

**Government of India  
Ministry of Railways  
Research Designs and Standards Organisation (RDSO)  
Manak Nagar, Lucknow (INDIA) -226011**

**Global Notice for Expression of Interest**

*Notice No. CT/SRC/EOI/Washable Apron dated 16.06.2015*

Ministry of Railways, Research Designs and Standards Organisation (R.D.S.O.), Lucknow is interested in '**Development of a cost effective & durable washable apron (ballastless) for use on passenger platform on Indian Railway's network for speed prevailing on its system**'. The design of washable apron should comply to the 'Functional Requirements specifications' available on RDSO's website. Firms who have experience and capability in designing and development of **cost effective washable apron (ballastless)** and are having ISO certificate, are requested to see the details on RDSO's website [www.rdsolndianrailways.gov.in](http://www.rdsolndianrailways.gov.in)→Tenders → EOI or contact Director/Track-IV, RDSO, Lucknow on Telephone No. 91-522-2452796/email: dtd5rdso@gmail.com on any working day for further details. The firms are requested to submit details in the prescribed format by **21/08/2015(15:00 hrs)** to Director/Track-IV, Anusandhan Bhawan, Track Design Directorate, RDSO, Manak Nagar, Lucknow – 226011 (INDIA).

Firms expressing interest shall note that:

1. Technical details submitted for design and development of washable apron shall clearly describe the detail construction method starting from the activity of dismantling of existing track/ washable apron ( in cases where existing washable aprons are required to be replaced) upto completion of the construction & commissioning of ballastless washable apron.
2. The firm shall submit offer in two no. sealed envelopes one containing application and technical details and the second containing budgetary cost of construction of washable apron (including all cost of fastening components etc.) per meter length based on their design. In the second envelope cost of technology transfer to Indian Railways including terms & conditions may also be submitted separately. This is not for the purpose for evaluation but for the purpose of handing over to authorities / Zonal Railways for their guidance where the shortlisted design may be taken up for trial.

Director/Track-IV  
For Director General (Track)  
RDSO, Lucknow  
(for & on behalf of President of India)

**भारत सरकार, रेल मंत्रालय**  
**अनुसंधान अभिकल्प और मानक संगठन**  
**मानक नगर, लखनऊ-226011**  
**रुचि की अभिव्यक्ति करने के लिए वैश्विक (ग्लोबल) सूचना**  
**सूचना संख्या सीटी/एस आर सी/ई.ओ.आई/वाशेबल एप्रन दिनांक 16.06.2015**

अनुसंधान अभिकल्प और मानक संगठन (अ.अ.मा.सं.), रेल मंत्रालय, लखनऊ, भारतीय रेलपथ प्रणाली के यात्री प्लेटफार्म पर उपयोग के लिए उसके तंत्र पर प्रचलित गति हेतु "प्रभावी लागत वाले एवं टिकाऊ वाशेबल एप्रन (बैलॉस्टलेस)" के विकास के लिए इच्छुक है। वाशेबल एप्रन के डिजाइन, अ.अ.मा.सं. की वेबसाइट पर उपलब्ध क्रियात्मक वांछित विशिष्टि (**Functional Requirement Specification**) पर आधारित हो। "प्रभावी लागत वाले एवं टिकाऊ वाशेबल एप्रन (बैलॉस्टलेस)" के डिजाइन एवं निर्माण में अनुभवी एवं सक्षम फर्म जिनके पास आइ.एस.ओ. प्रमाण-पत्र भी हो, से अनुरोध है कि वे अ.अ.मा.सं. की वेबसाइट [www.rdsso.indianrailways.gov.in](http://www.rdsso.indianrailways.gov.in) → **Tenders** → **EOI** पर उपलब्ध विवरण का अवलोकन करें। वे निदेशक/रेलपथ- च, अ.अ.मा.सं./ लखनऊ -226011 के फोन सं 91-522-2452796 पर किसी भी कार्य दिवस में अथवा ईमेल [dtd5rdsso@gmail.com](mailto:dtd5rdsso@gmail.com) द्वारा संपर्क कर इस विषय में वांछित जानकारी प्राप्त कर सकते हैं। इच्छुक फर्मों से अनुरोध है कि वे निर्धारित प्रोफार्मा में विवरण भरकर दो प्रतियों में निदेशक/रेलपथ-IV, रेलपथ निदेशालय, अनुसंधान भवन, अ.अ.मा.सं. मानक नगर/लखनऊ -226011 (भारत) के कार्यालय में दिनांक 21.08.2015 (15:00 बजे) तक जमा करें।

अभिरुचि व्यक्त करने वालों फर्म ध्यान दे -

1. बैलॉस्टलेस वाशेबल एप्रन के डिजाइन और विकास के लिए प्रस्तुत तकनीकी विवरण में इसके निर्माण की विसीति कार्य चैजना, मौजूदा ट्रेक/वाशेबल एप्रन (मौजूदा वाशेबल एप्रन को बदलने की दशा में) के उखाड़ने से लेकर वाशेबल एप्रन के निर्माण पूरे होने एवं पुनः चालू होने तक से स्पष्ट रूप वर्णित हैनी चाहिए।
2. फर्म प्रस्ताव को दो मुहरबंद लिफाफों में प्रस्तुत करें, जिसमें एक में आवेदन एवं तकनीकी जानकारी होगी और दूसरे में वाशेबल एप्रन के निर्माण की डिजाइन अनुसार प्रति मीटर बजटीय लागत (पूर्ण फार्सनिंग सिस्टम की लागत सहित) होगी। दूसरे लिफाफे में, भारतीय रेल को नियम एवं शर्तों सहित तकनीकी हस्तांतरण की लागत भी अलग से दी जा सकती है। इसका उद्देश्य चुने हुए डिजाइन का वित्तीय परीक्षण करना नहीं है। परन्तु इसे सम्बन्धित अधिकारियों/क्षेत्रीय रेलवे के मार्गदर्शन हेतु प्राप्त किया जा रहा है, जहाँ चुने हुए डिजाइन का परीक्षण किया जा सकता है।

निदेशक/रेलपथ-IV  
कृते महानिदेशक/रेलपथ  
अ.अ.मा.सं. मानक नगर/ लखनऊ  
(भारत सरकार के राष्ट्रपति की ओर से)

**Instructions/ Guidelines for the firms expressing their interest against Expression of Interest (EOI) Notice No. CT/SRC/EOI/Washable Apron dated 16.06.2015**

**1. DISCLAIMER**

Ministry of Railways, Research, Designs & Standards Organization (RDSO) has prepared this document to give interested parties background information of the product/ system for application in Indian Railways. While RDSO has taken due care in preparation of information contained herein and believes it to be accurate, neither RDSO nor any of its officers, employees gives any warranty or makes any representations, expresses or implies as to the completeness or accuracy of the information contained in this document or any information which may be provided in association with it. The information is not intended to be exhaustive. Interested parties are required to make their own inquiries and respondents will be required to confirm in writing that they have done so. The information is provided on the basis that it is non-binding on RDSO or any of its officers, employees or advisors.

RDSO reserves the right not to proceed with the project, at a later stage or to change the process or procedure to take the project forward. In such eventualities, RDSO will not be held responsible. It also reserves the right to decline to discuss the project further with any party expressing interest. No reimbursement of cost of any type will be paid to persons, or entities, expressing interest.

**2. PURPOSE OF INVITING EOI**

The purpose of inviting global EOI is to explore the various worldwide systems available for ballastless washable apron with full speed potential, ease of construction, low maintenance requirement, ease of washing/ cleanliness as per Indian station conditions. The EOI also intends to shortlist the firms for carrying out trial for assessing the suitability to Indian conditions, if any system found suitable prima- fascia for trial. The broad functional requirement specification for such a system is given in this document as Annexure 'D'.

**3. GENERAL INSTRUCTIONS FOR SUBMITTING RESPONSE TO EOI:**

- 3.1 **Eligibility Criteria:** The eligibility criteria for firms for consideration of offers for short listing shall be as per Para 2.0 of the Functional Requirement Specification (FRS) (Annexure 'D'). The firm will be required to furnish supporting documents to establish that they are meeting the laid down eligibility criteria.
- 3.2 General & Technical details to be provided by firm: General & technical details as per Para C of FRS shall be submitted by the firm with their offer.
- 3.3 The details submitted by the firm shall be scrutinized by a nominated committee at RDSO. The deficiency as observed in the offer during technical scrutiny or additional information as considered necessary will be advised to the firm. The information must be made available by firm within two weeks of advice. In case

the additional Information is not received within stipulated period, the evaluation will be done based on information made available originally.

- 3.4 The firm will have to arrange detailed technical presentation at RDSO, Lucknow/ Railway Board about the working procedure and performance details of the offered system, if required by the committee.
- 3.5 The discussions shall be held with the shortlisted firms for finalizing the system for trial if found suitable based on FRS.
- 3.6 **Submission of offers:** The intending firm/ organization shall submit their offer in the format given in Annexure – ‘B’ and undertaking as Annexure – ‘C’. Apart from this, the requisite documents in proof of meeting the eligibility criteria and Para-wise compliance of items of FRS shall also be submitted.
- 3.7 The firm will also submit a budgetary estimate of cost of the construction of washable apron per meter run under Indian condition as per their design giving complete cost breakup of various elements including fastening system proposed to be used at current price level. The firm may also submit cost, along with breakup of various components and conditions if any & cost of technology transfer to Indian Railways. A typical passenger platform on Indian Railways can be of 800m length.
- 3.8 The offers received against EOI shall be considered for short-listing the firms for carrying out field trial of the proposed system under Indian Railways conditions.

#### 4. SELECTION CRITERIA:

The firms meeting the eligibility criteria will be shortlisted broadly based on the following criteria by a nominated committee of RDSO.

S. No.	Item
1	Turn-over of the firm during last 3 years
2	Details of similar construction completed in the field of item under EOI
3	Experience and expertise for item under EOI
4	Details of patent held for the proposed system or component if any
5	Technical suitability of the system offered to suit Indian Conditions as per FRS

Note: In case, the proposal is submitted on behalf of 2 or more partner firms due to expertise of its partners in different fields, such proposal will be shortlisted based on above criteria for all such partner firms.

## 5. SUBMISSION OF OFFERS:

Interested firms are requested to submit their EOI to Director/Track-IV, RDSO, Anusandhan Bhawan, Manak Nagar, Lucknow- 226011 by 21.08.2015 (15:00 Hrs) in the enclosed "Format for Letter of Response" at Annexure B. In the EOI, the firms should mention RDSO's Notice No. **CT/SRC/EOI/Washable Apron dated 16.06.2015**. In the EOI, the respondents must furnish the details **in duplicate** as required in the enclosed "Format for Letter of Response" at Annexure B, the undertaking in format given at Annexure C and details stipulated in Functional Requirement Specification at Annexure D.

Director/Track-IV,  
For Director General (Track)  
RDSO, Lucknow.

**FORMAT FOR LETTER OF RESPONSE**

Respondents Ref No.:

Date:

Director/Track-IV

Room No: 118

Building: Anusandhan Bhawan,

Research Designs & Standards Organization (RDSO)

Ministry of Railways , Manak Nagar

Lucknow (INDIA ), Pin - 226011

Dear Sir,

**Subject: RESPONSE TO – EOI FOR PARTICIPATION**

1. We, the undersigned, offer the following information in response to the Expression of Interest sought by you vide your Notification No. **CT/SRC/EOI/Washable Apron dated 16.06.2015.**
2. We are duly authorized to represent and act on behalf of \_\_\_\_\_ (hereinafter the “respondent”)
3. We have examined and have no reservations to the EOI Document including Addenda No(s)\_\_\_\_\_.
4. We are attaching with this letter, the copies of original documents defining: -
  - 4.1 the Respondent’s legal status;
  - 4.2 its principal place of business;
  - 4.3 its place of incorporation (if respondents are corporations); or its place of registration (if respondents are cooperative institutions, partnerships or individually owned firms);
  - 4.4 Self certified financial statements of Last three years, clearly indicating the financial turn over and net worth.
  - 4.5 Copies of any market research, business studies, feasibility reports etc sponsored by the respondent, relevant to the project under consideration
5. We shall assist Ministry of Railways (MoR) and/or its authorized representatives to obtain further clarification from us, if needed.
  - 5.1 RDSO and/or its authorized representatives may contact the following nodal persons for further information on any aspects of the Response:

S. No.	Contact Name	Address	Telephone	E Mail

6. This application is made in the full understanding that:
- 6.1 Information furnished in response to EOI shall be used confidentially by RDSO for the purpose of development of specifications for the item under EOI
  - 6.2 RDSO reserves the right to reject or accept any or all applications, cancel the EOI and subsequent bidding process without any obligation to inform the respondent about the grounds of same
  - 6.3 We confirm that we are interested in participating discussion for finalization of the specification for the item under EOI

7. We certify that our turnover and net worth in the last three years is as under:

Financial Year	Turn over	Net worth

8. In response to the EOI we hereby submit the following additional details annexed to this application.
- 8.1 Turn-over of the firm/JV during the last three financial years with the copies of annual report
  - 8.2 Details of various previous constructions or consultancy undertaken.
  - 8.3 Details of customer(s)/Railways where washable apron/ballastless track construction/ design done by the firm/JV/Collaborator including quantity & length of construction.
  - 8.4 Experience and expertise for the items proposed in EOI.
  - 8.5 Complete technical details of the system as per functional requirements under this EOI.
  - 8.7 Details of Intellectual Property Rights (IPR) held, patent filed/held and MoU/ agreement signed.
  - 8.8 Details of ISO certification
  - 8.9 Undertaking as per Annexure- C
  - 8.10 Documents in proof of Eligibility criteria
  - 8.11 Para-wise compliance of Functional Requirement Specification
  - 8.12 Technical Details as per Functional Requirement Specification

8.13 Budgetary quotation with detailed breakup of various components for the system(s) offered.

8.14 List of various documents as per para C of FRS.

9. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail. We also understand that in the event of any information furnished by us being found later on to be incorrect or any material information having been suppressed, RDSO may delete our name from the list of qualified Respondents. We further understand that RDSO will give first preference to the applicants considered relevant for the purpose.

Yours sincerely,

(Sign)

NAME

In the Capacity of

Duly authorized to sign the  
response for and on behalf of

Date



## ANNEXURE-C

(To be submitted on non-judicial stamp paper of appropriate value as applicable in the respective state and duly notarized and witnessed)

### UNDERTAKING

I, son of \_\_\_\_\_ aged about \_\_\_\_\_ Years, resident of \_\_\_\_\_ do hereby solemnly affirm as under:

1. That the deponent is the Authorized signatory of (Name of the Sole Proprietorship Concern/Partnership Firm Registered Company/Joint Venture).
2. That the deponent declares on behalf of (Name of the Sole Proprietorship Concern/Partnership Firm Registered Company/Joint Venture) that:
  - a) In regard to matters relating to the security and integrity of the country, no charge sheet has been filed by an agency of the Government/conviction by a Court of Law for an offence committed by the \_\_\_\_\_ (name of the entity) or by any sister concern of the \_\_\_\_\_ (name of the entity) would result in disqualification.
  - b) In regard to matters other than the security and integrity of the country \_\_\_\_\_ (name of the entity) has not been convicted by a Court of Law or indicated/passed any adverse order by a regulatory authority against it or it's any sister concern which relates to a grave offence, or would constitute disqualification. Grave offence is defined to be of such a nature that it outrages the moral sense of the community.

DEPONENT

### VERIFICATION

I declare that the contents of para 1 to 2 above are true as per my knowledge and nothing has been hidden.

DEPONENT

**FUNCTIONAL REQUIREMENT SPECIFICATIONS FOR DESIGN AND DEVELOPMENT OF COST EFFECTIVE WASHABLE APRON (BALLASTLESS)**

**A. GENERAL:**

- 1.0 Interested firm or firms which are a part of Joint Venture should have adequate expertise in design and construction of washable apron/Ballastless track. Interested firms can also have technical collaboration with the firm having adequate expertise in design & construction of washable apron in India or abroad as per technical requirement detailed at para B.

**2.0 Eligibility criteria**

The firm should have:

- i) ISO: 9001 Certificate
  - ii) Applying firm should have Collaboration agreement or joint venture partnership with the firm having adequate expertise in design & construction of washable apron/ Ballastless track as per technical requirement detailed at para B of this document.
  - iii) The collaborator should have designed & constructed at least one washable apron or ballastless track on formation for a track of atleast 25t axle load (freight traffic) and design speed of 160 kmph or higher.(passenger traffic)
  - iv) Washable apron/ballastless track designed and constructed by the firm at site in past as per their design should have satisfactory working performance during running of trains for a reasonable time since the date of its construction.
  - v) Cost effective design & methodology with least construction period would be preferable. Firms should advise the total days required for the construction in case of works to be taken up in the existing yards where traffic blocks will be required for taking up the works of washable apron.
- 3.0 At the time of EOI, the firm will also submit detail design and relevant drawings and detailed construction procedure, testing scheme & maintenance manual etc. for the construction & maintenance of the washable apron for trial purpose.
- 4.0 In case the RDSO or applicant firm considers to have an interaction session with RDSO technical officials before the date of closure of EOI submission either party shall submit a request to the same effect atleast 30 days in advance. It is advised that the applicant firm should visit existing location of washable apron to get themselves conversant with typical conditions prevailing on Indian Railways. The visit can be arranged by RDSO through zonal railways at any location convenient to firm. However, the applicant firm must make a request to this effect atleast 15 days before the EOI closure date.

- 5.0 EOI containing design which is a copy of RDSO existing or under-development design of Ballastless Track may be summarily rejected. Decision of Track Design Directorate, RDSO will be final and binding on the applicant.
- 6.0 In case, firm is considered prima-facie suitable for design & development of washable apron based upon the documents submitted, the firm may be asked to construct washable apron with proposed design on atleast one location in Indian Railways for which the concerned zonal railway would form the required contract/agreement. Location shall be advised to the firms and discretion of Indian Railways regarding location shall be final.
- 7.0 The firm shall indemnify Ministry of Railways against any claims from any other party in connection with the intellectual property rights of the drawings and design or any other documents submitted by the firm or any other patent rights.

## **B. TECHNICAL REQUIREMENTS**

### **1.0 Following criteria shall be adopted:**

- i) Washable apron shall be designed for 25t maximum Axle Load.
- ii) Washable apron for platform lines shall be designed for full speed prevailing on Indian Railways network i.e. 160 kmph.
- iii) Washable apron shall be primarily in the form of ballastless track (BLT).
- iv) Washable apron should be designed suitable to mixed traffic (freight as well a passenger) running with different speed/axle load on the washable apron on Indian railways.
- v) Before construction, entire surrounding area may require dewatering and drained off and necessary ground improvement is to be carried as per suggested scheme given in para E. The applicant firm may suggest alternative dewatering and base preparation / ground improvement scheme suitable for Indian conditions for consideration of RDSO.
- vi) Design service life of washable apron should be a minimum of 60 years.
- vii) Washable aprons are extensively washed on Indian Railways due to various reasons i.e. toilet discharge etc. apart from watering of coaches. Suitable arrangement should be provided for ensuring that washable apron functions properly in view of daily cleaning requirement. Provision of adequate cross slope for drainage purpose and suitable measures to prevent ingress of water may be considered. Design of associated drainage arrangements in area near to washable apron shall also be part of design of washable apron. Necessary field visit to ascertain Indian conditions as specified in para 2.2 may be done for suggesting suitable drainage system.
- viii) No appreciable cracks or settlements or separation of parts should be developed during service in the apron leading to impaired service or failure.

- ix) Washable apron should be designed for almost maintenance free conditions except replacement of worn-out fastening components / rails after their service life is over.
- x) The proposed system should be easy to repair & expeditious to restore in case of damages due to derailment. The time & material requirement for repair should be clearly defined along with detailed procedure of repair.
- xi) Length of washable apron at typical passenger platform may be of 800m.

## 2.1 DESIGN REQUIREMENTS

In designing following parameters may be considered:

- a) Load distribution factor, prevailing on IR (to be taken as 0.55)
- b) Dynamic augment, prevailing on IR (to be taken as 2.5)
- c) Upward reaction / pressure from support base should be clearly mentioned in design
- d) Spacing of supports to rails – preferably at every 60 cm.
- e) The design should be cost effective serving all functional requirements expected of washable apron.
- f) Any other factor considered necessary by the designer.
- g) Design shall be per various codes of practice of BIS, EN, IRS, IRC and UIC with latest revision/ edition). If for any item/work, abovementioned codes are not relevant, best available Engineering practice / International codes shall be mentioned.
- h) Design & detail of suitable Transition System for smooth transition from ballasted track to washable apron on both ends shall be part of the design of washable apron.
- i) Design and detail of Expansion / Contraction Joints in washable apron at suitable intervals shall be part of the design of washable apron.
- j) Technical parameters required for foundation of washable apron shall be suitably considered for Indian conditions and shall be mentioned in the design. A design monograph of varying subgrade characteristics, if applicable, to be provided by the firm /designers.

Indian Railways is ready to consider changes in the above parameters (a, b and d) in case the firms are able to support it with the relevant documents and codes as per practice in other Railways.

### 2.1.1 Track Details : Washable apron shall be designed for following track details :

- i) Rail section: 60 kg, 90 UTS, 110 UTS / 52 kg, 90 UTS (UIC) (as per RDSO standard specification IRS/T-12) or any other type 60 kg rails
- ii) Schedule of Dimensions (SOD) and Maximum Moving Dimension (MMD) of Indian Railways for BG shall be followed.
- iii) Ruling gradient: 1 in 400 (steepest)
- iv) Rail cant at Rail seat (inward): 1 in 20
- v) Maximum degree of curvature: upto 2°
- vi) Maximum permissible cant: 165mm

- vii) Speed potential: Full speed prevailing on Indian Railways i.e. 160 kmph or even higher
- viii) Traffic: Mixed – passenger & freight
- ix) During service if some parameter goes out in case of any unforeseen circumstances, the leeway / margin available to correct the parameter.  
Vertical: + 10 mm / - 3mm, Horizontal:  $\pm 3$  mm.
- xi) Design of washable apron should take into consideration the forces due to continuous welded rail (CWR).
- xii) Design temperature range: 70 degree Celsius variation of rail temperature as per zone & chart of Indian Railway LWR manual and 40 Degree variation of ambient temperature.

**2.1.2 Track Tolerances:** Track tolerances over washable apron when installed and later during service under floating condition should be as under:

S. No.	Parameter	Installation	Service
1	Gauge (with reference to 1676mm, measured below 14 mm rail top) for straight track and for curve upto the radius of 350 m.	$\pm 1$ mm	$\pm 3$ mm
2	Variation in versine on curved track (20 m chord with half overlapping)	$\pm 3$ mm	$\pm 6$ mm
3	Vertical alignment over a 3.6 m chord	$\pm 1$ mm	$\pm 6$ mm
4	Lateral alignment over a 7.2 m chord on straight track	$\pm 1$ mm	$\pm 3$ mm
5	Twist on 3.6 m base	$\pm 1$ mm	$\pm 5$ mm

The above installation parameters are not sacrosanct and firms may like advise their own limits for the above parameters along with basis for suggesting the changes. Variation in horizontal alignment, vertical alignment, versine, twist and gauge shall not exhibit cyclic pattern.

### 2.1.3 Type of Traction:

IR has Diesel / Overhead Electric (25 KV) traction. The washable apron design should have adequate electrical insulation for correct performance of signaling and traction equipments even in flooded condition during monsoon for which necessary field visit may be done as specified in para 2.2 and the design should take care of return current as per traction.

## 2.2 CONSTRUCTION PROCESS

Interested firms are advised to visit important stations like New Delhi, Howrah, Mumbai etc to get familiar with typical Indian station environment like drainage system / extent of platform occupation/ typical cleanliness conditions, water flooding during monsoon period in station area etc. During visit Station Mangers can be interacted for getting above information. Procedure of construction

process of washable apron should be mentioned in details suitable to Indian conditions including dewatering of surrounding area, dismantling and removal of existing track/washable apron, ground improvement. Construction process & system suggested should be easy in construction suitable to conditions prevailing on stations of Indian Railways, clearly demonstrating how it can be constructed & installed within a reasonable time frame.

### **C. LIST OF DOCUMENTS TO BE SUBMITTED**

The firm will submit following document along with application form:

1. Documentary proof for Registration with RDSO or with any Government /public Department, if available.
2. ISO: 9001 Certificate
3. Collaboration Agreement/joint venture as mentioned in 2.0 (iii).
4. Certificate of satisfactory working performance from the User as mentioned in 2.0(iv)
5. Design, drawings & detail construction methodology giving detailed Bar chart of activities with reasonable & least construction period..
6. Estimated cost of construction of washable apron as per their design as mentioned in para A 3.0
7. The firm has to submit design of washable apron for 25t axle load with speed of 160 kmph satisfying technical and design requirements given in para B1.0, B2.1 & B2.2. A check list clearly indicating compliance against Technical & Design requirements under para B1.0, B2.1& B2.2 shall also be submitted.
8. Drawing, specification, name of railway, numbers, year of construction, performance of washable aprons /ballastless track used in other railway system designed by collaborator for Indian context.
9. Items for advising the cost and time frame for various activities per meter length of washable apron are as under:
  - a) Cost of dismantling of existing track
  - b) Cost of dismantling of existing washable apron ( if any)
  - c) Cost of dewatering (if required)
  - d) Cost of preparation of sub-base
  - e) Cost of preparation of sub-grade
  - f) Cost of laying of washable apron (Excluding cost of rails) including side drains.
  - g) Cost of laying of rails ( to be supplied free of cost by Railways) and welding etc
  - h) Cost of fastening components.
  - i) Any other costs

- D.** On satisfactory submission of above documents, if RDSO consider the firm fit for trial construction of washable apron as per their design, then firm will be asked to do so on atleast one location in Indian Railways. In this matter decision of railway authorities will be final. Firm will have to submit detail design & construction technique to RDSO at the time of submission of EOI. In addition, Track monitoring data to the extent available should be provided in support of design calculations.

After construction of proposed system at one location, RDSO & Zonal railway will monitor the performance jointly on quarterly basis & for atleast one year before considering the final adoption of the proposed system. The performance monitoring performa will be framed jointly by RDSO & firm covering broadly following parameters:

- i) Efficacy of fastening: Fastening system should be able to maintain track geometry (gauge, cross level, loose fittings etc.) at all times within track tolerances during service without any components breakage, excessive wear & tear.  
Track tolerances to be maintained at the time of construction & during trial /service should be as per para 2.1.2
- ii) Any track settlement
- iii) Any visible crack in concrete / RCC portion of slab portion
- iv) Efficacy of drainage system: e.g. the slope and drains constructed should function properly.
- v) Maintainability aspects: i.e. change of rail, other track components should be feasible in reasonable time and effort.
- vi) Any repairs undertaken
- vii) Monitoring of any special components /material used.

During field trial of washable apron instrumentation in the running line may be required to done by the firm for measurements of some parameters. For this purpose, firm will have to submit the scheme and details of parameter measurement, if required; instrumentation expert can be engaged by the firm for this purpose.

The decision about efficacy of design after trial based on observations of zonal railways & RDSO officials shall be final.

## **E. Suggested method for De-watering and Base preparation for washable apron**

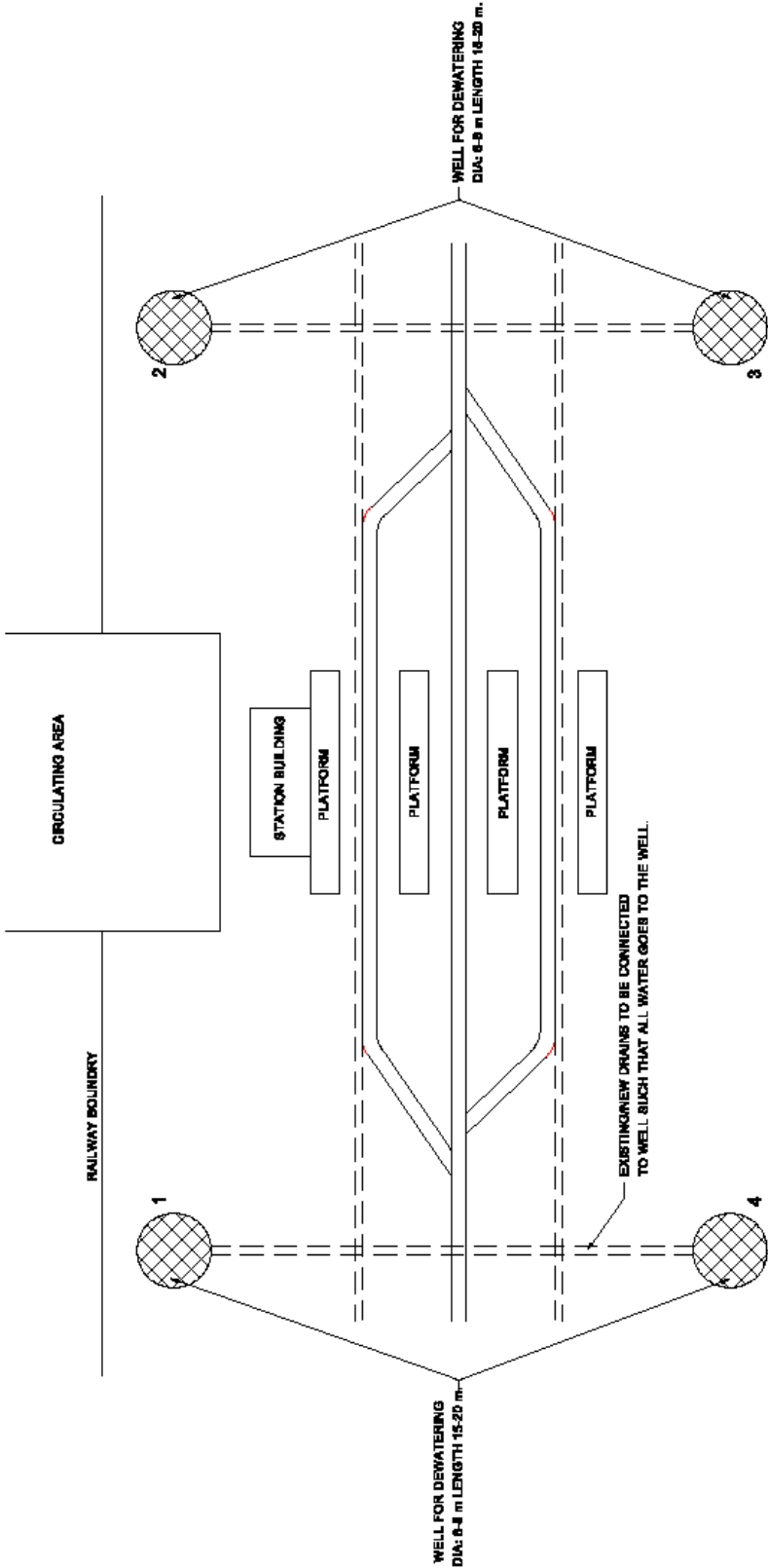
The washable apron, if constructed over weak subgrade (having bearing capacity  $< 10 \text{ tonne/m}^2$ ) without dewatering and complete drying of surrounding area and ground improvement, will not function effectively and not be durable. In order to have trouble free performance of washable apron over long service life, it is mandatory that before casting of base concrete, formation for washable apron should be prepared with adequate bearing capacity. For this purpose, dewatering of accumulated and ground water for complete drying of area and carrying out necessary ground improvement before and during construction of washable apron may be required to be done .

Followings steps for ground improvement are to be carried out to achieve the above –

1. Open wells should be excavated near both ends of washable apron length at the lowest levels of available ground. The lowest levels can be decided by carrying out dumpy level survey. The wells should be of diameter 6-8 meter and depth of 15 – 20 m. Temporary protection for support of walls of well can be planned, if required. The well can be located by the side of yard or slightly away depending on the suitable land available as indicated in the sketch enclosed.
2. Wells should be properly covered and protected for any accidents and eventualities.
3. The dewatering of washable apron length and it's nearby area should be subjected to for about a month's time for complete drainage of accumulated and ground water, if any in dry season. In case water table is close to ground level, suitable arrangement for pumping out water from wells be made. Complete drying of area should be ensured.
4. Dismantle the existing ballasted track / old washable apron, debris and caked up ballast should be removed completely.
5. Scum /muck /soil of poor bearing capacity should be removed completely over the entire construction area.
6. In case the depth of scum/poor soil is more than 500 mm which cannot be easily removed, bearing capacity improvement through other economical methods e.g. Sand/Gravel/Stone pile may be suitably done.
7. Minimum bearing capacity of compacted formation specified to lay the washable apron (say  $10 \text{ tonne/m}^2$ ) should be ensured before construction of base concrete of washable apron. Plate load tests should be carried out at one or two locations (as considered appropriate by field engineers) to determine the bearing capacity.



**SCHEMATIC SKETCH FOR PROVIDING WELLS  
FOR DE-WATERING OF CONSTRUCTION AREA  
FOR WASHABLE APRON**



**NOTE: ONE WELL AT EACH LOCATION ON EITHER SIDE OF YARD OUT OF  
4 LOCATIONS WITHIN RAILWAY BOUNDARY (AWAY FROM  
PASSENGER & RAILWAY CURRENT USE ,WELL PROTECTED).**

**RAILWAY BOUNDARY**