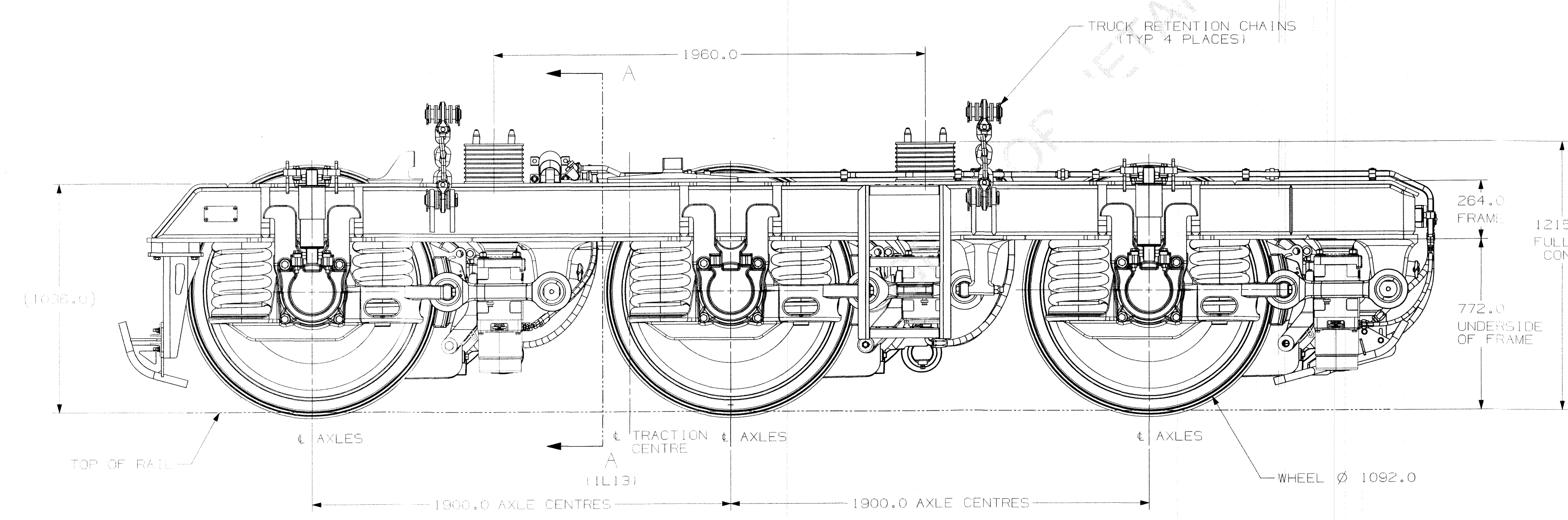
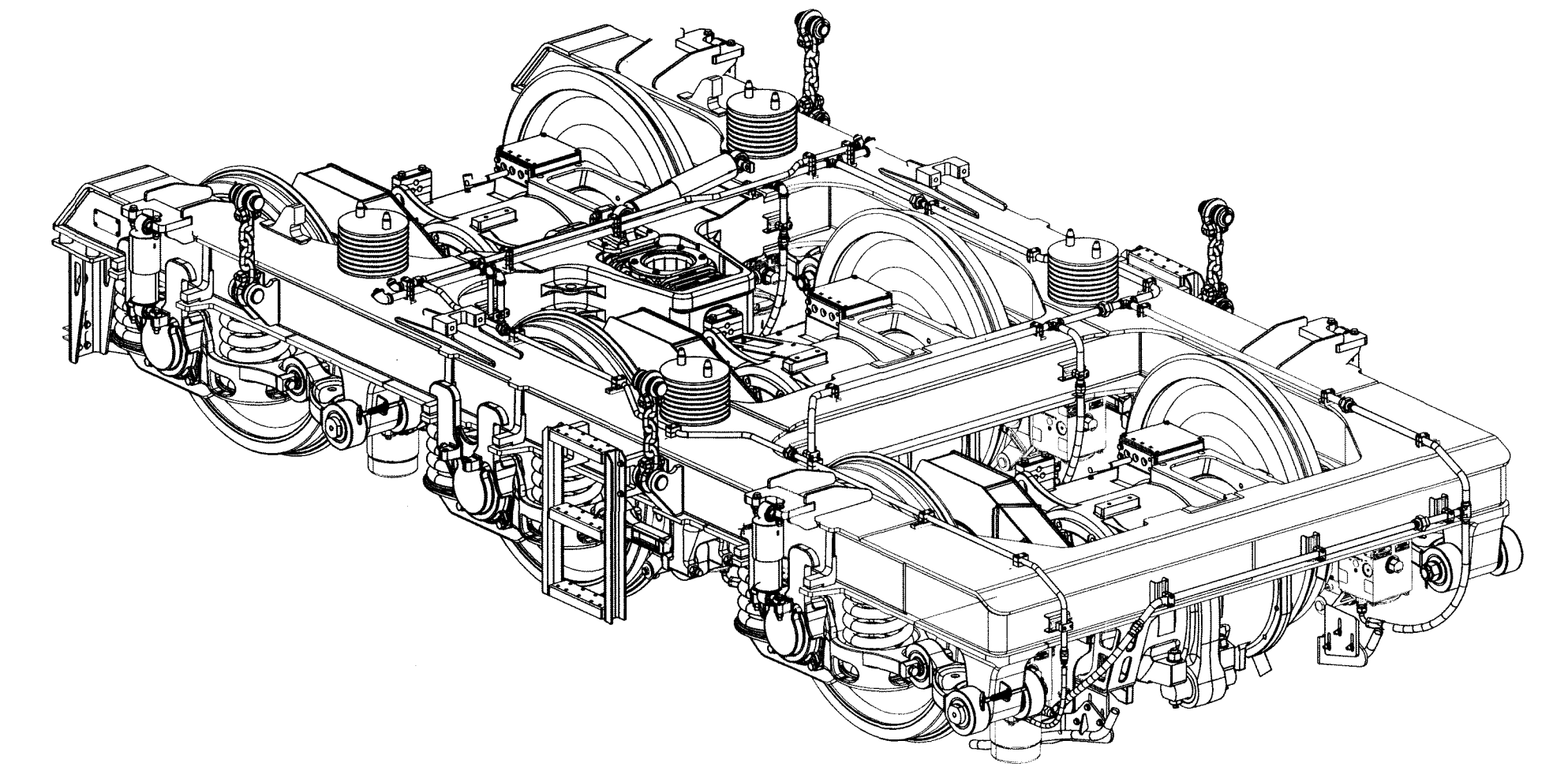
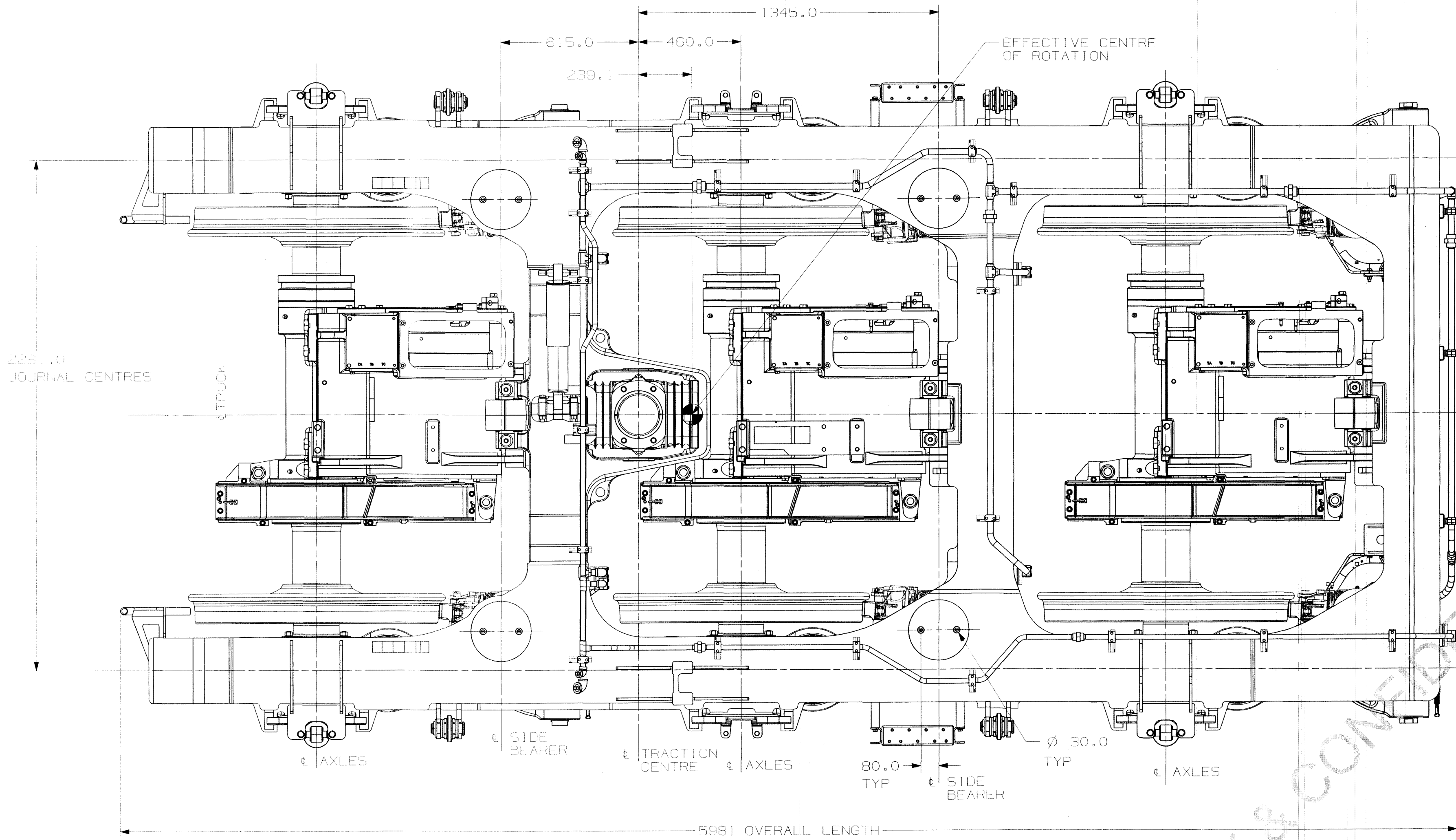
- |                        |                                |                                |                             |
|------------------------|--------------------------------|--------------------------------|-----------------------------|
| 1. ENGINE - 12 CYL.    | 11. CONTROL DEVICE COMPARTMENT | 21. HOT PLATE                  | 30. CENTRIFUGE - OIL FILTER |
| 2. ALTERNATOR          | 12. ENGINE AIR FILTER BOX      | 22. AIR CONDITIONER            | 31. AIR DRYER               |
| 3. AIR COMPRESSOR      | 13. TRACTION MOTOR BLOWER      | 23. APU                        | 32. OIL COOLER              |
| 4. RADIATOR FAN        | 14. ALTERNATOR BLOWER          | 24. OIL FILTER                 | 33. WATER TANK              |
| 5. DYNAMIC BRAKE BOX   | 15. AUX BLOWER                 | 25. HORN                       | 34. FUEL FILTERS            |
| 6. BATTERY BOX         | 16. TRACTION MOTOR             | 26. COUPLER                    | 35. SAND BOX                |
| 7. FUEL TANK           | 17. RADIATOR                   | 27. HEADLIGHTS                 | 36. ELECTRONICS LOCKER      |
| 8. AIR RESERVOIRS      | 18. FIRE EXTINGUISHER          | 28. MARKER LIGHT (RED & WHITE) | 37. COW CATCHER             |
| 9. AIR BRAKE EQUIPMENT | 19. BOGIE                      | 29. FLASHER LIGHT              | 38. HELPER CONSOLE          |
| 10. CONTROL CONSOLE    | 20. URINAL                     |                                | 39. INTERCOOLER             |
|                        |                                |                                | 40. SIDE BUFFERS            |

THIS OUTLINE DRAWING FOR IR-4500 CUSTOMER ONLY.

DIMENSIONS ARE IN MILLIMETERS (X.X) IN INCHES	CTO SYMBOL:	CTO'S PRESENT? NO
	CTO LOCATIONS:	
	PLAN REF 84A238791BF	
	FCF	
SIGNATURES	DATE	ERIE, PA
DRAWN SAJID AHMED		
ISSUED SAJID AHMED		
ENGRG IRAPPA		
TITLE		
LOCOMOTIVE GENERAL ARRG. DRAWING-REF		
FIRST MADE FOR IR-4500		
DWS NO		PAE5180-100
SHEET		2
SH		1

Appd.  
*[Signature]*  
संयुक्त निदेशक मानक (पालन शासन)  
Joint Director Standards (Motive Power)  
सि.ओ.मि.सो.रेल.मंत्रालय  
R.D.S.O. (Ministry of Railways)  
मानक नगर, लखनऊ-226011  
Manak Nagar, Lucknow-226011

GE Proprietary and Confidential. Provided under limited license for authorized use only. Not to be reproduced, transferred or circulated in any form without written consent of authorized personnel of General Electric Company. 2016 - Copyright - All rights reserved.

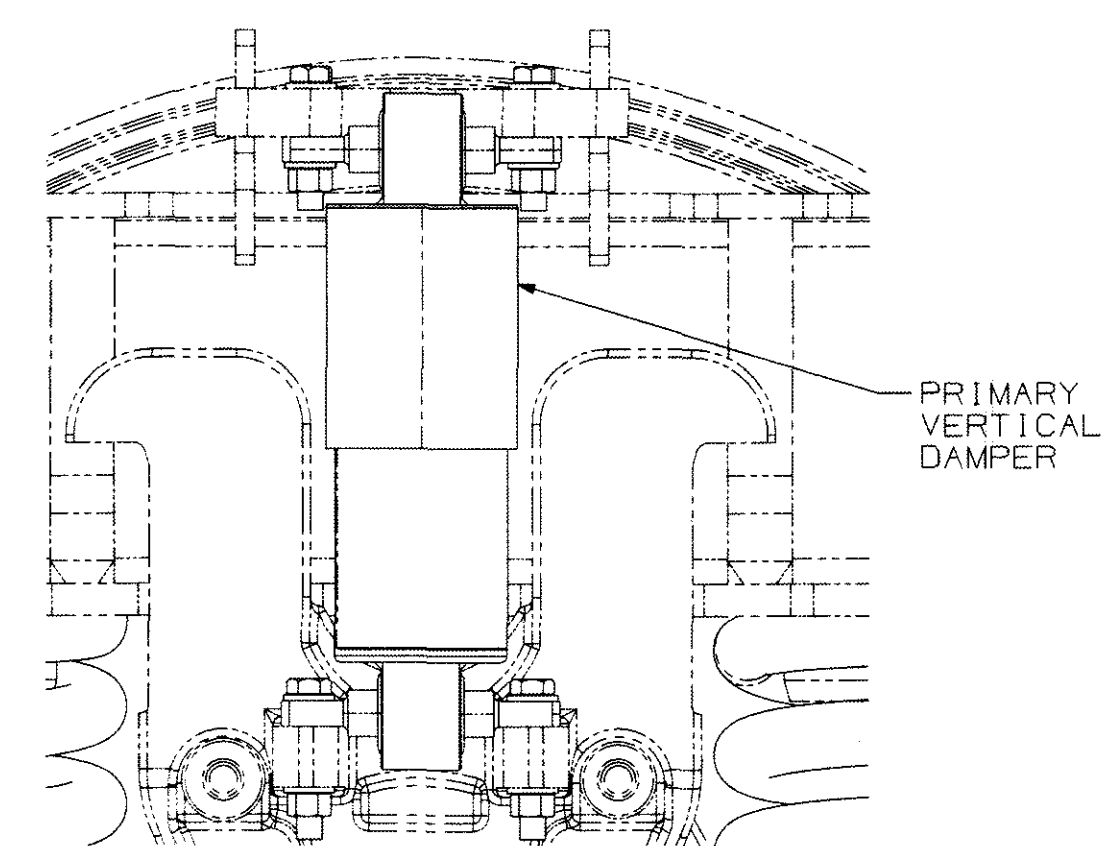
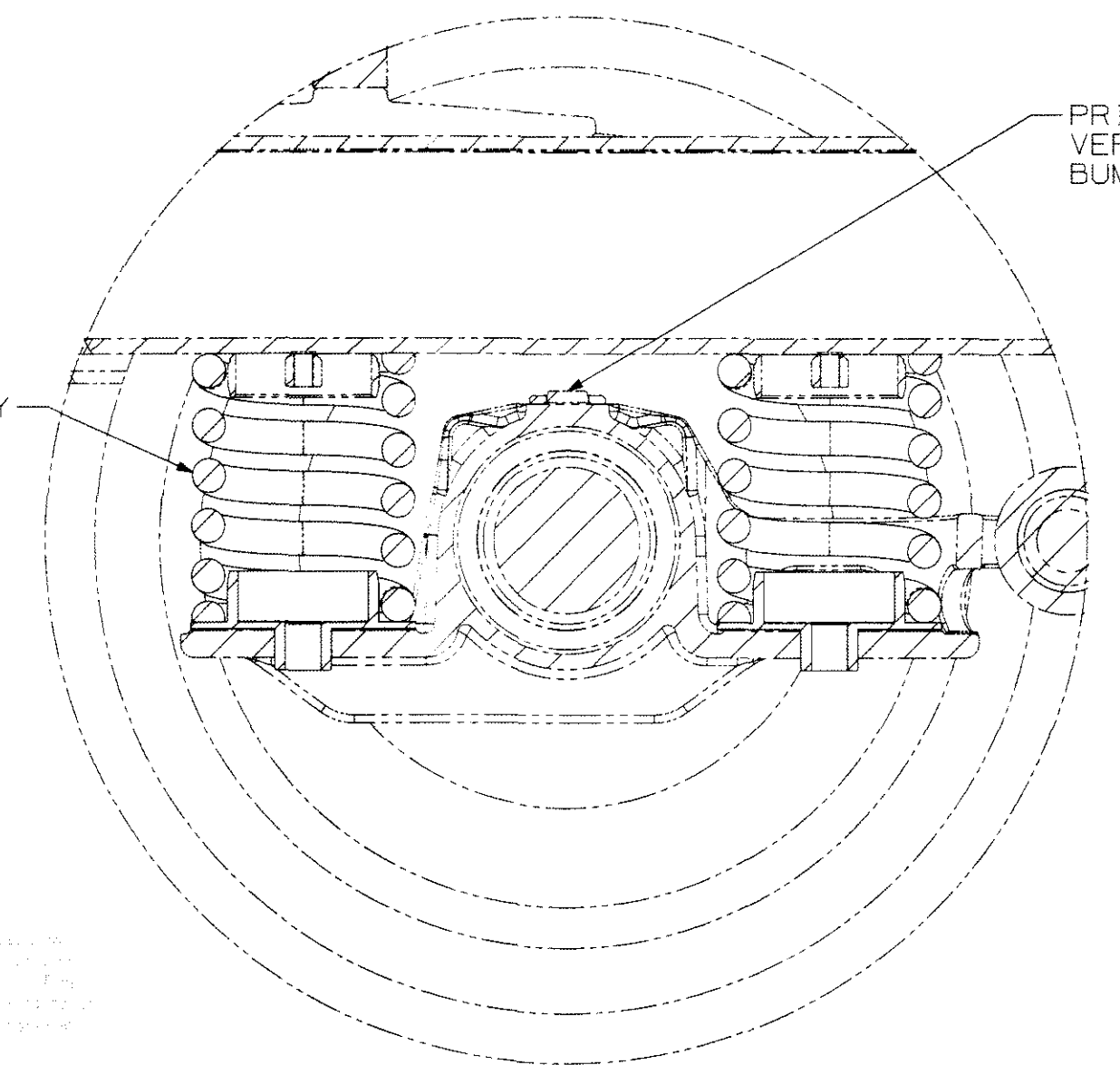
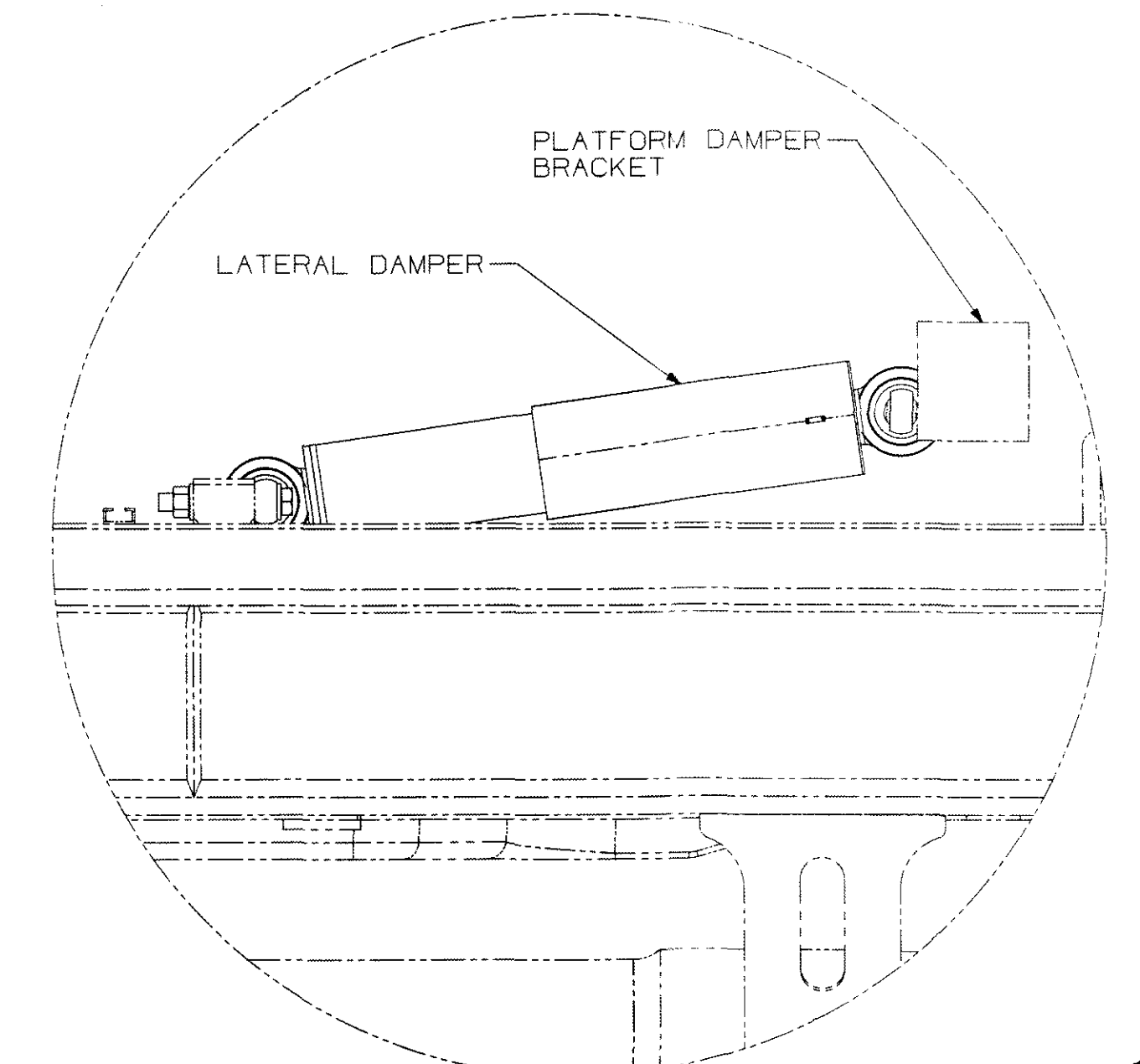
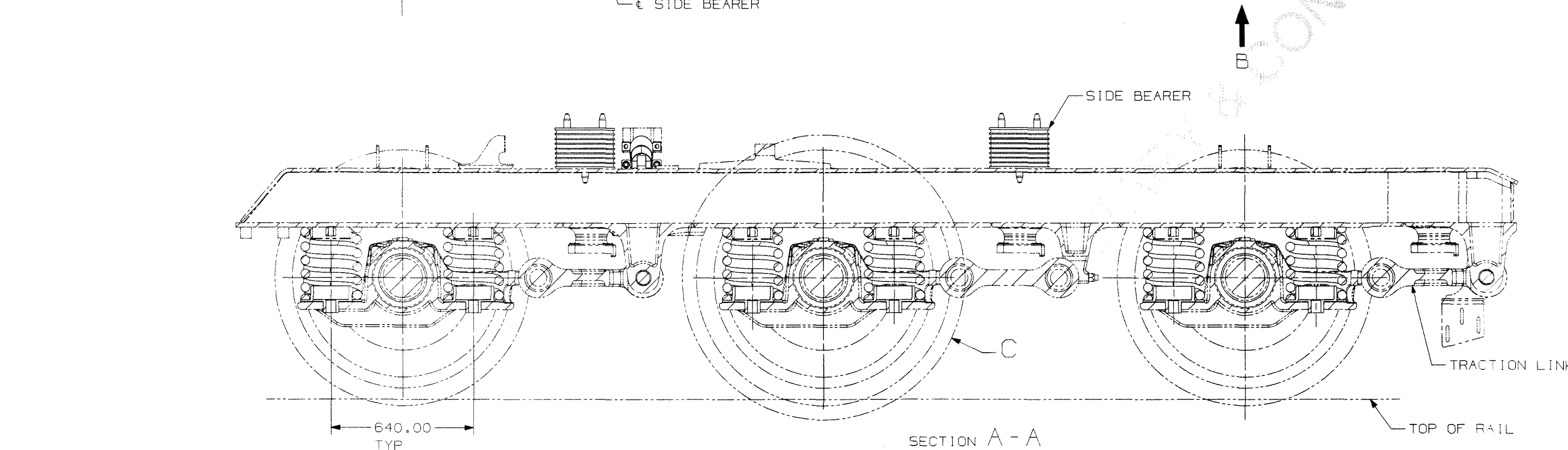
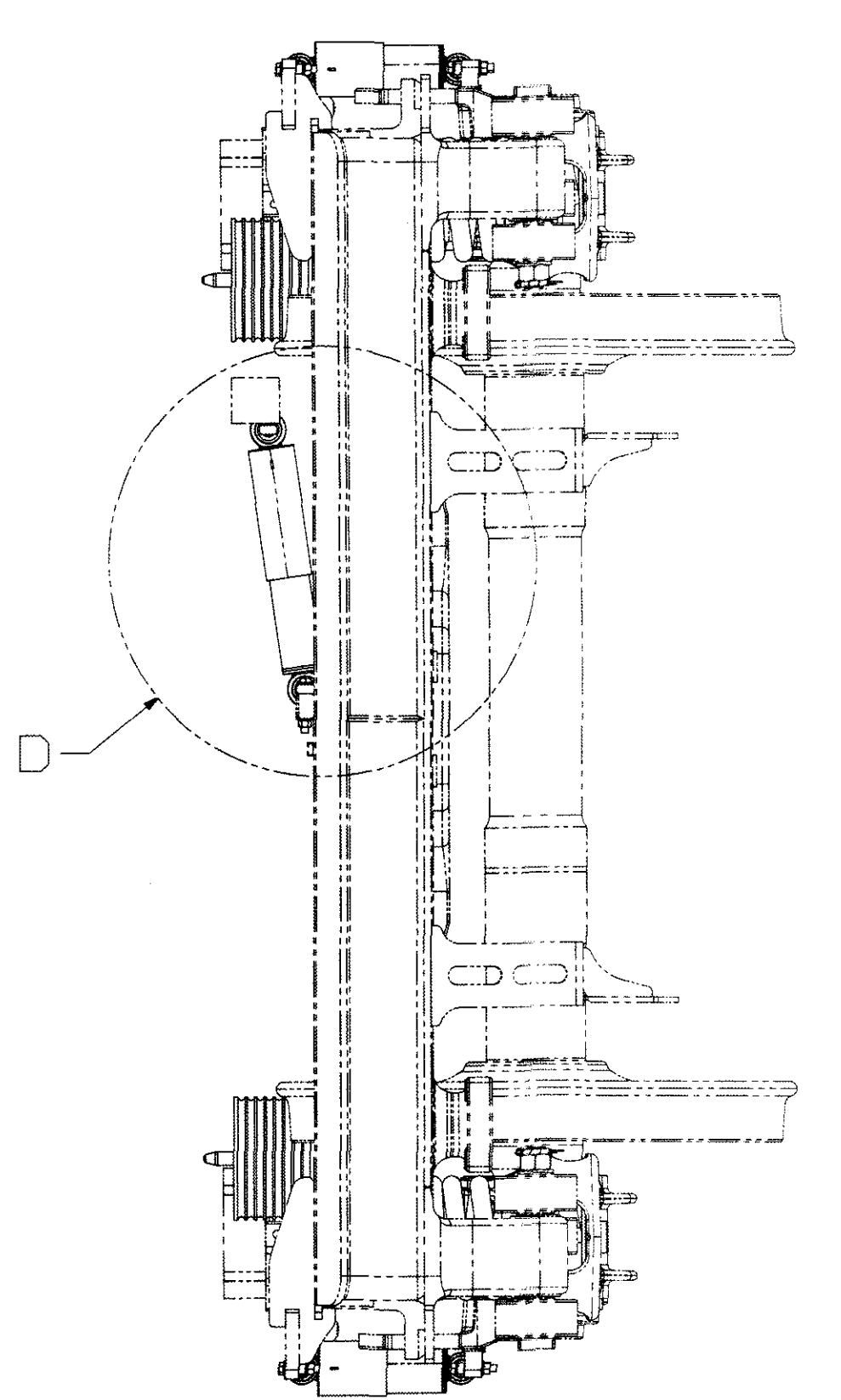
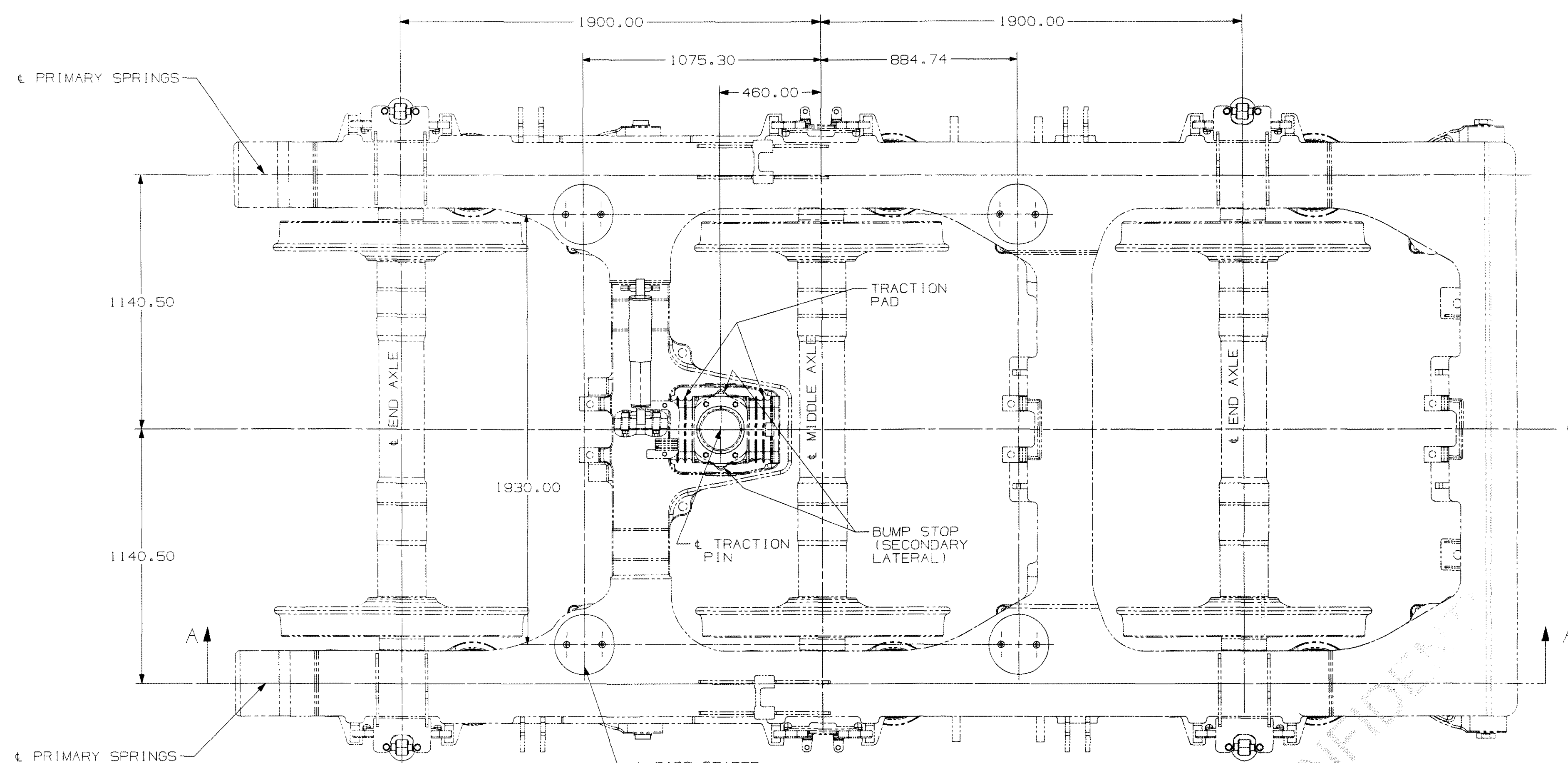


NOTE:  
 ALL DIMENSIONS ON THIS PRINT ARE REFERENCE ONLY

**APPROVED**  
*Rajni*  
 8/1/12  
 Director Standards (M.P.)  
 Director (to Rlys.)  
 S.D.S.O. (Ministry of Rlys.) Lucknow-11

THIS OUTLINE DRAWING FOR IR-4500 CUSTOMER ONLY.

DIMENSIONS ARE IN MILLIMETERS EXCEPT IN INCHES UNLESS OTHERWISE SPECIFIED. TOLERANCES PER ISIRI	CTO SYMBOL: CTO LOCATIONS: X PLAN REF: PFP	CTO'S PRESENT? NO
SIGNATURES: DATE: 8/1/12		GE TRANSPORTATION
DRAWN: JAGADEESH		TRUCK GEN. ARRGT-REF
CHECKED: JAGADEESH		1:1000 (SEE FIG. IR-4500)
APPROVED: M.LIND GARULE		84A238791AD



**APPROVED**

*Prasanna*  
 8/9/17  
 Director Standards (M.P.)  
 Director (P&R) (M.P.)  
 Director (Ministry of Rly.) Technical

NOTE:  
 1. ALL DIMENSIONS ON THIS PRINT ARE REFERENCE DIMENSIONS UNLESS OTHERWISE SPECIFIED.  
 2. DIMENSIONS MENTIONED WITH IN THE BRACKETS ARE IN "MILLIMETER".

THIS OUTLINE DRAWING FOR IR-4500 CUSTOMER ONLY.

DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED. TOLERANCES PER ISIRI	CTO SYMBOL: --	CTO'S PRESENT? NO
UNLESS OTHERWISE SPECIFIED, TOLERANCES PER ISIRI	CTO LOCATIONS: X	
	PLAN REF: PCP	
SIGNATURES	DATE	REVISION
DRAWN SHIVAKUMAR R	23-FEB-2017	
ISSUED SHIVAKUMAR R	23-FEB-2017	
ENGRG VAMSI		

NOTE: GOVERNMENT SHALL MAINTAIN THE CONFIDENTIALITY OF DESIGNS AND DRAWINGS SUBMITTED BY GE AS WELL AS INTELLECTUAL PROPERTY RIGHTS OF GE AS PER CLAUSE 13.1.4 MENTIONED IN ARTICLE 13 OF PCMA SIGNED ON 30.NOVEMBER. 2015 BETWEEN GE AND GOVERNMENT.

**GE TRANSPORTATION**  
 TITLE: SPRING RIGGING ARRGT-REF  
 PART NO: B4A23B791BT  
 SHEET NO: 1 OF 1  
 UGLDGE