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**Ref No: TKIAL/CO/AERA-MYTP/2024/02** **13th March 2024**

To,
The Director (P&S, Tariff),
Airports Economic Regulatory Authority of India,
AERA Building, New Administrative Block,
Safdarjung Airport,
New Delhi- 110003.

Sub: Comments on the Consultation Paper No. 25/2023-24 dated 12th February 2024 in The Matter of Determination of Aeronautical Tariff for Thiruvananthapuram International Airport, Thiruvananthapuram (TRV) for the Third Control Period (01.04.2022 - 31.03.2027)

Dear Sir,

This is in respect to the Consultation Paper No. 25/2023-24 dated 12th February 2024 in The Matter of Determination of Aeronautical Tariff for Thiruvananthapuram International Airport, Thiruvananthapuram (TRV) for the Third Control Period (01.04.2022 - 31.03.2027), we hereby submit our written comments chapter-wise.

We shall be pleased to provide any further information that the Authority may require in this regard.

Thanking you

Yours truly,
**For TRV (Kerala) International Airport Limited,**

**Manoj Chanduka**
**Authorized Signatory**

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**Comments on the Consultation Paper No. 25/2023-24 dated 12th February 2024 in The Matter of Determination of Aeronautical Tariff for Thiruvananthapuram International Airport, Thiruvananthapuram (TRV) for the Third Control Period (01.04.2022 - 31.03.2027)**

**Disclaimer**

This document has been prepared by TRV (Kerala) International Airport Limited (TKIAL) in response to AERA's Consultation Paper No. 25/2023-24 dated 12th February 2024 in The Matter of Determination of Aeronautical Tariff for Thiruvananthapuram International Airport, Thiruvananthapuram (TRV) for the Third Control Period (01.04.2022 - 31.03.2027)

The purpose of this document is to solely provide a response to the tentative decisions proposed by AERA in Consultation Paper (CP) and should not be referred to and relied upon by any person against TKIAL. This document includes statements, which reflect various assumptions and assessments by TKIAL and relevant references to various documents. Same does not purport to contain all the information to support our response.

This document may not be appropriate for all persons, and it is not possible for TKIAL to consider particular needs of each party who reads or uses this document.

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The response set out below to the CP shall not be construed as an acceptance by TKIAL of the various assumptions undertaken by the Authority in the CP.

We request the Authority to follow the previous orders passed in case of other airports by AERA, Hon'ble TDSAT and the Hon'ble Supreme Court of India, as well as orders concerning the points raised in the MYTP and this response. It is settled law that juridical discipline requires the Authority and/or courts of law to follow the previous orders to maintain certainty of things. At the same time, the Airport Operator is always entitled to raise / agitate the points which are not in consonance with the relevant guidelines and judicial pronouncements irrespective of previous orders in this regard.

The response is without prejudice to TKIAL's rights, submissions, contentions available to it in accordance with applicable laws.

List of Abbreviations:

| Abbreviation | Expansion |
|---|---|
| AAHL | Adani Airport Holdings Limited |
| AAI | Airport Authority of India |
| ACI | Airport Council International |
| ADP / AVP | Airport Driving Permit / Airport Vehicle Permit |
| AEL | Adani Enterprises Limited |
| AERA or Authority | Airport Economic Regulatory Authority of India |
| AO | Airport Operator |
| AOCC | Airport Operator Control Centre |
| ARR | Aggregate Revenue Requirement |
| ATM | Air Traffic Movement / Automated Teller Machine |
| ATP | Annual Tariff Proposal |
| AUCC | Airport Users Consultative Committee |
| AVSEC | Aviation Security |
| BIAL | Bengaluru International Airport Limited |
| CA | Concession Agreement signed between AAI and TKIAL as on 19th January 2021 |
| CAPM | Capital Asset Pricing Model |
| COD | Commercial Operation Date |
| CoD | Cost of Debt |
| CoE | Cost of Equity |
| CP | Consultation Paper No. 25/2023-24 dated 12th February 2024 |
| CPI | Consumer Price Index |
| CPWD | Central Public Works Department |
| CSS | Corporate Support Services |
| CWIP | Capital Work in Progress |
| DGCA | Director General of Civil Aviation |
| DIAL | Delhi International Airport Limited |
| EHCR | Employee Head Count Ratio |
| ERP | Equity Risk Premium |
| EV | Electric Vehicle |
| FIDS | Flight Information Display System |
| FRoR | Fair Rate of Return |
| FY | Financial Year |
| GHIAL / HIAL | GMR Hyderabad International Airport Ltd / Hyderabad international Airport Ltd |
| GoI | Government of India |
| HR | Human Resource |
| HSD | High Speed Diesel |
| IATA | International Air Travelers Association |
| ICAO | International Civil Aviation Organization |
| IDC | Interest during Construction |
| ILBS | In-Line Baggage System |
| IMG | Inter-Ministerial Group |
| LOA | Letter of Award |
| LOI | Letter of Intent |
| LPM | Liters per Minute |
| MCLR | Marginal Cost of Funds based Lending Rate |

| Abbreviation | Expansion |
|---|---|
| MIAL | Mumbai International Airport Limited |
| Mn | Million |
| MPPA | Million Passenger Per Annum |
| MYTP | Multi Year Tariff Proposal |
| NAR | Non-Aeronautical Revenue |
| NBFC | Non-Banking Financial Company |
| NCAP | National Civil Aviation Policy, 2016 |
| New T1 | New Reconstructed Terminal 1 |
| O&M | Operation & Maintenance |
| ORAT | Operational Readiness and Airport Transfer |
| PAX | Passengers |
| R&M | Repairs and Maintenance |
| RAB | Regulatory Asset Base |
| RCS | Regional Connectivity Scheme |
| RFPs/RFQs | Request for Proposals / Request for Quotes |
| RWY | Runway |
| SC | Supreme Court of India |
| SCP | Second Control Period |
| T1 | Terminal 1 of Thiruvananthapuram Airport |
| T2 | Terminal 2 of Thiruvananthapuram Airport |
| TCP | Third Control Period |
| TDSAT or the Appellate Authority | Telecom Disputes Settlement and Appellate Tribunal |
| TKIAL or TRV | TRV (Kerala) International Airport Limited |
| UDF | User Development Fees |
| VDGS | Visual Docking Guidance System |
| WACC | Weighted Average Cost of Capital |

Airport Operator or AO or TKIAL means the same and as has been used interchangeably in this document.

In this document, "Authority" where any clause from Concession Agreement is mentioned it refers to Airports Authority of India (AAI) and for rest of the document Authority refers to Airport Economic Regulatory Authority of India (AERA).

In this document, "The AERA Act" refers to The Airports Economic Regulatory Authority of India Act, 2008 (as updated from time to time).

In this document, "The AERA Guidelines" refers to Airports Economic Regulatory Authority of India (Terms and Conditions for Determination of Tariff for Airport Operators) Guidelines, 2011.

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# 1 Chapter 1 “Comments on Consultation Paper Chapter 5 - True Up of Airport Operator for the Period from COD Till March 31, 2022”

## 1.1 AERA proposal as per 4.5.19, 4.7.4 and 5.4.6 of CP and 4.4.4 of Appendix I relating to True up of RAB

*4.5.19*

- *Aeronautical assets (e.g. aerobridges, among others) are directly added to RAB and assets identified to be Non-Aeronautical (e.g. commercial complex) are excluded from it. The assets that have been classified as Common assets need to be further bifurcated into aeronautical and non-aeronautical based on a suitable ratio. This ratio has been determined based on the underlying proportion of their expected utilization for Aeronautical and Non-aeronautical services and activities at the Airport.*

*4.4.4 of Appendix I – Study on Allocation of Assets*

*The Authority, vide Order No. 03/2017-18 dated 2nd June 2017 for the Second Control Period, decided to adopt the Terminal Area Ratio as 90%:10% (Aeronautical : Non-Aeronautical) in order to encourage the growth of non-aeronautical revenues which would cross-subsidize aeronautical charges. The relevant para of the Order is as follows:*

*Para 7.6: The Authority observed that the percentage of non- aeronautical area is lower as compared to similar airports. The Authority had proposed to adopt 90% as aeronautical area for asset allocation of terminal related assets to encourage growth of NAR which would cross-subsidize aeronautical charges.*

*Para 7.16: The Authority notes that allocation ratio of 97.9% as mentioned by IATA refers to the average allocation of total assets and not just terminal assets. As per AAI's submissions, terminal related assets have been allocated based on 93.47%:6.53%, 93.11%:6.89% and 92.70%:7.30% respectively for FY 2015-16, FY 2016-17 and FY 2017-18. The Authority had proposed to consider terminal related assets in the ratio of 90%:10% for aeronautical and non-aeronautical allocation.*

*Therefore, the Study proposes to consider the Terminal Building Ratio of 90%:10% (Aeronautical : Non-Aeronautical) in line with the decision taken in the SCP Order as quoted above.*

*4.7.4*

*Taking cognizance of the above clauses in the Concession Agreement and adjustments & reclassification proposed by the Authority based on the outcome of the independent study conducted by the Independent Consultant appointed by AERA on allocation of assets for TRV, Thiruvananthapuram, including disallowance of Financing Allowance, exclusion of Financial lease assets, inclusion of IDC and the left out assets, reclassification of assets and the resulting change in depreciation, the Authority has determined the Deemed Initial RAB as on COD, as follows:*

***Table 30: Deemed Initial RAB for TKIAL as on COD considered by the Authority***

*(Rs. in crores)*

| Particulars | Ref. | Aeronautical Assets | Non-Aeronautical Assets | Other Assets | Total |
|---|---|---|---|---|---|
| | | (A) | (B) | (C) | D = (A + B +C) |
| Closing RAB as on 13th October 2021, as submitted by AAI (A) | Table 15 | 503.87 | 1.59 | 9.97 | **515.43** |
| Financing Allowance net of depreciation (B) | Para 4.5.16a) | -9.08 | - | - | **-9.08** |
| Financial Lease Assets (C) | Para 4.5.16b) | -3.10 | - | - | **-3.10** |
| IDC (D) | Para 4.5.16c) | 0.16 | - | 0.00 | **0.16** |
| Left out assets (E) | Para 4.5.16d) | 1.12 | - | - | **1.12** |
| Reclassification of assets (F) | Table 22 | -2.84 | 1.50 | 1.34 | - |
| Change in depreciation (G) | Table 28 | 1.11 | (0.31) | (0.25) | **0.54** |
| **Net block of assets as on 13th October 2021 after reclassification and other adjustments as per the Study [H = sum (A to G)]** | | **491.23** | **2.79** | **11.05** | **505.07** |
| Less: Assets retained by AAI (I) | | 8.00 | 0.07 | 10.51 | **18.59** |
| **Net block of assets transferred by AAI to TKIAL as on 13th October 2021 (J = H - I)** | | **483.23** | **2.71** | **0.54** | **486.48** |
| Other Assets* (ANS & Cargo) considered as aeronautical (K) | Table 22 | 0.54 | - | -0.54 | - |
| **Opening RAB of TKIAL as on 14th October 2021 (L = J + K)** | | **483.77** | **2.71** | **-** | **486.48** |

*5.4.6*

*The asset allocation study reviewed the various asset categories and developed a basis for the segregation of various assets into Aeronautical, Non-aeronautical and Common assets. Based on the same, the Authority has reclassified some portion of assets submitted by TKIAL for true-up of the period from COD till 31st March 2022 which has been detailed hereunder:*

*Various references that Assets have been allocated into Terminal Building as "The same have been reallocated in the ratio of Terminal Building which is in the ratio of 90:10"*

**Comments by TKIAL:-**

1.1.1 **The comments on similar matters are provided at 1.3.2 and 3.11 below. The same may be referred hereto.**

## 1.2 AERA proposal as per 5.7.15 page 89 of CP relating to Pre-COD expenses

*5.7.15 The Authority notes that TKIAL has submitted pre-COD expenses amounting to Rs. 9.02 crores for true-up of the post-COD period. This expense included Rs. 1.43 crores related to manpower cost including corporate cost allocation.*

*The Authority takes cognizance of the fact that AAI deputed its staff and management personnel to the Airport during the transition period, including prior to the COD to ensure that the relevant knowledge and experience of the operation and management of TRV is transferred to TKIAL. Therefore, the deputation of such staff is relevant towards the objective of smooth transition of the airport from AAI to AO, and fulfilment of the terms of the CA.*

*Furthermore, the Authority also notes that as per Clause 15.1.2 of the Concession Agreement, the Concessionaire is mandated to achieve COD within 180 days from the date of the Concession Agreement.*

*Based on the above factors, the Authority notes that AAI deputed its staff and management personnel to the Airport during the transition period, including prior to the COD and the cost of such personnel was paid by the Airport Operator. Additionally, Adani Group also deputed its own manpower from other group entities. The Authority has accordingly decided to consider salary expenses pertaining to such Adani Group entities for the period of six months prior to COD, i.e., from 14th April 2021 to 13th October 2021, for the purpose of tariff determination.*

*Based on the above considerations, the total costs pertaining to manpower cost prior to COD, as allowed for the purpose of true-up of TRV is as follows:*

*The Authority proposes to consider only this manpower cost for true-up based on the following analysis.*

- *The Authority, after making a detailed study on the provisions of the Concession Agreement, decided that there is no provision in the Concession Agreement to include in the true up, the remaining costs incurred by TKIAL prior to COD.*
- *The Authority proposes that the bid expenses incurred prior to the date of Letter of Award of TKIAL, and expenses incurred between the date of Concession Agreement and COD (other than as specifically considered above), as submitted by TKIAL are not to be considered for tariff determination.*

**Comments by TKIAL**: -

1.2.1. It is to be noted that the overall claim of the TKIAL included salaries, professional consultancies, and other administrative expenses. However, the Authority has only considered the salaries and has not provided any reason for disallowing the professional consultancies and other administrative expenses.

1.2.2. We would like to place on records that: -

1.2.2.1. Adani Enterprises Limited (AEL) was announced the successful bidder for Thiruvananthapuram Airport in Feb-2019. As the Concession agreement was a part of the Bid, AEL was aware of its obligations and responsibilities under the Concession Agreement and activities that were required to be done to

achieve the successful Commercial Operations Date (COD). This process was akin to Operational Readiness and Airport Transfer (ORAT) activity which is done when green field facility is commissioned at the Airport. When an old asset is taken over by a new owner with a responsibility to maintain superior service standards which were not supported by the existing infrastructure and bottlenecks, it is akin to a greenfield asset from the operations perspective.

The Authority in case of Bengaluru International Airport Limited (BIAL) has approved cost of Rs. 46 Crs for **ORAT** during tariff determination of third control period (refer page no. 252 of Order No. 11/2021-22 for BIAL Third Control Period).

1.2.2.2. We had earlier submitted to the Authority that various clauses in the Concession agreement mandated certain activities/obligations to be performed by the Airport Operator prior to COD so that the transition from AAI to AO is smooth. These activities covered many areas like operational readiness, familiarization & training, Trial programs, Airport facility assessment, Capability building & human resource management, observation period, financial closure etc. Being an operating Airport, these were important from the perspective of Airport users and passengers as well. It appears from the CP that the same has not been taken cognizance of by the Authority. Hence, we are reproducing the relevant provisions of the CA for your ready reference: -

**Extract of relevant clauses from the Concession Agreement:**

**Clause 16.5 Observation Period prior to COD: -** There was a requirement to have 60 days of observation period before COD whereby Concessionaire's team was to work along with AAI's team to understand the Airport operations. In order to have a dedicated Airport team to be ready for participation in the Observation period Concessionaire is required to hire personnel well before the time.

**Further As per Clause 5.8 of the CA,** Concessionaire is obligated to have trained personnel employed all the time. Before taking over the Airport, the AO is required to hire people who are trained to take care of safe operations of the Airport.

**As per Clause 4.1.3 of the CA**, as a condition precedent; Concessionaire needs to fulfill the following activities: -

| Particular | Details |
|---|---|
| Submission of PBG within 120 days of signing of CA. | Submission of PBG requires engagement with various Banks, lenders and financial institutions. This also requires a dedicated finance team to work with various financial institutions. |
| Procure all the applicable permits | All the necessary applicable permits need to be obtained which encompass all the functions of the Airport: -<br>Operational like CTO, Fire NOCs, Clearance of BoD<br>Financial – GST / PAN / TAN |

| Particular | Details |
|---|---|
| | Engineering & Maintenance – Travelators, Weights & Measures, Single Line,<br>HR Compliances – Shops & Establishment / ESI / PSF / CLRA<br>Security – Clearance of Aviation Security Program<br>In order to process and obtain the necessary applicable permits adequate manpower had to be onboarded well before the COD so that necessary applications are made timely, and approvals are obtained. |
| List of construction works to be undertaken in the first seven concession years | In order to provide a list of construction works, Master planning needed to be undertaken which required engagement of master planner, designer, architects, town planners etc.<br>Further under **clause 5.12 of the CA Obligations** relating to aesthetic quality of the Airport it is stated that "The Concessionaire shall engage professional architects and town planners of repute for ensuring that the design of the Airport meets the aforesaid aesthetic standards" |
| Execution of the escrow agreement as per Schedule M | This requires engagement with banks, lenders, financial institutions to perform the necessary documentation. |

**Clause 6.4.5 Works in Progress: -** Concessionaire is obligated to pay CWIP amounts to AAI. "*The Parties shall constitute a committee comprising representatives of the Concessionaire, Authority and each of the counterparties under such contracts, which committee shall be responsible for: (a) facilitating any discussions and/ or interactions amongst AAI, the Concessionaire and the counterparties under such contracts, including in respect of any modifications to the works, and (b) coordinating, facilitating, and monitoring the progress of such works-in-progress.*"
**In order to assess the works in progress both physical and financial, necessary teams were engaged from master planning, designing, asset health check, vendor management and financial experts.**

**Clause 10.2 Lease, Access, and Right of Way: -** Concessionaire is allowed to take necessary surveys, investigations etc. of the property prior to COD to assess various risks associated with the site.
**This activity required the engagement of various experts and agencies.**

**Clause 10.3 Procurement of the Site: -** Both AAI and Concessionaire need to undertake joint inspection of site, inventory of buildings, structures, roads works etc.
**This required dedicated finance, operations and engineering & maintenance teams in place to do the joint inspection and asset health check.**

**Clause 15.1 / 26.1 Commercial Operation Date / Financial Close: -** In order to achieve COD, financial close is a mandatory requirement.

**To make financial projections necessary studies were required to be undertaken like traffic study, revenue potential study, capex planning based on master planning, estimation of capex, operating cost estimation, engagement of financial consultant, financial modelling etc. This required the engagement of consultants and also an in-house corporate finance team.**

**Clause 18.17 Maintenance Programme** :- On or before COD, Concessionaire needs to submit detailed Maintenance Programme which shall include: (a) preventive maintenance schedule; (b) arrangements and procedures for carrying out urgent repairs; (c) criteria to be adopted for deciding maintenance needs; (d) intervals and procedures for carrying out inspection of all elements of the Airport; (e) intervals at which the Concessionaire shall carry out periodic maintenance; (f) arrangements and procedures for carrying out safety related measures; and (g) intervals for major maintenance works and the scope thereof.
**In order to prepare the Maintenance Programme a dedicated Engineer's team involvement was required. Further this required investigation and detailed health study of the existing assets. The detailed study was conducted by engagement of both in-house team and expert consultants.**

**Clause 28.1 Collection of Fees by the Concessionaire: -** On and from COD and till the Transfer Date, the Concessionaire has the sole and exclusive right to demand, collect and appropriate Fees from the Users for the provision of the Aeronautical Services and Non-Aeronautical Services, including the airlines and passengers, in accordance with the provisions of the Regulatory Framework.
**In order to collect the fees from COD onwards, the necessary IT infrastructure was required to be set up which included SAP, AODB, AOCC, Billing Systems, and Passenger Data Collection System. In addition, it required Engagement of Finance team, assessment of existing IT Infrastructure, engagement of IT experts and experts who understood the regulatory framework.**

**Clause 28.8 Display of Aeronautical Charges: -** Website was required to be ready and necessary aeronautical charges needed to be provided on the website. This required the creation of websites, domains, engaging IT experts, domain experts, experts from regulatory framework etc.

**Clause 30.3 Insurances: -** No later than 30 (thirty) days prior to commencement of the Concession Period, the Concessionaire shall by notice furnish to the Authority, in reasonable detail, information in respect of the insurances that it proposes to take.
This required engagement of insurance agents, risk measurement, assessment of asset value, risk mitigation plan etc.

**Various other requirements under the CA which entailed onboarding of personnel/consultants: -**

- Operational SOPs
- Clause 23 - Readiness of Performance Measurement Plan
- Schedule H - to obtain ACI Membership
- Schedule 1 - Submission of Aerodrome Emergency Plan prior to COD

- 18.15.4 Establishing Airport Safety Management Unit (ASMU)
- Formation of various committees - JCC for CNS ATM, MoU, Capex, Right of Way
- Aeronautical Information Services
- Apron Management Unit

1.2.2.3. Further, we had provided the details of various professional consultancies and expenses incurred as part of Pre-COD expenses as below:

| Particulars | Amt (Rs. Cr) | Remarks and Comments |
|---|---|---|
| **Category 1: Expenses till letter of award (1st Sep'20)** | **1.72** | |
| Project cost for setup for Airport Business (Expenses upto Aug'20) – Allocation by parent companies | 1.72 | |
| | | |
| **Category 2: Expenses from letter of award to COD** | **7.30** | |
| Project cost for setup for Airport Business (Munich Airport Service) - Allocation by parent companies | 1.87 | This was consultancy provided for organization set up, master plan review, Staff Capacity Building & Training Need Analysis, Transition Management. |
| Project cost for setup for Airport Business - Allocation by parent companies | 0.93 | Allocation by parent companies for providing group resources. The similar cost was approved in Ahmedabad, Lucknow and Mangaluru Airport |
| Pre-COD Payroll Cost (salary cost incurred by TKIAL) | 0.50 | Allowed by the Authority |
| Woori Bank – BG Commission & Facility Charges | 0.90 | These are charges paid to Bank for arranging Performance Bank Guarantee which is to be provided to AAI at least 2 months before the COD as required under CA |
| Consultancy for Master Planning – M/s AECOM | 0.38 | The master plan was required to be made as mandated under the CA. |
| IT Assessment & Transition – M/s Wipro | 0.32 | The consultant was engaged to assess the AAI existing IT infrastructure and what are the gaps. |
| Consultancy for Traffic Study – M/s Mott Macdonald | 0.25 | The report was used to make master plan which is mandatory requirement under CA |
| IT Assets – Licenses – Comparex India & Ashtech | 0.24 | Cost incurred on various IT software, services etc. used by employees deputed to achieve the COD. |
| Cargo Terminal Design Brief – Realog | 0.09 | The study conducted to understand the most optimum cargo design for the airport. |
| Franking Charges, ROC Filing and Others | 0.08 | Various charges paid on execution of concession agreement, financing documents etc. |

| Particulars | Amt (Rs. Cr) | Remarks and Comments |
|---|---|---|
| Consultancy for verification of CWIP from AAI – M/s Ernst & Young | 0.08 | The report is used to verify the CWIP works transferred by AAI to TKIAL as mandated under clause 4.6.5 of the CA. |
| Consultancy by CAPA | 1.09 | |
| MERCER Rewards and workplace policies re-alignment | 0.05 | The report was used to analyse AAI HR policies which was to be used to integrate with Adani group of policy for seamless transition of manpower from AAI to PPP. |
| IT Assets – MPLS link & connectivity | 0.05 | Cost incurred on various IT software, services etc. used by employees deputed to achieve the COD. |
| Misc. Exp (including Beautification of terminals, one-time expenses for handover, Printing-Stationery etc.) | 0.47 | Miscellaneous Expenses incurred as a run-up to achieve COD. |
| **Total** | **9.02** | |

As can be seen in the above table, payment for professional consultancy during Pre-COD period included payment for various services including Master Plan review, IT assessment, Traffic Study, Design brief, Verification of CWIP from AAI, Rewards and workplace policies from HR perspective, to name a few. All these services were essential to achieve the successful transition of the airport from AAI to AO. Further, the pre-COD expenses also included the bank charges and commission paid to Woori Bank for Issuance of Performance Bank Guarantee as required under CA.

1.2.2.4. **From the foregoing submissions, the Authority would appreciate that without having proper manpower and professional support, it would not have been possible to achieve transition of airport from AAI to AO as mandated under the CA. These activities were required to be performed prior to COD. Hence, the expenditure incurred by the AO to achieve successful COD are essential, genuine, and legitimate. Hence, allowing salary expenses for a part period only ignoring the other legitimate expenses on professional fees etc. is not logical.**

1.2.3. **In view of the above, we request the Authority to at least take into account the actual expenditure incurred post issue of LOA by AAI till COD i.e. Rs. 7.30 crores against Rs. 9.02 crores claimed.**

## 1.3 AERA proposal as per 5.7.13 and 5.7.16 page 86 onwards of CP relating to Rationalization of O&M Expenses

*5.7.13*
*Corporate Support Service (CSS) Expenses: The Corporate Support Service expenses have been considered by TKIAL as 100% Aeronautical. However, the Authority notes that the major component of these costs consists of Salaries and administrative costs that are recovered by AEL & AAHL through appropriate allocation methods. It is noted that the in-house legal team cost of Rs. 0.04 crore is included in the Corporate Cost allocation for Post COD Period. However, the employee expenses towards the in-house legal team of TKIAL have already been allowed under employee expense and therefore, providing additional expenses towards the legal department at the corporate level would result in redundancy. The Authority, therefore, proposes to exclude the in-house legal team cost and to reallocate the resulting CSS expenses in the ratio of TKIAL Employee Headcount ratio [91.67%:8.33%] as determined by the Authority.*

*5.7.16*
*The impact on the Aeronautical O&M expenses of TKIAL on account of the proposed recategorization, reallocation and other adjustments of expenses is as follows:*

*Various references that O&M Expenses have been allocated into various allocation ratios (EHCR, Gross Block Ratio, Terminal Building Ratio) which has an overall impact of reduction of Rs. 1.93 Cr in O&M Expenses as indicated in Table 71.*

**Comments by TKIAL**: -

1.3.1 Regarding the Authority's proposal to exclude cost of legal employees from Corporate Support Services cost, as Authority has allowed corporate cost allocation for other departments like Operations, Finance, etc. it is logical that corporate cost allocation for legal department should also be allowed.

AERA has mentioned in the CP, example of distinct roles and responsibilities of other functions like Finance, IT etc. at Airport Company and at Corporate Level. Likewise Legal department also has different roles and responsibilities at Airport company and Corporate Level

**Roles and Responsibilities at Corporate Level**

- Providing business and legal perspective and advice on a wide range of strategic, tactical, and operational issues to all Airports teams
- Determination of legal interests and options and counsel to top leadership on legal matters
- Coordinating and giving directions with external counsels
- Participating in the formulation of general management policy as a member of the executive management team
- Developing and leading internal audit and corporate compliance programs

**Roles and Responsibilities at Airport Level**

- Transaction support, including in relation to contracting and compliance.
- Drafting and vetting of RFP/RFQs,

- Applicability and compliances of local laws applicable to the Airport and maintaining proper corporate interactions with the relevant local, state and federal governmental bodies, legislatures.

1.3.1.1 We would like to take reference from Consultation Paper No. 15/2020-21 for Delhi Airport where Corporate Cost Allocation without any deduction of legal corporate cost is allowed by AERA in tariff order. It is to be noted that DIAL has Legal team employed at Airport Company also and there is no redundancy between the Corporate legal team and Airport Legal team. The extract from DIAL Consultation Paper No. 15/2020-21 is provided as follows:

**DIAL Corporate Level Structure**

**13.6.1 GMR AIRPORTS LIMITED**

*Table 80Cost Objected allocated from GAL to DIAL*

| S.NO | DEPARTMENT COST CHARGED | COST TYPE | BASIS OF APPORTIONMENT |
|---|---|---|---|
| 1 | GCM Office | Fully Chargeable | Weighted Average Ratio of Assets* |
| 2 | BCM Office | Fully Chargeable | Weighted Average Ratio of Assets |
| 3 | CEO Office | Fully Chargeable | Weighted Average Ratio of Assets |
| 4 | Stakeholder Management | Fully Chargeable | Weighted Average Ratio of Assets |

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AERA RFP 02/2018-19
Study on Efficient Operation and Maintenance Costs

| S.NO | DEPARTMENT COST CHARGED | COST TYPE | BASIS OF APPORTIONMENT |
|---|---|---|---|
| 5 | Commercial and BD | Semi- Chargeable* | Weighted Average Ratio of Assets |
| 6 | Legal | Fully Chargeable | Weighted Average Ratio of Assets |
| 7 | Sector HR | Semi- Chargeable* | Weighted Average Ratio of Assets |
| 8 | Sector IT | Semi- Chargeable* | Weighted Average Ratio of Assets |
| 9 | Strategic Planning Group | Fully Chargeable | Weighted Average Ratio of Assets |
| 10 | Finance and Accounts | Semi- Chargeable* | Weighted Average Ratio of Assets |
| 11 | Regulatory | Fully Chargeable | Weighted Average Ratio of Assets |

**DIAL Airport Company Structure**

*Table 42 Manpower Count for DIAL during Second Control Period*

| S. No | Department | Functions | FY15 | FY16 | FY17 | FY18 |
|---|---|---|---|---|---|---|
| 1 | Operations (DIAL) | Airport Operations | 465 | 437 | 471 | 570 |
| 2 | BCM/CEO Office | Senior Management | 12 | 12 | 32 | 60 |
| 3 | Commercial (Aeronautical & Non-Aeronautical) | Support Functions | 88 | 82 | 81 | 89 |
| 4 | Corporate Communication | Support Functions | 12 | 11 | 10 | 14 |
| 5 | Corporate Relations | Support Functions | 24 | 21 | 20 | 21 |
| 6 | SPG/Business Integration & Planning | Support Functions | 20 | 20 | 20 | 20 |
| 7 | Ethics &Intelligence & GMRVF | Support Functions | 26 | 27 | 33 | 37 |
| 8 | Finance & Accounts | Support Functions | 62 | 69 | 73 | 107 |
| 9 | Human Resources & FMS | Support Functions | 34 | 35 | 31 | 73 |
| 10 | Guest Relations | Support Functions | 25 | 24 | 23 | 21 |
| 11 | IT | Support Functions | 19 | 12 | 7 | 6 |
| 12 | Legal | Support Functions | 15 | 13 | 13 | 21 |
| 13 | MAG | Support Functions | 6 | 5 | 7 | 16 |
| 14 | Project & Engineering | Airport Operations | 27 | 23 | 21 | 18 |
| 16 | Quality, Service & Delivery | Airport Operations | 15 | 14 | 11 | 13 |
| 17 | Baggage Screeners | Airport Operations | 438 | 422 | 316 | 319 |
| 18 | Security | Airport Operations | 85 | 87 | 91 | 106 |
| 19 | Trolley retriever | Airport Operations | 215 | 204 | 220 | 226 |
| **Total Manpower (Excluding CPD)** | | | **1,588** | **1,518** | **1,480** | **1,737** |

1.3.1.2 It is relevant to note that these services are not being provided by a third party and are the employees of TKIAL`s parent company.

1.3.1.3 **Based on the above facts, we request the Authority to allow the corporate cost allocation, the amount which has been actually incurred and paid, during the period from COD till 31st March 2022 without any downward adjustment for legal department cost.**

1.3.2 **With respect to allocation of O&M Expenses**

1.3.2.1 Under the Shared-Till (or Hybrid Till) model as proposed in National Civil Aviation Policy, 2016, 30% of Non-Aeronautical Revenues are accounted for cross subsidizing the ARR. There is no mention of allocation of RAB, allocation of Operation and Maintenance etc. Therefore, there is no need to apply the allocation ratio whereby capital and operating expenditure is reduced, which acts as a dual burden for the Airport Operator. Also, the AERA Guidelines do not provide for applying the allocation ratio.

Relevant extract of National Civil Aviation Policy, 2016 is reproduced below:
"To ensure uniformity and level playing field across various operators, future tariffs at all airports will be calculated on a 'hybrid till' basis, unless otherwise specified for any project being bid out in future. 30% of non-aeronautical revenue will be used to cross-subsidize aeronautical charges."

For ease of reference, the relevant clause regarding the 'Shared Till' approach from the Concession Agreement is reproduced hereunder:

28.3.2. The GOI has, through the National Civil Aviation Policy dated June 15, 2016, approved, ("Shared-Till Approval") the 30% (thirty percent) shared-till framework for the determination and regulation of the Aeronautical Charges for all airports in India, and the same shall be accordingly considered by the Regulator for the purposes of the determination of the Fees/Aeronautical Charges pursuant to the provisions of this Agreement. It is clarified that, for the purposes of this Agreement, the Shared-Till Approval shall apply as on the date of this Agreement notwithstanding any subsequent revision or amendment of such Shared-Till Approval."

1.3.2.2 Further as per AERA Order No. 14/2016-17 issued on 23rd January 2017, the Authority has adopted the Hybrid Till whereas 30% of non-aeronautical revenues are used to cross-subsidize aeronautical charges. The order only provides for cross subsidization of 30% from non-aeronautical revenues. The relevant extract of the order is as : -

*The Authority, in exercise of powers conferred by Section 13(1)(a) of the Airports Economic Regulatory Authority of India Act, 2008 and after careful consideration of the comments of the stakeholders on the subject issue, decides and orders that:*

(i) *The Authority will in future determine the tariffs of major airports under "Hybrid-Till" **wherein** 30% of non-aeronautical revenues will be used to cross-subsidise aeronautical charges. Accordingly, to that extant the airport operator guidelines of the Authority shall be amended. The provisions of the Guidelines issued by the Authority, other than regulatory till, shall remain the same.*
***(emphasized)***

1.3.2.3 **The Authority, however, in addition to the cross subsidy of 30% of Non-AERO revenue, has reduced the RAB and O&M expenses by allocating the same to AERO & Non-AERO which is neither provided in the NCAP nor provided in the AERA guidelines.**

1.3.2.4 **Therefore, we request AERA to kindly revise all the calculations provided in the consultation paper without allocating building blocks into Aeronautical and Non-Aeronautical, which are not required either in AERA Guidelines or in NCAP.**

## 1.4 AERA proposal as per 5.7.14 page 89 of CP relating to Working Capital Interest

*Further, the Authority observed that TKIAL has considered interest on working capital and finance charges as a separate line item at the time of true up of ARR. The Authority notes that TKIAL has calculated working capital interest based on the actual revenue and payment of expenses. According to their calculations, the need for working capital interest amounting to Rs. 1.59 crores arose during the post-COD period.*

*The Authority observes that the expenses related to the post-COD period have been actualized, and there is no evidence of working capital interest being incurred in the books of TRV. As a result, including the working capital interest in the true-up calculation appears unreasonable. Therefore, the Authority proposes to exclude the working capital interest from the true-up process.*

**Comments by TKIAL**: -

1.4.1 TKIAL has tied up with AAHL for arranging funds through Inter Corporate Deposits for short term as well as long term requirements. The Inter Corporate Deposit are used for various purposes including but not limited to regular working capital requirement.

In respect to the Authority's comment that there is no evidence of working capital interest being incurred, we would like to submit that –

- The interest cost incurred is included in the Interest Expense on Inter Corporate Deposit (refer schedule 27 of the financial statement).
- As per the Inter Corporate Deposit agreement, **the loan amount from AAHL shall be utilized solely for purposes of activities in relation to the Airport**. The overall Inter Corporate Deposit amount received is fungible, and it is not possible to separately bifurcate the amount for respective usage. Hence, on a best estimation basis a calculation of interest is done in the financial model shared along with MYTP.

1.4.2 **The methodology and calculation of interest on working capital can vary based on opinions from different experts, however there is no denial of the fact that TKIAL has utilized the funds for various purposes in relation to Airport including but not limited to working capital requirement. Therefore, we request the Authority to kindly allow interest on working capital as TKIAL has actually incurred costs.**

## 1.5 AERA proposal as per 5.8 page 91 onwards of CP relating to True up Of Non-Aeronautical Revenue

*The Authority, on verification of the NAR submitted with the Book of Accounts entries of TKIAL, notes that Rs. 0.19 crores relate to Notional Income on Security Deposit which is an IND AS adjustment entry and Rs. 1.22 crores relate to revenue earned from agencies involved in aeronautical activities as given below.*
*Table 74 indicating space rental incomes from various airlines, Cargo, Ground Handling and Fuel Service Providers. Of this, Rs. 0.39 Cr relates to space rental income from airlines.*
*The Authority has reduced the Non-Aero revenue and considered the same in Aero Revenue.*

**Comments by TKIAL**: -

1.5.1 In respect to the consideration of space rental income from airlines, we would like to submit that The AERA Act, 2008 and the AERA Guidelines ***do not categorize airline space rental as aeronautical revenue.*** As per AERA Act (a) "aeronautical service" means any service provided—
*(i) for navigation, surveillance and supportive communication thereto for air traffic management;*
*(ii) for the landing, housing or parking of an aircraft or any other ground facility offered in connection with aircraft operations at an airport;*
*(iii) for ground safety services at an airport;*
*(iv) for ground handling services relating to aircraft, passengers and cargo at an airport;*
*(v) for the cargo facility at an airport;*
*(vi) for supplying fuel to the aircraft at an airport; and*
*(vii) for a stake-holder at an airport, for which the charges, in the opinion of the Central Government for the reasons to be recorded in writing, may be determined by the Authority;*

1.5.2 We would also like to draw reference to the definition of Revenues from Non-Aeronautical sources read with Clause 4.23 of the International Civil Aviation Organization ("ICAO") Doc 9562 as below:

*"Revenues from non-aeronautical sources: Any revenues received by an airport in consideration for the various commercial arrangements it makes in relation to the granting of concessions, the rental or leasing of premises and land, and freezone operations, even though such arrangements may in fact apply to activities that may themselves be considered to be of an aeronautical character (for example, concessions granted to oil companies to supply aviation fuel and lubricants and the rental of terminal building space or premises to aircraft operators). Also intended to be included are the gross revenues, less any sales tax or other taxes, earned by shops or services operated by the airport itself."*

*4.23 Rentals. Rentals payable by commercial enterprises and other entities for the use of airport-owned building space, land or equipment. Such rentals should include those payable by aircraft operators for airport-owned premises and facilities (e.g. check-in counters, sales counters and administrative offices) other than those already covered under "air traffic operations"*

1.5.3 **In view of the above, it is clear that the space rental income is not an Aeronautical Service as per AERA Act, and also it is specified as Non-Aeronautical Service as per ICAO. Hence, we request the Authority to kindly consider revenues from space rentals as Non-Aeronautical.**

# 2 Chapter 2 “Comments on Consultation Paper Chapter 6 – Traffic Projections for the Third Control Period”

## 2.1 AERA proposal as per 6.2.5 to 6.2.9 page 99 onwards of CP relating to Exempted Traffic

*6.2.5 The Authority notes that the TKIAL has considered only billable ATM, after excluding ATM traffic that is exempted from landing charges. However, the Authority is of the view that RCS scheme is promoted by the GoI with the objective of making regional air connectivity affordable by supporting airline operators through concessions offered by the Central Government, State Government and the Airport Operators. As this scheme is promoted to encourage small aircraft, the flights operating under this scheme are not eligible to be claimed as exemption. The Authority noted that out of the total exempted traffic submitted by TKIAL for FY 2022-23 (12.2% of the total domestic ATMs), 1.0% constitutes flights operating under the RCS Scheme and the balance pertains to non-RCS flights. Hence, the Authority had considered the billable ATM traffic after excluding the ATMs that pertain to less than 80-seater capacity non-RCS flights that are exempted from landing charges.*

*6.2.6 The Authority also notes that TKIAL has, vide its reply to queries dated 6th November 2023, informed that the RCS flights operated by InterGlobe Aviation Limited (Indigo) has ceased from 30th May 2022 and that there are no flights operating under RCS Scheme beyond this date from TRV.*

*6.2.7 he Authority, after rationalization, has derived the exempted traffic as approximately 11% for FY 2022-23 and has considered the same for determining the billable domestic ATM for FY 2022-23. For FY 2023-24, the Authority proposes to consider the same exempt traffic as determined for FY 2022-23 while for the remaining tariff years, the Authority proposes to consider the exempt traffic submitted by TKIAL.*

*6.2.8 Similarly, Government of India has allowed exemption of UDF to certain categories of passengers through Order No. AIC 14/2019 read with AIC 20/2019. TKIAL cannot claim any pass-through regarding UDF on such categories and this is followed by AERA across all the Major Airports.*

*6.2.9 Based on the above factors, the exempt traffic considered by the Authority for determining billable domestic ATM (after excluding ATMs that pertain to less than 80-seater capacity flights which fall under non-RCS category) and billable passenger traffic for the Third Control Period for TRV is as follows:*

*Table 86: Exempt traffic considered by the Authority for determining billable traffic at TRV airport for the Third Control Period*

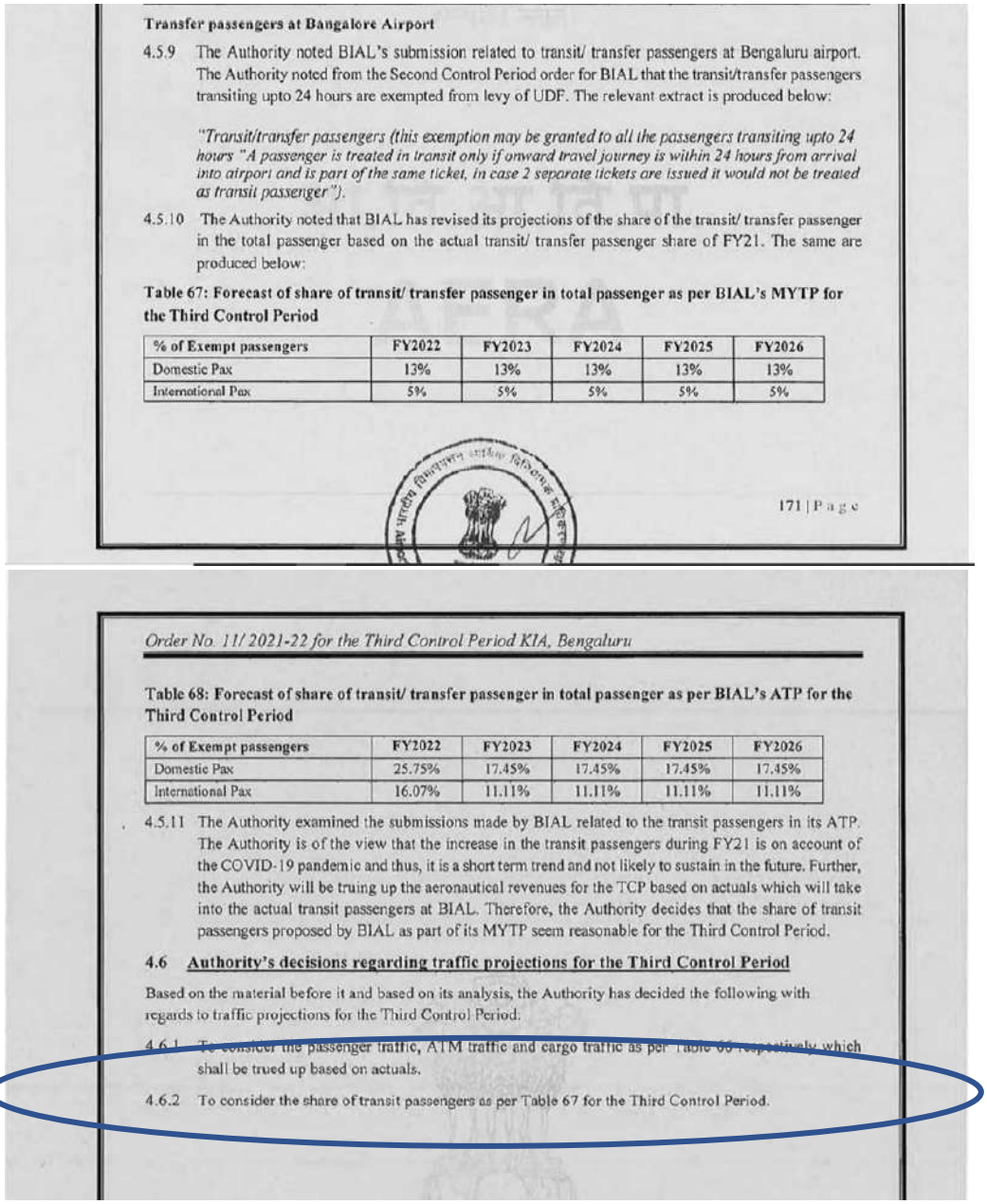
| Particulars | FY 23 | FY 24 | FY 25 | FY 26 | FY 27 |
|---|---|---|---|---|---|
| Exempt Domestic ATM proposed by Authority as a % of total Domestic ATM | 11.26% | 11.00% | 10.00% | 9.00% | 8.00% |

** Actual data has been considered for FY 2022-23*

**Comments by TKIAL: -**

2.1.1 With respect to RCS flights, we would like to submit that there are no RCS flights currently operating from TRV. In case any RCS flights gets scheduled at TRV in TCP, we humbly request the Authority to consider those flights as exempt as these flights will not be charged any landing charges by TKIAL as per notification from Government of India.

2.1.2 In respect to exempted passengers, we would like to draw the attention of Authority on the Tariff order for Bangalore Airport for Third Control Period order no. 11/2021-22 dated para 4.5.9 onwards.



**Transfer passengers at Bangalore Airport**

4.5.9 The Authority noted BIAL's submission related to transit/ transfer passengers at Bengaluru airport. The Authority noted from the Second Control Period order for BIAL that the transit/transfer passengers transiting upto 24 hours are exempted from levy of UDF. The relevant extract is produced below:

*"Transit/transfer passengers (this exemption may be granted to all the passengers transiting upto 24 hours "A passenger is treated in transit only if onward travel journey is within 24 hours from arrival into airport and is part of the same ticket, in case 2 separate tickets are issued it would not be treated as transit passenger").*

4.5.10 The Authority noted that BIAL has revised its projections of the share of the transit/ transfer passenger in the total passenger based on the actual transit/ transfer passenger share of FY21. The same are produced below:

**Table 67: Forecast of share of transit/ transfer passenger in total passenger as per BIAL's MYTP for the Third Control Period**

| % of Exempt passengers | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 |
|---|---|---|---|---|---|
| Domestic Pax | 13% | 13% | 13% | 13% | 13% |
| International Pax | 5% | 5% | 5% | 5% | 5% |

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*Order No. 11/ 2021-22 for the Third Control Period KIA, Bengaluru*

**Table 68: Forecast of share of transit/ transfer passenger in total passenger as per BIAL's ATP for the Third Control Period**

| % of Exempt passengers | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 |
|---|---|---|---|---|---|
| Domestic Pax | 25.75% | 17.45% | 17.45% | 17.45% | 17.45% |
| International Pax | 16.07% | 11.11% | 11.11% | 11.11% | 11.11% |

4.5.11 The Authority examined the submissions made by BIAL related to the transit passengers in its ATP. The Authority is of the view that the increase in the transit passengers during FY21 is on account of the COVID-19 pandemic and thus, it is a short term trend and not likely to sustain in the future. Further, the Authority will be truing up the aeronautical revenues for the TCP based on actuals which will take into the actual transit passengers at BIAL. Therefore, the Authority decides that the share of transit passengers proposed by BIAL as part of its MYTP seem reasonable for the Third Control Period.

**4.6 Authority's decisions regarding traffic projections for the Third Control Period**

Based on the material before it and based on its analysis, the Authority has decided the following with regards to traffic projections for the Third Control Period:

4.6.1 To consider the passenger traffic, ATM traffic and cargo traffic as per Table 66 respectively which shall be trued up based on actuals.

4.6.2 To consider the share of transit passengers as per Table 67 for the Third Control Period.

2.1.3 In the Bangalore Tariff order, AERA has accepted the contention that transit passengers are exempted from UDF, and the percentage share of transit passenger assumed by Bangalore seems reasonable.

2.1.4 In AERA Order No. 46/2015-16, in respect of Metro Development Fees approval determination of Metro Connectivity Project for Mumbai Airport, AERA has suitably adjusted the billable passengers after deducting the exempted Passengers. The relevant extract from Order is provided as follows: -

*Decision 5.b - To estimate the future billable passengers for both domestic and international passengers, as considered in Table 5.*

Table 5: Estimated Billable Embarking Passengers for FY 2015-16 to FY 2023-24

| Particulars (in millions) | FY 2015-16 | FY 2016-17 | FY 2017-18 | FY 2018-19 | FY 2019-20 | FY 2020-21 | FY 2021-22 | FY 2022-23 | FY 2023-24 |
|---|---|---|---|---|---|---|---|---|---|
| Total domestic passengers (A) | 27.15 | 29.25 | 31.51 | 33.95 | 36.57 | 36.57 | 36.57 | 36.57 | 36.57 |
| Total international passengers (B) | 12.20 | 13.03 | 13.91 | 14.86 | 15.86 | 15.86 | 15.86 | 15.86 | 15.86 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Embarking Domestic Passengers (C) = (50% of A) | 13.58 | 14.63 | 15.76 | 16.98 | 18.29 | 18.29 | 18.29 | 18.29 | 18.29 |
| Embarking International Passengers (D) = (50% of B) | 6.10 | 6.52 | 6.96 | 7.43 | 7.93 | 7.93 | 7.93 | 7.93 | 7.93 |
| Billable domestic passengers (E) = (80% of C) | 10.86 | 11.70 | 12.60 | 13.58 | 14.63 | 14.63 | 14.63 | 14.63 | 14.63 |
| Billable international passengers (F) = (80% of D) | 4.88 | 5.21 | 5.57 | 5.94 | 6.35 | 6.35 | 6.35 | 6.35 | 6.35 |

2.1.5 As can be seen from above, the Authority has been consistently recognizing the exempted traffic and its impact in collection.

2.1.6 It is to be noted that AO has made adjustment in ATMs and Passengers to calculate only the billable traffic. The adjustment is necessitated to project the correct Aeronautical revenues.

2.1.7 **We, therefore, request Authority to consider deduction of exempted Passenger traffic of 3%, as per latest trends, while determining billable traffic for projection of aeronautical revenues. Accordingly, TKIAL has prepared its ATP after considering only billable traffic. If we do not reduce the traffic which is not billable, the same will result in a known under-recovery since inception as projected ARR will not match with correct projected revenue.**

# 3 Chapter 3 “Comments on Consultation Paper Chapter 7 – Capital Expenditure (Capex), Depreciation and Regulatory Asset Base (RAB) For the Third Control Period”

## 3.1 AERA proposal as per clause 7.1.11 on page 108 of CP relating to TKIAL's domain expertise

*The Authority, through its Independent consultant, which interacted with the Technical team of TKIAL on the aspects of airport planning, traffic estimation, designing and its short, mid and long term impact on Airport Economics as provided in the Concession Agreement, observed that prima facie, it appears that TKIAL does not have the domain specific expertise to carry out detailed evaluation of the infrastructure requirements based on which the Capital Expenditure Projects may be assessed and planned at the airport, in the overall interest of all the stakeholders of the airport. The Airport Operator needs to work on the aspect of capacity in this regard as has been highlighted in earlier tariff orders.*

**Comments by TKIAL**: -

**Preparation before submission of MYTP**

3.1.1 In this context, we would like to state that the Concession Agreements (CA), signed with Airport Authority of India (AAI) for Thiruvananthapuram Airport in 2021 is the base documents on which planning, and operations of the respective airports is carried out.

The CA and its schedules mandate the following obligations on the Concessionaire / Airport Operator (AO) which must be mandatorily undertaken while preparing the Master Plan and development of facilities at the Airports: -

a. Para 12.2.2 of CA, requires that the Master Plan for the Airport must be consistent with all the regulatory requirements, and it shall be made pursuant ***to full consultation with all major stakeholders***, in accordance with the terms of the Applicable Laws and this Agreement.

b. Para 12.5.1 of CA, states that the Concessionaire shall undertake construction at the Airport in conformity with Schedule A, Schedule B, the Specifications and Standards set forth in Schedule C, and the Master Plan.
The Master Plan is to be prepared using the ***AAI perspective Master Plan*** as provided in the Para 4 of Annex II of Schedule A.

c. Para 23.1.1 of CA, the AO is required to achieve or exceed the performance indicators specified in Article 23 of the CA and service quality requirements specified in Schedule H ("Key Performance Indicators"). As per Schedule A, the Concessionaire shall plan its development activities and Construction Works for any Phase such that there is ***no breach*** of Key Performance Indicators, IATA Level of Service – C (optimal standards), Safety Requirements and any other statutory and regulatory requirements under the Applicable Laws, which are required to be followed for the operations of the Airport.

d. Para 4.1.3 (h) of the CA, Airport Operator is required to undertake Construction Works within first 7 years of Concession Period (**Phase I**), having due regard to the works (a) currently being implemented by the Authority and (b) proposed to be implemented by the Authority as on the date of signing the Agreement ***(and as set forth in Schedule U).***

Annex II of Schedule A provides that the Concessionaire ***shall plan and develop Phase I*** of the Airport in the manner set out in the Agreement, as well as cater to annual passenger throughput capacity (domestic and international) and annual

cargo handling capacity, along with ancillary facilities ***as per its demand projections***.

"Phase I" means ***all the Construction Works proposed to be undertaken by the Concessionaire pursuant to Clause 4.1.3(h), as per the Master Plan,*** and shall, for the avoidance of doubt, include the works-in-progress handed over to the Concessionaire by the Authority pursuant to Clause 6.4.5;

Based on above AO has prepared the Master Plan and subsequently MYTP, adopting the following process: -

1. The traffic projections were prepared by an independent global expert (M/s Mott McDonalds) in 2021 which provides detailed analysis with different scenarios of traffic. The traffic projections are an outcome of various factors considered during forecast including Catchment Area Analysis, Airline Analysis, Historical Data Analysis, COVID 19 impact, Design Day Flight Schedule Development and it categorically includes likely impact due to competing airports.
2. Schedule U of the CA provides the list of projects which were planned by AAI before privatization in 2018 and some of those major projects were discussed / approved by AERA in its tariff order for previous control period. These have been duly considered in Phase I.
3. The Key Performance Indicators, ICAO requirements, DGCA / BCAS observations, applicable laws etc. were analyzed and deliberated in detail.
4. After detailed analysis of obligations mandated under the CA, AO with the support of global experts (Ms AECOM) prepared the phase wise Master Plan. The Master Plan was discussed with all the stakeholders like AAI, DGCA, BCAS, state government, local state bodies etc. for taking their inputs and then submitted to AAI.
5. AO critically assessed the projects planned for Phase I (first 7 years of CA) and accordingly prioritized the projects to be undertaken during the 5 years third control period (from 1st April 2022 to 31st March 2027).
6. A fresh AUCC was conducted to appraise the users and stakeholders about the vision of the Airports, phase wise Master Plan and the upcoming facilities (including the projects which were already approved or discussed in AERA`s previous control period orders).
7. AO prepared the MYTP and submitted it to AERA for consideration in February 2023.

As evident, AO has done a comprehensive exercise before submission of MYTP.

**Process after MYTP submission**

3.1.2 TKIAL has promptly responded to various technical queries/clarifications/information requests to the satisfaction of the consultants appointed by the Authority. As tabled below it has been a yearlong due diligence conducted by the consultant.

| Sr.# | Sequence of Events | Timelines |
|---|---|---|
| 1 | Submission of MYTP by TKIAL for TCP (along with true up for previous control period) | 21st February 2023 |
| 2 | Kick-off meeting between with the Authority, their consultant and TKIAL (convened by the Authority) | 2nd March 2023 |

| Sr.# | Sequence of Events | Timelines |
|---|---|---|
| 3 | First Query / Clarification / Information Request shared by the consultant | 4th April 2023 |
| 4 | Site visit by the consultant | 2nd December 2023 |
| 5 | Consultation Paper issued by the Authority | 12th February 2024 |

3.1.3 Further, Technical consultants were not engaged in this particular case, rather a financial consultant was provided with the responsibility to perform technical evaluation for various capital expenditure.

3.1.4 The financial consultant has taken support from various intermediary technical members/experts who had appeared in limited online discussions during this prolonged due diligence period. The interactions were fruitful, and all answers were provided. However, no intermediary technical member/expert has ever visited the site and understood the real situation.

3.1.5 It is interesting to note that the capacity enhancement plan proposed by TKIAL is not different than what AAI has proposed pre-privatization, and it was approved by AERA in the second control period. All the stakeholders would have to appreciate that there are various obligations cast upon the airport operator as part of concession agreement which requires certain standard parameters to be considered during planning and designing. Our practices (especially for infrastructure planning) are also aligned with various standards including IATA ADRM. Further, recently, there are various initiatives taken up by statutory agencies like BCAS to enhance customer experience which necessitates higher passenger processing systems and infrastructure with a provision to cater to ever growing passenger demand. In various submissions, we, as the airport operator, had provided required justifications for various infrastructure requirements.

3.1.6 Also, a reference can be made to Para 2.4.7 of the CP, where it is clearly mentioned that the financial consultant has only done the verification process and reconciliation of building blocks and nothing more than that. The Consultants had never had any doubt about the ability of the Technical Team of AO nor they have raised the issue with AO any time during the long due diligence period. Therefore, we believe that the prima facie opinion formed by the Authority basis the feedback of the Consultant is not based on facts and has arisen due to some miscommunication between the Consultant and the Authority. Thus, the said comments, we believe, are not warranted.

*Extract from Para 2.4.7*
*The Authority has appointed an independent consultant, M/s PKF Sridhar & Santhanam LLP, to assess the MYTP submitted by TKIAL for the Third Control period. M/s PKF Sridhar & Santhanam LLP has assisted the Authority in examining the true up submission of AAI for the Second Control Period and Pre-COD period, by comparing each regulatory building block with the Tariff Order for the Second Control period, reviewing true up submission of TKIAL for the Post COD period, performed independent studies on the allocation of assets between Aeronautical and Non-aeronautical activities and efficient O&M expenses of TRV for the Second Control Period and FY 2021-22, examined the MYTP of TKIAL by* ***verifying the data from various supporting documents submitted by TKIAL such as audited financials, Fixed Asset Register, Bill***

***of Quantities of capital addition projects including award of various work orders, examining the building blocks in tariff determination,*** *visiting the Airport in December 2023 and also ensuring that the treatment given to it is consistent with the Authority's methodology, approach etc.*

3.1.7 In view of the above, we request the Authority to kindly consider removing this comment while issuing the final order.

## 3.2 AERA proposal as per clause 7.3.41 and 7.3.63 of CP relating to Inflation-adjusted normative cost of terminal and apron works.

*7.3.41*
*The Authority has derived the inflation adjusted normative rates for Terminal Building for the current Control Period by considering the rate of inflation as follows:*

- *FY 2021-22 –The Authority observes that FY 2021-22 was an exceptional year due to COVID-19 pandemic, wherein the inflation rate was 12.97%. However, during the period FY 2016-17 to FY 2020-21, the rate of inflation was in the range of 1.31% to 4.26%. Considering this extraordinary situation, the Authority feels that the inflation rate of FY 2021- 22 needs to be rationalized. Hence, instead of considering the inflation rate of 12.97% for FY 2021-22 (as per press release dated 18th April 2022 by Dept. for Promotion of Industry and Internal Trade, Government of India), the Authority has considered the average rate of inflation of FY 2020-21 (1.29%) and of FY 2021-22 (12.97%), which works out to 7.14%. The Authority has considered this average rate of inflation for FY 2021-22, in order to smoothen out the volatility in commodity price caused by COVID-19 pandemic and the supply side disruptions.*

- *FY 2022-23 – 9.42% (considered as per the data published by the Office of the Economic Advisor, Department for Promotion of Industry and Internal Trade) and*

- *FY 2023-24 to FY 2026-27 – 0.30% in FY 2023-24 and 3.80% thereafter (considered as per 85th Round of Survey of Professional Forecasters on macroeconomic indicators).*

- *In the Order No.07/2016-17 dated 13th June 2016 on "In the matter of Normative Approach to Building blocks in Economic Regulation of Major Airports – Capital costs Regarding" the ceiling cost mentioned is inclusive of taxes applicable at that time, which is 12%. Subsequently, GST has been introduced wherein the GST rate is 18%. Hence, the inflation adjusted normative cost is worked out below by considering the additional 6% resulting in a total GST rate of 18%.*

*The inflation adjusted normative costs, thus derived is presented in the below table:*

*Table 102: Details of Inflation-adjusted Normative rates derived by the Authority*

| Year | Inflation (%) | Inflation adjusted normative rates (Rs.) | Inflation adjusted normative cost @18% GST* |
|---|---|---|---|
| Base Amount | | 1,00,000 | 1,05,357 |
| FY22 | 7.14% | 1,07,140 | 1,12,880 |
| FY23 | 9.42% | 1,17,233 | 1,23,513 |
| FY24 | 0.30% | 1,17,584 | 1,23,883 |
| FY25 | 3.80% | 1,22,052 | 1,28,591 |
| FY26 | 3.80% | 1,26,690 | 1,33,477 |
| FY27 | 3.80% | 1,31,505 | 1,38,550 |

**Note:*
*Inflation adjusted base amount (inclusive of 12% GST) (A) = Rs. 1,00,000 per sqm*
*Inflation adjusted base amount (exclusive of 12% GST) (B=A*100/112) = Rs. 89,286 per sqm*
*Add GST @ 18% (refer para 7.3.41i) c) (C=B*18%) = Rs. 16,071 per sqm*
*Normative cost including GST (D = B+C) = Rs. 1,05,357 per sqm*

*d. The Authority accordingly proposes to consider a cost of Rs. 1,33,477 per sqm as the normative cost for the expansion proposed instead of Rs. 1.51 lakhs per sqm considered by TKIAL. To this, an additional 5% towards allowance for extra cost over applicable rates*

*for working in operational area as detailed in para 7.3.39 is proposed to be added making the total cost estimate to be Rs. 1,40,151, rounded to Rs. 1.40 lakhs per sqm. Accordingly, the total cost of the said expansion works out to Rs. 182.00 crores (Rs. 1.40 lakhs per sqm * 13,000 sqm).*

*7.3.63*
*TKIAL submitted a cost estimate of Rs. 13,650 per sqm (including loading for demolition, additional cost for work in operational areas etc.) for expansion of apron. The Apron area considered for evaluation by TKIAL is 59,887 sqm. The Authority has, after detailed analysis, issued its Order on Normative cost vide Order No. 07/2016-17 on 13th June 2016 where in the normative cost was given as Rs. 4,700 per sqm. The Authority notes that the cost mentioned is inclusive of taxes applicable at that time, which is 12%. Subsequently, GST has been introduced wherein the GST rate is 18%. Therefore, the Authority has rationalized the normative cost submitted by TKIAL and computed the inflation adjusted normative cost by considering an additional 6% thereby resulting in total GST of 18% as given below:*
*Table 110: Inflation-adjusted normative rate considered for Apron*

| Financial Year | WPI Index* | Inflation %** | Inflation adjusted Cost | Inflation adjusted normative cost @18% GST |
|---|---|---|---|---|
| FY16 | 109.70 | | 4,700*** | 4,952 |
| FY17 | 111.60 | | 4,781 | 5,038 |
| FY18 | 114.90 | | 4,923 | 5,187 |
| FY19 | 119.80 | | 5,133 | 5,408 |
| FY20 | 121.80 | | 5,218 | 5,498 |
| FY21 | 123.40 | | 5,287 | 5,570 |
| FY22 | | 7.14%# | 5,664 | 5,968 |
| FY23 | | 9.42% | 6,198 | 6,530 |
| FY24 | | 0.30% | 6,217 | 6,550 |
| FY25 | | 3.80% | 6,453 | 6,799 |
| FY26 | | 3.80% | 6,698 | 7,057 |
| FY27 | | 3.80% | 6,953 | 7,325 |

** Source: Office of The Economic Adviser, Government of India (htttps://eaindustry.nic.in)*
*** Source: Reserve Bank of India Publications (https://www.rbi.org.in/Scripts/Publications.aspx/publication=BiMonthly)*
**** Base amount as per Order No.7/2016-17 dated 13th June 2016 which is inclusive of prevalent tax of 12%*
*Note:*
*Inflation adjusted base amount (inclusive of 12% GST) (A) = Rs. 4,700 per sqm*
*Inflation adjusted base amount (exclusive of 12% GST) (B=A*100/112) = Rs. 4,196 per sqm*
*Add GST @ 18% (refer para 7.3.41i) i)c) (C=B*18%) = Rs. 755 per sqm*
*Normative cost including GST (D = B+C) = Rs. 4,952 per sqm*
*# Instead of considering the inflation rate of 12.97% for FY 2021-22 (as per press release dated 18th April 2022 by Dept. for Promotion of Industry and Internal Trade, Government of India), the Authority has considered the average rate of inflation of FY 2020-21 (1.29%) and of FY 2021-22 (12.97%), which works out to 7.14%*

*From the above table, the Authority observes that inflation-adjusted normative cost for apron is lesser than the normative cost proposed by TKIAL. Further the Authority notes that the current status of the proposed capex is in design stage, hence, the Authority proposes to shift the capitalization of Apron construction to FY 2024-25 and consider the normative cost of Rs. 6,799 per sqm (inclusive of 18% GST) as base for the computation of the cost for construction.*

**Comments by TKIAL**: -

3.2.1 This is to bring to your kind notice that in view of the increase in the GST rate from 12% to 18%, CPWD had issued O.M. No. 158/SE(TAS)/GST/2022/331-H dtd. 10.08.2022 (attached herewith as Annexure 1) wherein the multiplying factor of 1.0633 (i.e. 6.33%) is provided. Accordingly, the base value for terminal works would be Rs. 106,330 per sqm instead of Rs. 105,357 as calculated in CP.

3.2.2 Further, as indicated in CP, the inflation value for FY22 is considered as 7.14% (i.e. Average of 1.29% (FY21) and 12.97% (FY22) in view of extraordinarily high inflation of FY22. It is observed that AERA guidelines on Normative Costing do not provide for averaging of inflation.

3.2.3 Notwithstanding the AERA Guidelines. if the Authority has considered averaging of inflation for FY21 and FY22, from a consistency and fairness perspective, we request that for FY24 wherein the inflation is extraordinarily low (i.e. Only 0.3% for FY24) similar averaged out inflation for FY24 to be considered. Hence, the inflation factor for FY24 would come to 4.86% (i.e. Average of 9.42% (FY23) and 0.3% (FY24).

3.2.4 In view of the aforementioned justifications, we request the Authority to consider the inflation-adjusted normative cost as below:

| Year | Inflation (%) | Inflation adjusted normative rates (Rs.) | Inflation adjusted normative cost @18% GST* |
|---|---|---|---|
| Base Amount | | 100,000 | 106,333 |
| FY22 | 7.14% | 107,140 | 113,925 |
| FY23 | 9.42% | 117,233 | 124,657 |
| FY24 | 4.86% | 122,930 | 130,715 |
| FY25 | 3.80% | 127,601 | 135,682 |
| FY26 | 3.80% | 132,450 | 140,838 |
| FY27 | 3.80% | 137,483 | 146,190 |

Thus, Inflation-adjusted normative cost for FY26 is Rs. 1,40,838 per sqm. To this, an additional 5% towards allowance for extra cost over applicable rates for working in operational area as detailed in para 7.3.39 is proposed to be added making the total cost estimate to be Rs. 1,47,880, rounded to Rs. 1.48 lakhs per sqm. Accordingly, the total cost of terminal 2 expansion works out to Rs. 192.40 crores (Rs. 1.48 lakhs per sqm * 13,000 sqm).

3.2.5 Similarly, the inflation-adjusted normative cost for apron for FY 25 (after adjusting for 1.0633 factor for GST and change of FY24 inflation) works out to Rs. 7,173 per sqm instead of Rs. 6,799 per sqm.

| Year | WPI Index * | Inflation (%) | Inflation adjusted normative rates (Rs.) | Inflation adjusted normative cost @18% GST* |
|---|---|---|---|---|
| FY16 | 109.7 | | 4,700 | 4,998 |
| FY17 | 111.6 | | 4,781 | 5,084 |
| FY18 | 114.9 | | 4,923 | 5,235 |
| FY19 | 119.8 | | 5,133 | 5,458 |

| Year | WPI Index * | Inflation (%) | Inflation adjusted normative rates (Rs.) | Inflation adjusted normative cost @18% GST* |
|---|---|---|---|---|
| FY20 | 121.8 | | 5,218 | 5,549 |
| FY21 | 123.4 | | 5,287 | 5,622 |
| FY22 | | 7.14% | 5,664 | 6,023 |
| FY23 | | 9.42% | 6,198 | 6,591 |
| FY24 | | 4.86% | 6,499 | 6,911 |
| FY25 | | 3.80% | 6,746 | 7,173 |
| FY26 | | 3.80% | 7,003 | 7,446 |
| FY27 | | 3.80% | 7,269 | 7,729 |

3.2.6 **We hereby request the Authority to consider the inflation-adjusted normative costs for terminal and apron as explained above.**

**Notwithstanding the above, our additional points relating to Normative costing are as:**

3.2.7 AERA has been using Rs 1,00,000 per sq mtr as a Normative Costing based on the study conducted which prescribed range from Rs 95,000 to 1,25,000 sq tr. It is also observed that AERA has never issued the study in the public domain for comments by the stakeholders. The relevant extracts from some of the orders are as: -

**Extract from Patna Order No. 13/2019-20 dated 24th Oct. 2019**

7.2.2.2 The Authority examined the rationale behind the proposed capital expenditure, along with its status. Further, the Authority sought and observed a detailed break-up of the expected costs for this capital expenditure.

7.2.2.3 The Authority has adopted the 'normative approach' towards determination of cost of terminal building. The Authority has considered a normative cost of INR 100,000 per sq. meters. The Authority has given clarification regarding this normative cost in previous tariff orders pertaining to other airports such as Guwahati, Lucknow. The Authority undertook studies for a few major airports for determining the reasonableness of the capital expenditures for their respective terminal buildings. As per these studies, the cost worked out to be in the range of 0.95 to 1.25 lakhs per sq. meter. Accordingly the Authority decided to adopt INR 100,000 per sq. meter for terminal buildings of this design and specifications. This cost is subject to review during the determination of tariff for the 2nd control period.

**Extract from Amritsar order No. 56/2020-21 dated 24.12.2020**

**7.2 Authority's examination regarding Capital Expenditure for the First Control period at Consultation stage**

7.2.1 The Authority examined the proposed capital expenditure including its rationale, detailed line item wise breakup, current progress including procurement steps and future planning.

7.2.2 The Authority analyzed the expansion of existing terminal building being proposed including the need and objectives, proposed capital expenditure, and, scope of work. The Authority noted that the CAPEX proposals are in the planning stage and yet to be awarded. Accordingly, the key takeaways noted below.

- As per AAI's submissions, the expansion of existing PTB shall be spread across an area of 16,000 sqm (Ground Level – 8,000 sqm and First Floor– 8,000 sqm) with a cost estimate of INR 243.28 crores. The unit area cost for the expansion of terminal worked out to INR 152,050 per sqm.
- The Authority has adopted the normative approach towards determination of cost of terminal building and has considered a normative cost of INR 100,000 per sq. meters in line with previous tariff orders pertaining to other airports such as Guwahati, Lucknow, Chennai and Patna. The Authority conducted a study of few Major Airports for determining the reasonableness of the capital expenditures for respective terminal buildings. As per these studies, the cost worked out to be in the range of 0.95 to 1.25 lakhs per sqm. Accordingly, the Authority decides to adopt INR 100,000 per sqm for terminal buildings of similar design and specifications.

3.2.8 In respect to inclusion/exclusion of Service Tax/GST in Normative Cost, we submit that-

3.2.8.1 In the AERA Order No. 43/2021-22 dated 15th March 2022 for Kolkata Airport, AAI submitted the Normative Cost benchmarking whereby GST has been excluded in the calculation. The same was duly noted and acknowledged by the Authority.

6.2.43. The cost per sq.m. for the above terminal building work was submitted by AAI vide an email correspondence dated 09.12.2021 ("Normative cost for Capacity Enhancement at Terminal Building"). The Authority had noted that the normative cost working submitted by AAI did not include the cost of modification works pertaining to cut-out fillings, piling foundation work, and basement work. The details of the same are provided in the table below:

**Table 85: Normative cost calculation for capacity enhancement at terminal building submitted by AAI**

| Description | Amount (in Rs. Cr.) | Area (in sq.m.) | Rate per sq.m. |
|---|---|---|---|
| Cost excluding modification work, consultancy charges, Corporate Environment Responsibility, and GST (A) | 80.90 | 11,774 | 68,711 |
| Cost per sq. m for piling work (B) | - | | 10,371 |
| Cost per sq. m. (C = A - B) | - | | 58,340 |
| Normative Cost benchmark | - | | 1,21,665 |

3.2.8.2 Refer the extract from RITES report for Analysis of Capital Expenditure on Expansion of Bangalore International Airport (Terminal Building, Taxiway and Apron) for the second control period (01/04/2016 to 31/03/2021) conducted in Jan-2018, where it is mentioned that in order to compare the project cost against the normative costing, **the project cost without Service tax is analyzed**. ***Extract from RITES REPORT***

*"The cost of terminal building is proposed at Rs.1,00,800 per sqm at June 2014 price level as against AERA prescribed norms of Rs. 65,000/sqm. This rate has further been adjusted for cost escalation* ***and service tax which*** *works out to Rs. 1,30,745/sqm. Inclusive of ICT costs."*

**Therefore, the contention of the Authority that Normative Cost includes the erstwhile Service Tax is not correct. Hence, we request the Authority to kindly add GST of 18% instead of adding 6% differential between GST and Service Tax while calculating the Normative Cost benchmark.**

## 3.3 AERA proposal as per clause 7.3.62 on page 127 of CP relating to Expansion of Terminal-II Apron

*7.3.62 The Authority notes TKIAL submission of 21 NBE stands at International Building T-II which after expansion and upgradation will be converted into Integrated Terminal Building and will cater to both the international and domestic passenger traffic till the reconstruction of Terminal-I. The Authority notes that TKIAL currently has 13 stands available. With the movement of domestic traffic in T-II, while extra stands may be required, after reconstruction of T-I, the stands as proposed by TKIAL will be left unutilized. Thus, considering the fact that T-II will be utilized for both domestic and international passengers till the reconstruction of T-I but may revert to its position of being International Terminal only, post commissioning of new Terminal-I, the Authority proposes to consider half of the proposed stands submitted by TKIAL as part of Capital Expenditure.*

*Accordingly, the cost calculated by the authority only for 50% of the Apron area as compared to our submission.*

**Comments by TKIAL:**

3.3.1 Currently Terminal 2 has 13 stands. The airport has served peak airport 2-way ATMs of 9 in 2019-20 (just before covid) with annual pax was 3.9 Mn. It is proposed to completely shift all operations to T2 when the New T1 is under construction. The traffic forecast indicates that the peak demand of 2-way airport ATMs will reach up to 15 in 2026-27 for an annual traffic forecast of 6.1 Mn which will be served by T2 alone.

3.3.2 As per Benchmarking an Airport requires approx. 3.5 apron stands per million pax. Considering 6.1 million passenger traffic to be handled at T2, T2 would be requiring 22 stands, accordingly TKIAL has proposed 8 additional stands.

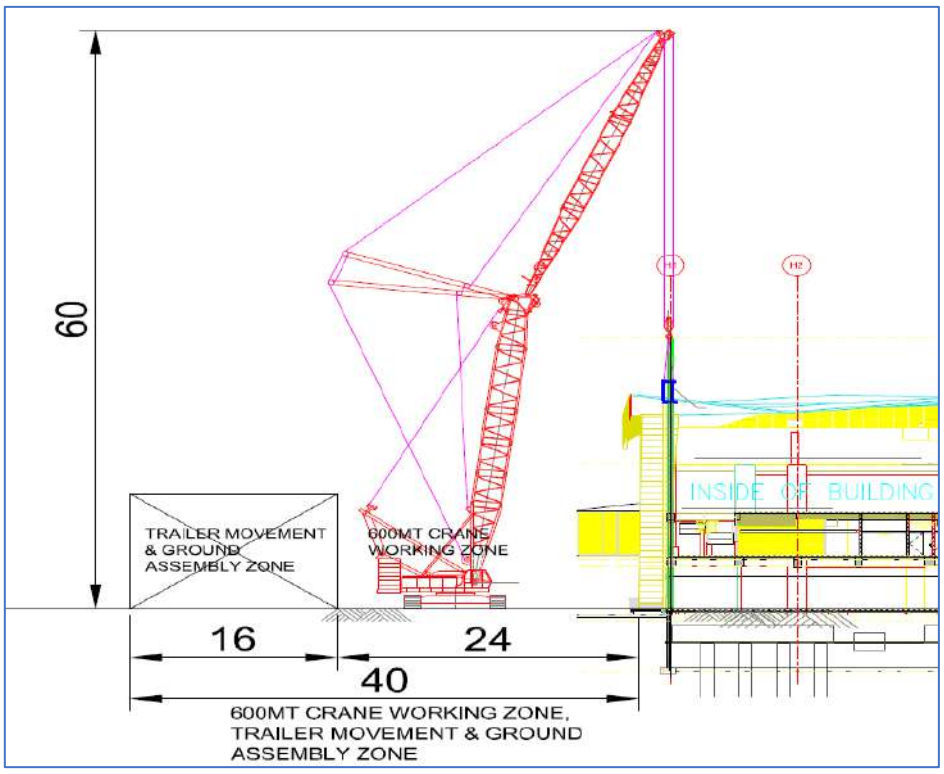
**Benchmarking**

| Comparators | Annual Pax 2019-20 (mppa) | Annual Movements 2019-20 | Total Number of Stands | Number of Stands/mppa |
|---|---|---|---|---|
| BIAL | 32.3 | 230,359 | 119 | 3.7 |
| Chennai | 22.2 | 167,962 | 91 | 4.1 |
| Kolkata | 22 | 165,761 | 59 | 2.7 |
| HIAL | 21.6 | 183,450 | 82 | 3.8 |
| AMD | 11.4 | 84,577 | 52 | 4.6 |
| Cochin | 9.6 | 66,106 | 34 | 3.5 |
| LKO | 5.6 | 41,752 | 14 | 2.5 |
| Coimbatore | 2.9 | 25,253 | 11 | 3.8 |

**Non-Availability of Apron at T1**

3.3.3 Moreover, the proposed new T1 terminal footprint falls further towards the current airside. Thus, during construction, the T1 stands will not be available for operations. Please refer to the below images of plan and section for the construction & erection planning of new T1 terminal.

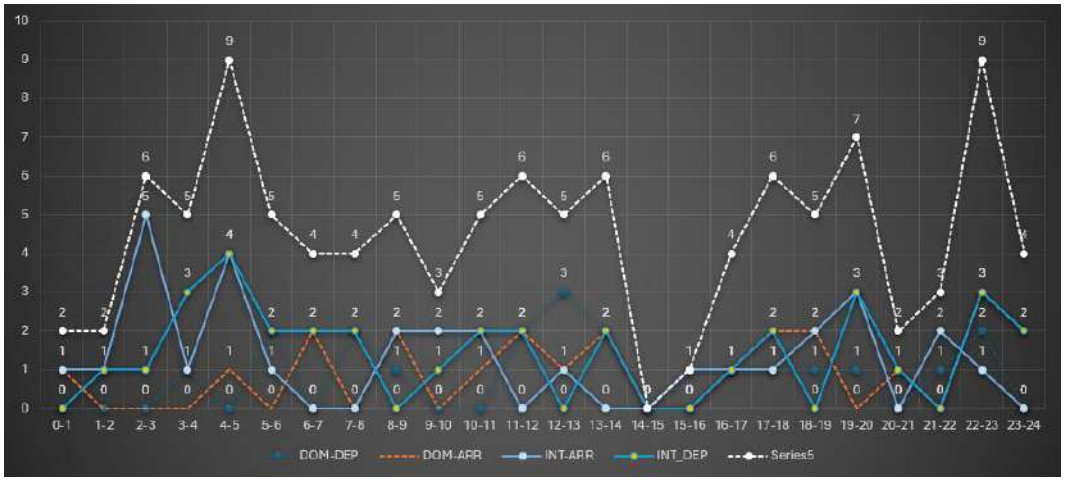

**PLAN**




**SECTION**

3.3.4 During the financial consultant's visit to TRV on 02-Dec-2023, we have explained that there is an existing peak hour ATM of 9 and in the hour preceding and succeeding we have 10 more ATMs. Accordingly, if we apply dwell time requirement, total stand requirement comes to approx. 32. Accordingly, even after T1 Stands are made available after reconstruction program for T1 is completed, total existing stands (T1=11, T2=13, Total=24) will fall short. Actual ATM data and Graph given below for elucidation.

| | 3-4am | 4-5am | 5-6am | Stand Req. |
|---|---|---|---|---|
| INT ARR | 1 | 4 | 1 | 12 |
| INT DEP | 3 | 4 | 2 | 15 |
| DOM ARR | 0 | 1 | 0 | 2 |
| DOM DEP | 1 | 0 | 2 | 3 |
| **TOTAL** | | | | **32** |




**3.3.5** **As explained above based on benchmarking and considering peak hour requirements (irrespective aprons at T1 will not be available for use due to ongoing construction) the apron quantity requested by TKIAL is optimal. Hence, we request authority to kindly allow proposed apron stands, else the limitation at the Airside will be hinderance in catering to the ongoing demand of travel.**

## 3.4 AERA proposal as per clause 7.3.90 and 7.3.91 on page 134-135 of CP relating to Capex cost for International Cargo Centre

*7.3.90 The Authority has examined the details of the cost estimate in detail together with the supporting details provided by TKIAL. The unit rate for the cargo terminal works out to Rs. 99,272 per sqm (including Truck parking and site circulation and excluding MHE equipment).*

*7.3.91 The Authority notes that this is higher than that approved for Lucknow airport where the estimate was Rs. 60,300 per sqm. The Authority therefore proposes to consider Rs.60,300 per sqm, i.e., the rate per sqm allowed in Lucknow, for computing the cost of cargo terminal work. Accordingly, the revised break-up of the cost proposed by the Authority towards construction of the International Cargo Centre is as given in the table below.*

*Table 119: Detail break-up of construction cost of International Cargo Centre as proposed by the Authority.*

*(Rs. in crores)*

| Particulars | Amount |
|---|---|
| Cargo terminal work (Rs. 60,300 per sqm * 5000 sqm) | 30.15 |
| MHE equipment | 21.55 |
| Equipment expected to be utilized in the new facility (refer Table 116) | 2.00 |
| **Total** | **53.70** |

**Comments by TKIAL:**

3.4.1 The Authority has considered the Cargo Terminal complex of 5,000 sqm at Rs. 60,300 per sqm based on the rate adopted from the LKO Tariff Order. It is to be noted that the rate provided in LKO was based on estimates.

We had also submitted to the consultant that the estimated rates at TRV are in line with the per sqm rate at which the contract is awarded at Ahmedabad Airport which was duly considered in the tariff order for Ahmedabad. The rate reference from Ahmedabad Tariff Order No. 40/2022-23 dated 18th January 2023 is Rs. 77,533 (which after 2 years' cost escalation and differential cost for TRV location would come to Rs. 85,600 per sq mtr).

Refer point 7.3.148 from Ahmedabad Tariff order as appended below:

7.3.148. The Authority found that there was no basis for the cost estimated for the Perishable Cargo section which was considered as INR 85,000 per SQM. The Authority compared the cost incurred for Perishable Cargo units at other airports and found the cost proposed by AIAL to be higher. In the absence of further details to justify the higher cost, the Authority had considered the cost towards the perishable cargo facility at the same rate as that of the general cargo facility (obtained from LoA).

7.3.149. Based on the above, the cost proposed by the Authority towards ICT is given in the table below.

**Table 150: Cost towards New Cargo Complex - Phase 1 proposed by the Authority**

| S. No. | Description of Item | Rate (INR) | Quantity (SQM) | Amount (INR Cr.) |
|---|---|---|---|---|
| J.1 | **New Cargo Complex - Phase 1 & 2** | | | |
| | **Cost proposed by the Authority:** | | | |
| 1 | Work awarded (as per LoA) | | | 161.30 |
| 2 | Perishable cargo | 77533.50 | 3,000 | 23.26 |
| | **Total (A)** | | | **184.56** |
| | **Cost submitted by AIAL (B)** | | | **233.92** |
| | Difference (B – A) | | | 49.36 |

**3.4.2 As the actual awarded cost would serve as a better rate reference as compared to block cost estimate, we request that Cargo Terminal Complex cost as submitted by TKIAL may be allowed.**

## 3.5 AERA proposal at clause 7.3.99 on page 136 of CP relating to Fuel Hydrant line

*The Authority notes that TKIAL has proposed a Fuel Hydrant line spread across 7 Kms amounting to Rs. 167.57 crores. The Authority notes that the currently Domestic terminal handles a maximum of two flights per hour, while the international apron manages a maximum of three to four flights per hour. Given the low density of flights, using fuel bowsers is optimal for re-fueling needs. Therefore, the proposed underground Hydrant refueling system, incurring a significant expense of Rs 167.57 crores, is considered avoidable at this stage. Hence, the Authority proposes not to consider the same for this current control period.*

**Comments by TKIAL: -**

3.5.1 Most of the PPP Airports like DIAL, BIAL, HIAL, MoPA have Hydrant Facilities. Further the Hydrant Facilities at Ahmedabad and Lucknow Airport are under construction.

3.5.2 At TRV, Hydrant Facility is strongly recommended for the following reasons: -

3.5.2.1 The project was duly discussed during the AUCC meeting with all stakeholders (incl. Oil Marketing Companies and airlines) and the same was duly accepted by all stakeholders.

3.5.2.2 At TRV, the international operations are higher (approx. 50% of the traffic is international) as compared to other PPP Airports. Hydrant system helps in improving turnaround time, in case of international/widebody movement. As in the case of Hydrant System, the fueling rate is much higher than that of bowsers. In refuelers the refueling rate is limited to 800 LPM whereas in hydrant refueling system a maximum of 3,000-3,500 LPM flow rate can be achieved.

We would like to submit that the fuel throughput per ATM at TRV is much higher than Ahmedabad, Lucknow, Mumbai, Hyderabad, Bangalore and MOPA. Therefore, the effect of quick refueling will be even more palpable at TRV.

| Airport | Fuel Throughput per ATM (KL) |
|---|---|
| TRV | 5.83 |
| AMD | 2.12 |
| LKO | 2.58 |
| MUM | 5.26 |
| HIAL | 2.35 |
| BIAL | 3.33 |

3.5.2.3 The Hydrant System will make TRV airport attractive for airlines, particularly international carriers. In case of wide body aircraft movements with an average fuel uplift of 55-60 KL, the minimum refueling time using refuelers will be 100-120 minutes, also 3-4 fleet of refuelers will be engaged to complete this task occupying larger space at the tarmac. Meanwhile the same refueling operation can be completed by a single hydrant dispenser within 20-25 mins. Providing less turnaround time and optimized tarmac utilization. If we go for aircrafts from the far east with a fuel requirement of 100-120KL,

this issue will become more prominent which leads to engaging multiple refuelers and manpower. In hydrant system, refueling is not only quick, but it is also safe and less susceptible for any quality issue in the Jet Fuel. It is because the whole system works in a closed loop and with minimal manual intervention.

Considering TRV being a prominent international airport envisaging larger wide body air traffic movements, hydrant refueling system is highly desired.

3.5.2.4 At Thiruvananthapuram, the fuel farm is located at the domestic terminal which is nearly 4 KM apart from the international side, it's a cumbersome task for maneuvering of refuelers loaded with 14-18 tons of aviation turbine fuel to the international apron. So practically for each refueling bowser has to travel 10 kms, which will increase the HSD consumption. It will also lead to an increased carbon footprint.

3.5.2.5 It will be a herculean task to lay hydrant system (retrofitting) at a later stage once tarmac is fully constructed. Given the growth potential at this airport, hydrant system will become a non-negotiable facility to have at this airport in the very near future.

3.5.2.6 Laying hydrant system after completion of the airside/tarmac at a later stage will be costlier and time consuming. As it is difficult to lay hydrant in operational airside.

**3.5.3 In view of the above reasons, we request the Authority to kindly allow capex for Fuel Hydrant which is non-negotiable in the near term.**

## 3.6 AERA proposal at Para 7.3.108 of CP relating to Airport Boundary Wall, New Airside Perimeter and Land Acquisition

*The Authority notes the need for the project from an airport safety and security perspective. Further, the Authority also notes that the project execution is contingent upon the acquisition or availability of land at the Airport. Therefore, the Authority proposes not to consider the capital expenditure for boundary wall and new Airside Perimeter in the Third Control Period and shift the same to the next control period(s) once the land is made available for the construction of boundary wall by the airport operator.*

**Comments by TKIAL**: -

3.6.1 We observed from Para 7.3.108 of CP, the Authority has proposed to shift the projects to the next control period subject to availability of land.

3.6.2 Kindly refer to our submission in the MYTP Page 92 as *"Out of overall projects listed above, two projects i.e. Construction of Perimeter Road on North Side and Airport Boundary wall on North Side are dependent on land acquisition. TKIAL acknowledges that acquisition of land is time consuming. It involves multiple stakeholders, various processes and procedures which have variability on the timing and cost of the acquisition of land. Considering these factors, TKIAL has not projected the costs of land acquisition. Therefore, TKIAL requests the AERA to kindly consider the necessary true-ups for the same in the next control period and to provide for eligible return on land acquisition cost".*

3.6.3 **In the MYTP we have ourselves requested for these projects along with return on land acquisition cost on actual incurrence basis. The authority has agreed with the need for the project, and we again request the Authority to kindly provide true-up on actual incurrence basis including return on land acquisition cost.**

## 3.7 AERA proposal as per 7.3.143 on page 150-151 of CP relating to Soft Costs claimed towards technical services, PMC, Preliminaries and Pre-operatives, Contingencies, Statutory approvals, Labour cess, Site-preparation, Insurance etc.

*The Authority upon review of TKIAL's explanation and relevant documents notes the following: -*

*i. In respect of Rs. 522.48 crores claimed by TKIAL towards PMC and other costs, the Authority notes that for other PPP airports such as HIAL, BIAL, DIAL etc. the above-mentioned costs had been considered in the past in the range of 8% - 11% of the project costs. The Authority is of the view that 16% claimed by the TKIAL is on a very high side, as compared to other PPP Airports and hence not justified. Also, the Authority notes that a significant portion of the cost being considered is for procuring equipment etc. on which there is no Project Management cost etc. required to be incurred. The Authority proposes to consider an overall estimate of 8% on the total capital expenditure which in turn, provides for a higher loading of these soft costs on the relevant projects. Accordingly, the Authority proposes to consider the aforementioned costs to the extent of 8% of the Capital Expenditure costs allowed by the Authority for the current Control Period. The Authority has thus derived the amount proposed to be allowed towards the aforementioned costs as Rs. 97.28 crores, as against Rs. 522.48 crores claimed by TKIAL.*

*ii. The Authority notes the following:*

*a. Many of the CAPEX allowed to the AO are bought out items, wherein orders are placed on Supply, installation, Testing & Commissioning (SITC) basis. Hence, soft costs such as Project Management Consultancy (PMC), Design etc. need not be incurred on such items.*

*b. The new Capital Expenditure allowed to AO includes works on air side. On air side works such as Apron, Taxiway, Runway overlay, Fuel Farm etc., PMC charges are normally in the range of 1% to 3% maximum.*

*c. Soft cost claimed by the AO includes contingencies also, which do not come as a separate line item while capitalizing the assets and is not to be claimed without any contingent activity.*

*Hence taking an overall view, soft cost @ 8% of total capital expenditure is reasonable and justified.*

*Further, the Authority clarifies that the soft cost @ 8% allowed on Aero CAPEX is in addition to the cost of Independent Engineer (whose roles and responsibilities have been defined in Clause 24.1. and 24.2 Schedule L of the Concession Agreement) which has been considered while determining ARR of TKIAL for the Third Control Period.*

*iii. The decrease in costs is mainly on account of applying 8% on the 'allowable' Capital Expenditure as against 16% claimed by AO and the reduction in Capital Expenditure considered by the Authority due to shifting/ disallowance of some projects such as Construction of new Domestic terminal -1, GA Terminal, Construction of Code C Taxiway for GA Apron, Fuel hydrant line, Airport Boundary Wall, etc., as well as rationalization of certain others during the Third Control Period such as Expansion of Terminal-II apron, New Airside Security Gate, International Cargo Centre (ICC), Fuel storage farm, Development of RESA for RWY 32, Fire Fighting Equipment and facilities, etc.*

**Comments by TKIAL**: -

3.7.1 As per recent released CPWD SOP 2022 dated 13.07.2022 https://cpwd.gov.in/Publication/sop2022.pdf, the Project Estimation should take of the following requirements: -

*10. Preliminary estimate (PE) is to be prepared on the basis of Plinth Area Rates or length of road etc. worked out on the rate per unit area/length/number, or such other method adopted for ready and rough calculation, so as to give an idea of the approximate cost involved in the proposal.*

*11. Prevailing Cost Index over the plinth area rates, effect of ESI & EPF leviable (rates as given in Annexure -14, Contingencies and Departmental Charges (if applicable) are to be added in the PE.*

As per CPWD norms the various costs to be considered while preparing the preliminary estimates and should include the following components: -

a. Planning Consultancy 4% and Project Management Consultancy 5% (refer below PART 1 as the relevant extract from CPWD SOP2022)
b. Other Technical Services like Preliminary Sketches, Detailed Drawings, Preliminary Estimates, Structural Design, Execution, Audit & Account etc. is ranging between 7% to 24% depending upon size of the project (refer below PART 2 as the relevant extract from CPWD SOP2022)
c. Contingency cost is 3% (refer below PART 3 as the relevant extract from CPWD SOP2022)
d. ESI & EPF ranging between 0.85% to 4.2%, say average of 2% (refer below PART 4 as the relevant extract from CPWD SOP2022)

3.7.2 As per accounting standards (refer extract as PART 5 below) the costs relating to the Project Team are required to be capitalized. These costs have been approved by AERA in various orders for PPP and AAI Airports ranging between 2-3% of the project cost (refer below PART 6 for few Airports examples). The same is recognized by AERA in its Guidelines Form F11 (b) (refer below PART 7 as the extract from AERA Guidelines).

The overall Soft Costs based on above point 4.7.1 and 4.7.2 above is minimum 18-20%.

3.7.3 As per "Airport Capital Improvements: A Business Planning and Decision-Making Approach" study conducted by Airport Cooperative Research Program (ACRP), Transport Research Board (sponsored by US Government's Federal Aviation Administration). The soft costs range between 10% to 30%. The extract from Page 48 the report is as follows: -

*Soft costs typically range from 10% to 30% of total project costs. These include design fees, permitting fees, utilities, costs associated with inspections and land acquisition, costs associated with the bidding and procurement process, and project administration and management costs.*

Full study report is provided as **Annexure 2** - ACRP Report - Airport Capex

3.7.4 Further, in Tariff Order No. 27/2023-24 dated 07th December 2023 issued for Goa Airport, "In the matter of determination of aeronautical tariff for Manohar International Airport, MOPA, GOA (GOX) for the First Control Period" the Authority has approved soft cost (design consultancy, PMC expenses, pre-operative expenses and contingencies) at 13%-16%. (refer below table 73 of the Tariff order, the cost approved at Consultation Paper is considered in the tariff order).

**Table 73: CAPEX proposed by the Authority for the First Control Period at Consultation Stage**

*(Rs. in crores)*

| S.No | Description | Amount |
|---|---|---|
| 1 | Runway, Taxiways and Apron - (Phase-I, II & III) | 526.17* |
| 2 | Passenger Terminal Building including Fit Outs (for 7.7 MPPA) (Phase-I, II & III) | 1,283.98 |
| 3 | Airside buildings, Airside roads & Drainage System (Phase-I & III) | 346.65 |
| 4 | Site Preparation/ Earthwork | 628.43 |
| 5 | Administrative building & Site office | 50.37 |
| 6 | ATC Technical Block and Tower | 87.43 |
| 7 | Main Access Road, Spine Road and Car park | 104.71 |
| 8 | Additional Works (Phase-I & III) | 63.59 |
| 9 | Permanent Water & Electricity | 20.00 |
| 10 | ASDC | 7.66 |
| 11 | General Capex | 50.00 |
| **A** | **Sub Total (1 to 11)** | **3,168.99** |
| 12 | Design Consultancy & PMC Expenses | 120.52 |
| 13 | Independent Engineer Services | 15.07 |
| 14 | Pre-operative Expenses (Phase-I, II & III) | 251.36 |
| 15 | Contingencies (Phase-I & III) | 18.38 |
| **B** | **Sub Total (12 to15)** | **405.33** |
| 16 | Financing Allowance | 321.88 |
| 17 | DSRA | - |
| **C** | **Sub Total (16 & 17)** | **321.88** |
| | **Grand Total (A+B+C)** | **3,896.20** |
| 18 | **Phase-I** | **3,225.79** |
| 19 | **Phase-II** | **179.28** |
| 20 | **Phase-III** | **441.14** |
| 21 | **General Capex** | **50.00** |

Soft Cost Rs. 405 Crs over the Project Cost of Rs. 3,169 Crs (approx. 13%). If the Site Preparation/ Earthwork of Rs. 628 Crs is removed from the project cost as it is not applicable for TRV, then the like-to-like soft cost will be approx. 16%.

3.7.5 **Based on information from reputed agencies from India and Overseas and recent tariff orders, it is evident that soft costs requested by TKIAL is based on rational estimates and within the acceptable reasonable range. We therefore request the Authority to allow the soft cost which is based on best practices subject to true-up on actual incurrence basis.**

**PART 1**

**SOP No. 8/7: Levy of Fees by CPWD for Consultancy Services (Para 8.20)**

CPWD handles consultancy works of planning and designing (with or without construction) of various projects including high-rise buildings, housing complexes etc. of Public Sector Undertakings and other organizations to undertake construction on turnkey basis, or for Mission's buildings abroad, etc. at negotiated rates. Fee for the Consultancy Services is charged by CPWD as given below.

**FEES FOR CONSULTANCY SERVICES**

(a) Planning 4%
(b) Construction Management 5%
(c) Visits of CPWD Officers from India 1%

For planning and designing work, the following charges is levied:
(i) Development of Master Plan Rs.10000/- per hectare
(ii) Architectural plans and drawings 3 % for original work ½ % for repetition
(iii) Structural designs and drawings 1% for original work ½ % for repetition

**PART 2**

**ANNEXURE- 5**

**(Reference Para 3.1.1.4 (1))**

**RATES OF DEPARTMENTAL CHARGES**

| Objectives of works | All maintenance works, and minor works costing upto Rs. one lakh | Construction works costing upto Rs. Two Crores | Construction works costing between Rs. Two and five Crores | Construction works costing more than Rs. five crores |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| (A) Establishment Charges | | | | |
| 1. Preparation of preliminary sketches | ½% | ¼% | ¼% | ¼% |
| 2. Preparation of detailed working drawings | 1% | ¾% | ½% | ¼% |
| 3. Preparation of preliminary estimates | ¼% | ¼% | ¼% | ¼% |
| 4. Preparation of detailed estimates | ½% | ¾% | ½% | ¼% |
| 5. Preparation of structural designs | 1% | 1% | ¾% | ¾% |
| 6. Execution | 19-¼% | 7-¾% | 4-¾% | 4-¼% |
| Total Establishment charges | 22-½% | 10-¾% | 7% | 6% |
| (B) T&P (Machinery Equipment) | ¾% | ¾% | ½% | ½% |
| (C) Audit & Account | ¼% | ¼% | ¼% | ¼% |
| (D) Pensionary | ¼% | ¼% | ¼% | ¼% |
| | 23-¾% | 12% | 8% | 7% |

## PART 3

*SOP No. ¾: Provision for Contingencies and its Utilization (Refer Para 3.1.1.3 (3) )*

1. *In addition to the provision for all expenditure which can be foreseen for a work, a provision of contingency is kept as follows: (i) Estimated cost up to Rs. 1 Crore ……. 5% (ii)* ***Estimated cost more than Rs. 1 Crore … 3%, subject to minimum of Rs. 5 Lakh***

## PART 4

**ANNEXURE- 14**

**(Refer SOP No. 3/2)**

**STATEMENT SHOWING THE RATES OF EPF and ESI CHARGES TO BE INCLUDIED IN PRELIMINARY ESTIMATE**

| Category of work | Component of Labour | EPF @12.5 % of labour Component | ESI @ 4.5 %of labour Component | Total of EPF & ESI |
|---|---|---|---|---|
| Buildings | 25% | 3.125% | 1.125 % | 4.25% |
| Road Works & pavements in airfields | 5% | 0.625% | 0.225% | 0.85% |
| External sewerage | 10% | 1.25 % | 0.45% | 1.70% |
| External water supply | 5% | 0.625% | 0.225% | 0.85% |
| Bridge/Flyover works | 25% | 3.125% | 1.225% | 4.25% |
| Maintenance works engaging only labour component | 100% | 12.50 %. | 4.50% | 17.00 % |
| Other Maintenance work | 70% | 8.75% | 3.15% | 11.9% |

## PART 5

**Indian Accounting Standard (Ind AS) 16** ***Property, Plant and Equipment***

**Elements of cost**

16 The cost of an item of property, plant and equipment comprises:

(a) its purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates.

(b) any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

(c) the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located, the obligation for which an entity incurs either when the item is acquired or as a consequence of having used the item during a particular period for purposes other than to produce inventories during that period.

***17 Examples of directly attributable costs are:***

***(a) costs of employee benefits (as defined in Ind AS 19, Employee Benefits) arising directly from the construction or acquisition of the item of property, plant and equipment;***

(b) costs of site preparation;

(c) initial delivery and handling costs;

(d) installation and assembly costs;

(e) costs of testing whether the asset is functioning properly, after deducting the net proceeds from selling any items produced while bringing the asset to that location and condition (such as samples produced when testing equipment); and

(f) professional fees.

**PART 6**

**Extract from Chennai Airport Order No. 38/2021-22 for the Third Control Period**

| Grand Total of Capital Additions Proposed in the Third Control Period | | | | |
|---|---|---|---|---|
| Grand total of capital additions proposed to be considered in | Total | 3,882.58 | 2,139.82 | (1,742.66) |
| | Financing Allowance | 51.88 | - | (51.88) |
| | IDC | 108.17 | 21.93 | (86.27) |
| | Project division expenses capitalized (Exp. Cap) | 87.07 | 47.58 | (39.57) |

Order No. 38/2021-22 for the Third Control Period Page 137 of 231

~2.25%

**Extract from Pune Airport Order No. 38/2021-22 for the Third Control Period**

the control of Pune International Airport or its contracting agency and is properly justified, the same would be considered by the Authority while truing up the actual cost at the time of determination of tariff for the Fourth Control Period. Further, this proposal was applicable to all the projects forecasted to be capitalized in the Third Control Period given in this Consultation Paper. This will ensure timely adherence to the capital expenditure plan proposed in the Third Control Period.

4.2.33 Based on the discussion above, the total capital additions proposed to be considered by the Authority in the Third Control Period was as tabulated below:

4.2.34 Based on the Authority's analysis of capital expenditure deferred from Second Control Period (Para 4.2.9 to Para 4.2.24) and new capital expenditure proposed to be incurred in the Third Control Period (Para 4.2.25 to Para 4.2.31), the Authority considered a total Capital Expenditure of Rs. 52,540.93 lakhs as given below:

**Table 83: Capital Expenditure additions for the Third Control Period considered by the Authority**

| Reference | Project | No. | Particulars | Submitted by AAI | Proposed by the Authority | Difference |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3=2-1 |
| I | Capital additions deferred from the Second Control Period to the Third Control Period | I.A | New Integrated Terminal Building | 44,621.19 | 43,694.92 | -926.27 |
| | | I.B | PMC-Expansion of Terminal Building- (Tensile canopy) | | | |
| | | I.C | PMC-Expansion of Terminal Building-Electrical works (aerobridge) | | | |
| | | I.D | Baggage Trolley & XBIS | 508.47 | 508.47 | - |
| | | I.E | Financing Allowance | 3,337.57 | - | -3,337.57 |
| | | I.F | IDC | 2,023.22 | 2,005.96 | -17.26 |
| | | I.G | Project division expenses capitalized (Exp. Cap) | 1,651.26 | 1,630.60 | -20.67 |
| | | I | Sub-Total (NTTP) | 52,141.71 | 47,839.95 | -4,301.77 |

~3.5%

## PART 7

Form P11 (b): Payroll Related Expenditure and Provisions (refr Section A5.4.5)

| S.N. | Particulars - with detailed breakup | Last available audited year^ | Financial Year before Tariff Year 1* | Tariff Year 1 | Tariff Year 2 | Tariff Year 3 | Tariff Year 4 | Tariff Year 5 |
|---|---|---|---|---|---|---|---|---|
| A | *Salaries and Wages* | | | | | | | |
| B | *PF Contribution* | | | | | | | |
| C | *Medical Expenses* | | | | | | | |
| D | *Overtime* | | | | | | | |
| E | *Staff Welfare Fund* | | | | | | | |
| F | ..... | | | | | | | |
| 1 | Grand Total | | | | | | | |
| 2 | Employee expenses capitalised | | | | | | | |
| 3 | Net Employee expenses (1)-(2) | | | | | | | |

* Projected values to be provided
# Fields in italics are indicative only
^ Information for last financial year for which audited accounts are available

## 3.8 AERA proposal as per 7.3.144 on page 151 of CP relating to re-adjustment in ARR in case any particular capital project is not completed/capitalised as per the approved capitalisation schedule.

*The Authority proposes to reduce (adjust) 1% of the uncapitalized project cost from the ARR / target revenue as re-adjustment in case any particular capital project is not completed/ capitalized as per the approved capitalization schedule. It is further proposed that if the delay in completion of the project is beyond the timeline given in the capitalization schedule, due to any reason beyond the control of the TKIAL or its contracting agency and is properly justified, the same would be considered by the Authority while truing up the actual cost at the time of determination of tariff for the next Control Period. The re-adjustment in the ARR/ Target Revenue is to protect the interest of the stakeholders who are paying for services provided by the AO and is also encouragement for the AO to commission/ capitalize the proposed assets as per the approved CAPEX plan/ schedule.*

**Comments by TKIAL**:-

3.8.1 The Authority has proposed to disincentivize the AO by reducing 1% of the project cost in case of delay in implementation of the project. Such a proposal puts TKIAL in double jeopardy because any delay in completion of project implies denial of return on such asset and depreciation and added to it will be this reduction in cost. It is abundantly clear that it is in the interest of TKIAL to complete the project as per schedule, however there could be delays due to various uncertainties. There may be shortage of manpower, funds, force majeure, and unforeseen event, for any reason including but not limited to the scarcity of raw material, finished goods and manpower due to after effect of Covid-19.

3.8.2 One of the principles for tariff fixation stipulates incentive for undertaking investment in a timely manner. Instead of providing an incentive for timely completion of the project the Authority is proposing a disincentive due to delay.

3.8.3 As per TDSAT Judgement dated 06th October 2023 in MIAL SCP and TCP
At the outset, this Hon'ble Tribunal decided the present issue in the MIAL SCP & TCP Judgment whereby it has been held that the decision of the Authority of carrying out 1% re-adjustment is improper and not justified. The relevant portion of the MIAL SCP & TCP Judgment is extracted below:

*"308. Moreover, in absence of any provision for penalty under OMDA or SSA or AERA Act, 2008, no such penalty can be imposed, otherwise highly discriminatory position will prevail because today 1% of project cost penalty is imposed and subsequently it may be increased to 1.5%. If 1% penalty is allowed then 1.5% penalty would also have to be allowed then in forth coming years, as there are unguided powers, the penalty might be 3% also and, thereafter it can be 5% or more also. There will be no end to penalty in absence of any provision under OMDA, SSA and AERA Act, 2008. It ought to be kept in mind that unguided and uncontrolled power always leads to discrimination. In case of one airport operator penalty imposed will be 1% and in case of another airport operator it can be 2% because there is no law, there is no contract, there is no provision and there are no guidelines. The balance has already been created under OMDA and SSA in the methodology of true up in next control period and as stated hereinabove, as per*

*the said methodology, excess amount recovered shall be trued up with carrying cost in next control period. Therefore, in the aforesaid example, if Rs.83 Crores has been recovered, the true up amount in the next control period, if the project is not commenced or completed within the time bound schedule, would be at Rs.121 Crores which is in fact more than sufficient revenue clawed back from the airport operator and perhaps for this very reason no powers have been given to AERA for imposing penalty. Hence, we hereby quash and set aside the decision of AERA of carrying out 1% of readjustment to project cost and applicable carrying cost in the target revenue at the time of determination of tariff for next control period.*

*309. Here in the facts of the present case, AERA has failed to appreciate the prevailing pandemic situation of COVID-19 and its aftermath. Curfew type situation or lockdown type situation was prevailing. Labourers were not available and hence, there is bound to be delay in execution of the project work. Such a big factor ought to have been appreciated by AERA. The genuine difficulty of airport operator ought to have been appreciated.*

*310. Thus, Issue No. XVII is answered in negative i.e. the decision of AERA of carrying out 1% re-adjustment to Project Cost and applicable carrying cost in the Target Revenue at the time of determination of Tariff for 4th Control Period is incorrect, improper and not justified."*

3.8.4 Also, as per the HIAL TDSAT order dated 14th February 2024, a similar pronouncement has been made. Refer below extract from the TDSAT order.

*508. AERA has penalized for delay in execution of projects, the airport operator – Appellant which is equal to reduction of 1% of the total cost of project from ARR.*

*509. Much has been argued out by the counsels for both the sides on this issue, it has also been submitted by Learned Senior Counsel for the Appellant that the issue of imposition of penalty has already been decided by this Tribunal by a detailed judgment and order dated 06.10.2023 in AERA Appeal No.2 of 2021 and AERA Appeal No.9 of 2016, in a discussion in Issue No. XVII of that Judgement.*

*510. Looking to the facts and circumstances of the present case and also keeping in mind the AERA Act, 2008 and Concession Agreement under dated 20.12.2024 (Annexure-A3 to the memo of this appeal) there is no provision under the AERA Act, 2008 nor in there is any provision in the Concession Agreement which contemplates the levy of penalty much less levy of penalty 1%there is no provision in the AERA Act nor in the Concession Agreement which contemplates the levy of any penalty and as such the levy of 1% penalty on delayed execution is beyond the power of AERA.*

3.8.5 **In light of the above reasons, we request the Authority not to include this proposal in the final Order.**

## 3.9 AERA proposal as per 7.3.147 on page 152-153 of CP relating to Financing Allowance

*TKIAL has claimed Financing Allowance/IDC of Rs. 340.34 crores for the CAPEX projects which had been calculated on the average Capital Work in Progress (CWIP) of the entire project funds (funded out of debt and equity), at the rate of 12% (which is cost of debt).*

*The Authority has examined AO's claim as well as the justification provided for the same in detail and has summarized its view as shown below:*

*• The Authority considers that providing return on capital expenditure from the very beginning of construction will significantly lower the risks for an airport operator and may require revisiting the return on equity allowed to airport operators, as the investment in the asset class will then be equated to risk free rate of return.*

*• Further, provision of Financing Allowance will disincentivize TKIAL from ensuring timely completion of projects and delivery of services to the users. Therefore, the Authority is of the view that a return should be provided only when the assets are made available to the airport users except in the case of certain costs like IDC that will have to be incurred if debt is used for funding projects.*

*• Furthermore, the future returns from the project should generate adequate returns to cover the cost of equity during the construction stage. The AO is adequately compensated for the risks associated with the equity investments in a construction project once the project is capitalized by means of a reasonable cost of equity.*

*• Developments at greenfield airports inherently take longer durations to commission and operationalize. Therefore, the Airport Operator would have to wait for a considerable duration before getting returns on large capital projects. Keeping this in view, the Authority had earlier provisioned a financing allowance in the initial stages to such airports. It may be further noted that the Authority has never provided financing allowance in the case of brownfield airports in any of its Tariff Orders. Further, financing allowance for greenfield airports of BIAL, HIAL, CIAL etc. was allowed only for the initial stages of their development, after which IDC was permitted only on the debt portion of the proposed capital expenditure.*

*• It is pertinent to note that in case of a greenfield airport, investment in regulatory blocks by the Airport Operator would not make the airport facilities available to the passengers. Brownfield and Greenfield airports cannot be equated on this issue. In greenfield airports, the tariff is not applicable, and no revenue is available to the airport operator till the aeronautical services have been created and put to use. However, in the case of brownfield airports, where the AO brings in additional investments, the airport facilities are mobilized and enabled to other functional parts of the airport, which remains functional, and the AO is able to collect charges from the users. In the case of TKIAL, the Airport ought to be considered as a brownfield airport, which in the opinion of the Authority would not be eligible for an allowance on the equity portion of newly funded capital projects.*

*• Financing Allowance is a notional allowance and different from interest during construction. Therefore, the provision of Financing Allowance on the entire capital work in progress would lead to a difference between the projected capitalization and actual cost incurred, especially when TKIAL funds the projects through a mix of equity and debt. Further, the Authority opines that only IDC should be provided on the debt borrowings availed for the execution of a project.*

*• AERA Guidelines, 2011 does not specifically state that Financing Allowance is to be provided on the equity portion of the capital expenditure. The proviso to Section 13 (1) (a) states that "different tariff structures may be determined for different airports having*

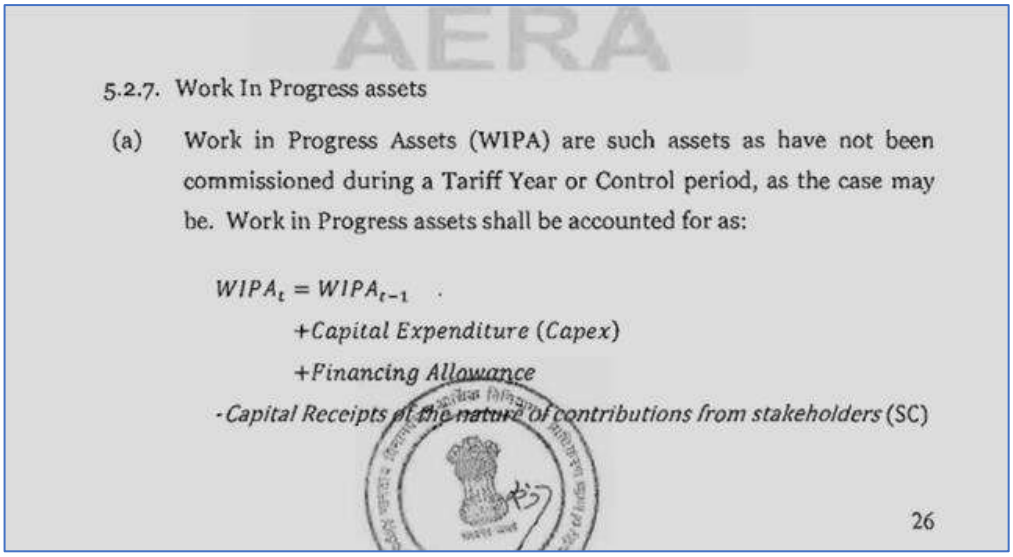
*regard to all or any of the above considerations specified at sub-clauses (i) to (vii) of Section 13 (1) (a)".*

*• In respect of IDC, the Authority is inclined to allow the same and accordingly, the Authority has considered IDC to be provided on the debt portion of the value of average CWIP derived on the basis of revised Capitalization Schedule proposed by the Authority. Further, the Authority proposes to consider the notional gearing ratio (debt-equity ratio of 48:52) followed for other PPP airports and cost of debt @ 9% (refer Table 148 of Chapter 8) for the Third Control Period for calculating the value of IDC. Based on the same, the Authority has derived an amount of Rs. 36.01 crores and proposes to allow the same as against Rs. 340.34 crores (as Financing Allowance and IDC) claimed by the TKIAL for the Third Control Period.*

**Comments by TKIAL**: -

3.9.1 Clause 5 of The AERA Guidelines (which entails the methodology of aeronautical tariff determination) allows Airport operators to be eligible for Financing Allowance as a return on the value invested during the construction phase of an asset including the equity portion, before the asset is put to use.

3.9.2 Thus, Clause 5 provides an explicit, detailed elaboration of Financing Allowance. Manner and formulae of computation and addition of the "commissioned assets" into RAB including the financing allowance are elucidated in detail with examples. For your kind reference the relevant extracts from The AERA Guidelines are reproduced below:



5.2.7. Work In Progress assets

(a) Work in Progress Assets (WIPA) are such assets as have not been commissioned during a Tariff Year or Control period, as the case may be. Work in Progress assets shall be accounted for as:

$$WIPA_t = WIPA_{t-1}$$
$$+Capital\ Expenditure\ (Capex)$$
$$+Financing\ Allowance$$
$$-Capital\ Receipts\ of\ the\ nature\ of\ contributions\ from\ stakeholders\ (SC)$$

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$-Commissioned\ Assets\ (CA)$

Where:

$WIPA_t$: Work in Progress Assets at the end of Tariff Year t

$WIPA_{t-1}$: Work in Progress Assets at the end of Tariff Year t-1

Capital Expenditure: Expenditure on capital projects and capital items made during Tariff Year t.

The Financing Allowance shall be calculated as follows

$$\text{Financing Allowance} = R_d \times \left(WIPA_{t-1} + \frac{Capex - SC - CA}{2}\right)$$

Where $R_d$ is the cost of debt determined by the Authority according to Clause 5.1.4.

SC are capital receipts of the nature of contribution from stakeholders (including capital grants and subsidies) pertaining to the capital expenditure incurred in Tariff year t.

CA are Commissioned Assets which pertain to the accumulated value of the WIPA attributable to all assets that have been put into effective operation during Tariff Year t.

3.9.3 AERA Guidelines also provides illustration for RAB and Financing Allowance calculation. Refer illustration 4 and 7 of the AERA Guidelines as provided below. It is clear from the Illustration that Commissioned Assets (CA) are identical numbers in (1) Addition during the year and (2) Calculation of Financing Allowance. Financing allowance is computed on the Work in Progress balance based on capital expenditure ***(irrespective of how it is funded)*** and is capitalized as part of commissioned assets for RAB computation.

*Illustration 4: The following example illustrates the approach for forecasting RAB for the Control period. The numbers in the illustration have been rounded to the nearest integers.*



**Forecast RAB**

| | | 2010-11 | Tariff Year 1 | Tariff Year 2 | Tariff Year 3 | Tariff Year 4 | Tariff Year 5 |
|---|---|---|---|---|---|---|---|
| **Opening $RAB_{t-1}$** | OR | 22,750 | 20,500 | 18,826 | 16,462 | 13,998 | 12,277 |
| **Commissioned Assets** | CA | - | 633 | - | - | 681 | - |
| **Depreciation** | DR | 2,250 | 2,307 | 2,364 | 2,364 | 2,402 | 731 |
| **Disposals** | Di | - | - | - | 100 | - | - |
| **Incentive Adjustments** | IA | - | - | - | - | - | - |
| **Closing $RAB_t$** | CR=OR+CA-DR-Di+IA | 20,500 | 18,826 | 16,462 | 13,998 | 12,277 | 11,547 |
| **RAB for calculating ARR** | RA=(OR+CR)/2 | | 19,663 | 17,644 | 15,230 | 13,138 | 11,912 |

- *The example illustrates that $RAB_{t-1}$ for the first Tariff Year of the first Control Period is equal to the forecasted RAB at the end of the financial year 2010-11 and the Initial RAB, as calculated in Clause 5.2.4, is used as the opening RAB for 2010-11.*
- *The example also illustrates that the RAB value, to be considered for the calculation of ARR for a Tariff Year t, shall be the average of the RAB value at the end of Tariff Year t and the RAB value at the end of the preceding Tariff Year t-1, as explained in the Clause 5.2.3.*

*Illustration 7: The following example illustrates this approach for calculation of Work in progress assets, financing allowance and commissioned assets. The numbers in the illustration have been rounded to the nearest integers.*

**Forecast Work in Progress Assets**

| | | 2010 -11 | Tariff Year 1 | Tariff Year 2 | Tariff Year 3 | Tariff Year 4 | Tariff Year 5 |
|---|---|---|---|---|---|---|---|
| Opening WIP: $WIPA_{t-1}$ | OW | - | - | - | 558 | 638 | - |
| Capital Expenditure | CE | - | 833 | 521 | - | - | - |
| Financing Allowance | FA=$R_d$ x (OW+(CE-CA-SC)/2) | - | - | 37 | 80 | 43 | - |
| Capital Receipts | SC | - | 200 | - | - | - | - |
| Commissioned Assets | CA | - | 633 | - | - | 681 | - |
| Closing WIP: $WIPA_t$ | CW = OW + CE + FA - SC – CA | - | - | 558 | 638 | - | - |

- *The cost of debt, $R_d$, used for calculation of financing allowance, is the cost of debt determined by the Authority under Clause 5.1.4.*
- *The example illustrates that those assets, which have been acquired or commissioned within the same Tariff Year (i.e. Tariff Year 1), have been included both in Capital Expenditure and Commissioned Assets.*
- *The value of commissioned assets, as calculated, shall be used for forecasting RAB for the Control Period.*

3.9.4 Further, Form No. F15 (b) of the AERA Guidelines requires that the airport operator has to submit project-wise Financing Allowance. The AERA Guidelines mandate the airport operator to include the Financing Allowance in the claim. As per Clause 5.2.7, the value of a commissioned asset (which includes Financing Allowance) shall be used for the determination of forecasted RAB.

3.9.5 The AERA guidelines do not restrict Financing Allowance to be provided only to Greenfield Airport. No distinction has been carved out regarding the applicability of the Financing Allowance under greenfield or brownfield airport. It is pertinent to note that the Authority has allowed Financing allowance for Cochin Airport in AERA Order No. 07/2017-18 dated 13th July 2017 when it was operational, and it was generating revenues too. Cochin Airport made the first significant investment during Second Control Period when the Financing Allowance was provided. Further, it is important to note that at that time, the Cochin Airport was operational (Cochin Airport has been in operation since 1999 refer para 3.1.2 of Cochin Tariff Order) and generating revenues while the New Terminal Building was being constructed. Hence, the reason provided by the Authority that it has never provided Financing Allowance to non-revenue generating Airports is not correct.

3.9.6 The regulatory principles laid down by AERA by means of guidelines provide a fundamental foundation of regulatory clarity to the stakeholders on the manner in which different components of costs and revenues are treated.
When the airport such as Thiruvananthapuram is transitioned to a PPP model and handed over to the private operator for operation, management and development, the expectation from the private AO is to invest substantially in enhancing the infrastructure facilities. Having regard to the size of investment being made by AO vis-a-vis the investments made by AAI in the past several years, the proposed investment

by AO is akin to development of greenfield airport facilities and financing allowance must be allowed for such projects. *It is similar to Cochin Airport when it made the first significant investment during Second Control Period.*

3.9.7 As per the Concession Agreement, the tariffs are to be calculated as per the AERA Act, AERA Guidelines. Refer below the definitions from the Concession Agreement. AERA Guidelines provides for Financing Allowance without any differentiation for Greenfield or Brownfield Airport and hence Financing Allowance are to be provided to all Airport.

> *"Fee" means the charge levied on and payable by a User for availing any or all of the: (a) Aeronautical Services, as per the rates determined or revised and approved by the Regulator, in accordance with the provisions of Regulatory Framework; and (b) Non-Aeronautical Services;*
>
> *"Regulatory Framework" means the framework adopted by the Regulator as per the Applicable Laws, including the AERA Act and Airports Economic Regulatory Authority (Terms and Conditions for Determination of Tariff for Airport Operators) Guidelines, 2011;*

Non-application of AERA Guidelines will lead to Non-Adherence of Concession Agreement. It is a settled position in various jurisdiction that Concession Agreement need to be honored by the regulatory authority.

3.9.8 **We therefore request that the financing allowance should be computed as per formulae prescribed in the AERA Guidelines.**

## 3.10 AERA proposal as per 7.3.147 on page 153 of CP relating to Interest During Construction

*In respect of IDC, the Authority is inclined to allow the same and accordingly, the Authority has considered IDC to be provided on the debt portion of the value of average CWIP derived on the basis of revised Capitalization Schedule proposed by the Authority. Further, the Authority proposes to consider the notional gearing ratio (debt-equity ratio of 48:52) followed for other PPP airports and cost of debt @ 9% (refer Table 148 of Chapter 8) for the Third Control Period for calculating the value of IDC. Based on the same, the Authority has derived an amount of Rs. 36.01 crores and proposes to allow the same as against Rs. 340.34 crores (as Financing Allowance and IDC) claimed by the TKIAL for the Third Control Period.*

**Comments by TKIAL**: -

3.10.1 To avoid repetition of comments on Cost of Debt, please refer comments provided in point 4.2.

3.10.2 Further it is to be noted that IDC is calculated considering certain projected cash outflows. Whereas in actual, the cash outflows could be different.

3.10.3 **Therefore, we request authority to provide necessary true-up for actual IDC capitalized in the financial statements at the time of tariff determination of next control period, in addition to recalculation of IDC as requested above.**

## 3.11 AERA proposal at clause 7.4.3 to 7.4.7 of CP relating to Allocation Ratios including Terminal Building Ratio

*7.4.3 It was observed that TKIAL has classified the entire area of the terminal building as aeronautical. Upon enquiry, TKIAL stated that this was done in accordance with the AERA Act.*

*7.4.4 The Terminal Building Area is planned in an airport considering the facilities to be provided for Aeronautical activities and provision of space for certain Non-Aeronautical activities such as Food & Beverage, Duty Free etc. Also, in the case of PPP airports, the focus on Non-Aeronautical activities is expected to be more as these would generate revenues and a part of the same would also cross subsidize the Aeronautical charges. The Authority also noted that in other PPP airports such as DIAL, MIAL, BIAL etc. the area allocated for Non-Aeronautical activities are over 10%. Similarly in AAI operated airports like Chennai, Kolkata and Patna, the Terminal Building Ratio is considered as 90%:10%. IMG norms inter alia provides for non-aeronautical area.*

*Also, the Authority has derived Employee Allocation Ratio as 97.49% as well.*

*Accordingly, the Authority has applied various allocation ratios for individual capex and assets. This has resulted into lower capitalization by Rs. 72.67 Cr.*

**Comments by TKIAL**: -

**AERA Act or AERA Guidelines do not provide allocation**

3.11.1 In respect to Terminal Building Ratio, It is observed that as per The AERA Guidelines, 5.2.1 (vi) all the assets which are part of the terminal building shall be considered as part of RAB. Therefore, terminal building as a whole should be considered as RAB / Aeronautical asset and not to be allocated into Aero and Non-Aero. For quick reference the relevant clause from the guidelines is reproduced as follows as *"Notwithstanding the principles mentioned under points (i) to (v) above, assets with fixed locations inside terminal buildings shall be considered within the scope of RAB."*

3.11.2 Further, in respect to allocation of various capex and Operation & Maintenance expenses, we would like to submit that: -

3.11.2.1 Under the Shared-Till (or Hybrid Till) model as proposed in National Civil Aviation Policy, 2016, 30% of Non-Aeronautical Revenues are accounted for cross subsidizing the ARR. There is no mention of allocation of RAB, allocation of Operation and Maintenance etc. Therefore, there is no need to apply the allocation ratio whereby capital and operating expenditure is reduced, which acts as a dual burden for the Airport Operator. Also, the AERA Guidelines do not provide for applying the allocation ratio.

Relevant extract of National Civil Aviation Policy, 2016 is reproduced below:
"To ensure uniformity and level playing field across various operators, future tariffs at all airports will be calculated on a 'hybrid till' basis, unless otherwise specified for any project being bid out in future. 30% of non-aeronautical revenue will be used to cross-subsidize aeronautical charges."

For ease of reference, the relevant clause regarding the 'Shared Till' approach from the Concession Agreement is reproduced hereunder:

28.3.2.

The GOI has, through the National Civil Aviation Policy dated June 15, 2016, approved, ("Shared-Till Approval") the 30% (thirty percent) shared-till framework for the determination and regulation of the Aeronautical Charges for all airports in India, and the same shall be accordingly considered by the Regulator for the purposes of the determination of the Fees/Aeronautical Charges pursuant to the provisions of this Agreement. It is clarified that, for the purposes of this Agreement, the Shared-Till Approval shall apply as on the date of this Agreement notwithstanding any subsequent revision or amendment of such Shared-Till Approval."

3.11.3 As per AERA Order No. 14/2016-17 issued on 23rd January 2017, the Authority has adopted the Hybrid Till whereas 30% of non-aeronautical revenues are used to cross-subsidize aeronautical charges. However, it does not mention that capital and operating expenditure need to be allocated into Aeronautical and Non-Aeronautical which tantamount to cross subsidization of aeronautical charges to the extent non-aeronautical allocation is eliminated. The order only provides for cross subsidization of 30% from non-aeronautical revenues. The relevant extract of the order is as: -
*The Authority, in exercise of powers conferred by Section 13(1)(a) of the Airports Economic Regulatory Authority of India Act, 2008 and after careful consideration of the comments of the stakeholders on the subject issue, decides and orders that:*
*The Authority will in future determine the tariffs of major airports under "Hybrid-Till" wherein 30% of non-aeronautical revenues will be used to cross-subsidize aeronautical charges. Accordingly, to that extant the airport operator guidelines of the Authority shall be amended. The provisions of the Guidelines issued by the Authority, other than regulatory till, shall remain the same.*

**IMG Norms are not applicable to PPP Airports**

3.11.4 Notwithstanding the above, it is submitted that norms of IMG report are not applicable to PPP airports, as per clause no. G of IMG Report. reproduced below:
*"In case of airports developed through Public Private Partnerships the project authorities may adopt a case-by-case approach with respect to norms relating to unit area and unit costs. Based on the judicious consideration of international best practices and financial viability, the norms may be specified in each case prior to inviting bids for private participation."*

3.11.5 No norms with respect to unit area and costs were mentioned in the bidding documents and Concession Agreement of Thiruvananthapuram Airport. The Concession Agreement does not mention regarding the applicability of the IMG Norms. Therefore, we request AERA not to apply IMG norms in the case of Thiruvananthapuram Airport.

3.11.6 **In view of the foregoing, we request the Authority to apply the Terminal Building Ratio, wherever it is factored in CP, as 100% Aeronautical which is in line with the Guidelines of 2011.**

3.11.7 Without prejudice to the above and in the alternate, terminal building is built with certain length, breadth and height considering the passenger throughput and service level requirements. The structure of the terminal includes façade, ceiling, columns etc. which have no relation with leasable floor area. The commercial activities like retail, food and beverage, etc. require limited works where the cost is much lower than the cost required to build the terminal building. TKIAL submits that terminal building allocation ratio should, at best, be based on cost of floor plate of commercial leased

area in the terminal vis-à-vis total cost of the terminal building, instead of allocating entire terminal cost based on leasable area.

3.11.8 Without prejudice to the above, it is submitted that the terminal building allocation ratio cannot be a notional number as has been done in the Consultation Paper. The Authority has applied the actual capital expenditure and Operating Expenditure for FY22-23 while projecting the expenses for the control period, and it is logical that it should have used the actual terminal building ratio. The terminal building allocation ratio should not be different than actual.

3.11.9 **Therefore, we request AERA to kindly revise all the calculations provided in the consultation paper without allocating building blocks into Aeronautical and Non-Aeronautical, which are not required per se either in AERA Guidelines or NCAP.**

## 3.12 AERA proposal as per 7.5.5 to 7.5.7 on page 168-169 of CP relating to Depreciation

*7.5.5 The Authority also notes that most of the useful lives considered by TKIAL are in deviation from those prescribed by AERA vide Order No. 35/2017-18 dated 12th January 2018 regarding determination of useful lives of airport assets. TKIAL in their submission has mentioned that it has considered different rates for certain asset classes based on the recommendations of independent technical evaluation made for Lucknow International Airport and Ahmedabad International Airport. The Authority notes that the reasons justifying the deviation from Order No. 35/2017-18 dated 12th January 2018 was not sufficiently explained in the technical evaluation shared by the Airport Operator. The intention behind the Order is to have a uniform approach in the determination of useful lives for key airport assets, therefore the methodology adopted by TKIAL lacks merit.*

*7.5.6 Further, the useful life prescribed in AERA's Order No. 35/2017-18 dated 12th January 2018 has considered the typical usage of these assets for an airport and there appears to be no reason for the usage of these assets to vary from the typical usage for TRV. The Authority has also provided TKIAL with adequate maintenance expenditure to enable the airport to maintain the assets in good working conditions during the life of the assets. Therefore, the Authority proposes to not consider the lower useful life submitted by TKIAL for the assets.*

*7.5.7 The Authority notes as under:*
*Asset class – Building: The Expert has recommended shorter life for False Ceiling, Sanitation works, Glass facade and Flooring works which appear to be integral part of the Airport Terminal Building. The Authority's Order No. 35/2017-18 does not provide for reducing the life of assets under Asset class - Buildings. The Authority observes that various components mentioned above are also an integral part of the Terminal Building and should be added to the Terminal Building cost by applying the same rate of depreciation as that of buildings. While the technical report provided by the Airport Operator has determined the shorter life to be adopted, it has not provided sufficient rationale for adopting such a shorter useful life. Since these assets are all part of the building, the Authority is of the view that the same rate applicable to building should be applied to these assets and no reduction in life of these assets are called for. Further, the Authority notes that adequate maintenance expenditure is allowed to enable the Airport Operator to maintain the assets in good working condition during its entire life. The Authority has issued Order No. 35/2017-18 as part of its normative approach to various Building Blocks in Economic regulation of Major Airports where it has stated that "The Authority has been of the considered view, that it would be preferable to have as far as practicable, a broad year to year consistency in what Depreciation is charged by the companies as certified by the relevant statutory auditors and what the Authority would take into account in its process of tariff determination. Issue of a notification will ensure this objective." In view of all the above, the Authority is not inclined to deviate from ensuring this objective and therefore proposes not to consider the shorter useful life of 25 years claimed by the Airport Operator for both the Terminal Building and newly projected Cargo terminal building.*
*Asset Class – Runways. Taxiways and Aprons: The Expert has recommended adopting a shorter life of 20 years based on useful life followed by certain international associations*

*and regulators, like, Federation Aviation Administration – US Department of Transportation, Civil Aviation Authority – UK, Australian Airports Association — Australia, International Civil Aviation Organization, etc., which the Authority feels does not provide proper justification for adopting a shorter useful life. Therefore, the Authority finds no reason to reduce the life of the Runway, which enhances the burden of Airport users by increasing the tariff.*

*Other Asset Classes: Order No. 35/2017-18 provides for specific determination of life through technical evaluation for specific assets other than those listed in the Order based on specific requirements of the Airport.*

*The Authority finds that none of the assets in these classes where a shorter life has been adopted as specific assets are based on specific requirement of the Airport. Therefore, the Authority finds no merit in reducing the life of such assets for tariff purposes.*

*Fuel farm facility — The Authority examined the list of items forming part of Fuel facility including assets planned to be purchased from IOCL and observed that there are assets belonging to different asset category, namely Buildings, Roads, Plant and Machinery, Vehicles etc., and based on the same proposes not to consider the weighted average useful life of 7.5 years claimed by the Airport Operator. Instead, the Authority proposes to adopt the specific depreciation rate prescribed as per Order No. 35/2017-18 for such asset category.*

**Comments by TKIAL**: -

3.12.1 In this regard, reference is made to the Useful life of Assets Order No. 35/2017-18 dated 12th January 2018, *"... if the period of useful life of assets is considered differently, the Airport Operator shall document and provide the reasons/justification and the basis for the period considered in determining the useful life of assets for the purpose of tariff determination which shall be examined and considered by the Authority."*

3.12.2 TKIAL has considered the depreciation for the assets based on the useful life of the assets as per the Companies Act and useful life of various assets as recommended by independent technical evaluation for Lucknow and Ahmedabad Airports. The said technical report provided reasons as to why a shorter lifespan should be considered. TKIAL also submits that the same is consistent with Authority's Order No. 35/2017-18 dated 12th January 2018 and amendment to the Order dated 09th April 2018.

3.12.3 **We request the Authority to kindly allow the depreciation rates as assessed by the technical auditor, which is in line with the AERA Order.**

# 4 Chapter 4 “Comments on Consultation Paper Chapter 8 - Fair Rate Of Return (FRoR) For The Third Control Period”

## 4.1 AERA proposal as 8.2.1 to 8.2.4 on page 173 of CP relating to Cost of Equity

*8.2.1 The Authority had commissioned independent studies for the evaluation of cost of capital separately, in case of each PPP Airport, namely DIAL, MIAL, GHIAL, BIAL and CIAL through a premier institute, namely Indian Institute of Management (IIM) Bangalore and proposes to use these study reports as a basis, to the extent applicable and relevant, to ascertain the Cost of equity of TRV for the Third Control Period.*

*8.2.2 The Authority believes that the Cost of Equity for the purpose of determination of FRoR has to be fairly consistent across PPP airports so that there is uniformity of evaluation of their inherent financial risk, and compensation for the same in the form of return on RAB. The independent study reports have drawn from the international experience of airports and their conclusions have been evaluated to the extent comparable with TRV in terms of hybrid till, ownership structure, size, scale of operations and regulatory framework. The average Cost of equity arrived at by the independent study reports is 15.18%.*

*8.2.3 The above independent study reports have used the Capital Asset Pricing Model (CAPM) and a notional gearing (Debt: Equity) ratio of 48:52 to determine the levered Equity beta and accordingly, derive the Cost of equity.*

*8.2.4 Based on the above reports, the Authority proposes the Cost of equity of 15.18% for TRV for computation of The Fair Rate of Return for the Third Control Period.*

**Comments by TKIAL**: -

4.1.1 As per AERA Guidelines. AERA is expected to estimate cost of equity by using CAPM for each AO subject to consideration of such factor as the Authority may deem fit. However, in the instant CP, AERA has not estimated the cost of equity for TKIAL. Rather it has taken reference from Cost of Equity calculated for other PPP Airports and applied it to TKIAL. This is not in line with the AERA Guidelines.
Extract from the AERA Guidelines

*"5.1.3 Cost of Equity*

*Cost of Equity – The Authority shall estimate the cost of equity, for a Control Period, **by using the Capital Asset Pricing Model (CAPM)** for **each** Airport Operator, subject to the consideration of such factors as the Authority may deem fit."*

4.1.2 TKIAL had adopted the study undertaken by LIAL through services of PriceWaterhouse Coopers Services LLP (PwC) on evaluating the applicable Cost of Equity (CoE). Based on this study, the AO considered the CoE as 17.30%.

4.1.3 The methodology used to compute the CoE of LIAL (as well as TKIAL) is the Capital Asset Pricing Model (CAPM), as mentioned in AERA Guidelines. The three components to be estimated in the CAPM are (a) the beta of the CCSIA, (b) the risk-free rate and (c) the equity risk premium. Following assumptions related to above three components which appropriately capture the risks of CCSIA have been used to calculate the CoE:

4.1.4 Identification of comparable airports: Various airports were identified which are listed on stock exchanges across the globe or have regulated betas. A set of airports were removed from the list because of either lack of data for the required time period or unreliable data.

4.1.5 Determination of equity and asset beta for the selected airports: Beta is indicative of the systematic risk of the project. In order to calculate this, the analysis regresses the movement of the stock prices (of respective airports) on the movement of an index representing the market portfolio. The beta values pertaining to this regression are called the 'equity' betas. Once the equity beta is calculated, the analysis 'un-levers' the beta (i.e., purges off the effects of the capital structure) by using the Hamada equation. Unlevered beta is called the 'asset' beta for the respective airports.

4.1.6 Computing the proximity scores for each airport and asset beta of CCSIA: Once the asset betas have been computed, quantifiable assessment has been undertaken for identified airports to determine the proximity/ relevance scores. All the airports have been compared with Lucknow airport based on the following airport characteristics:

- Regulatory Environment
- Operational Structure
- Payment Structure
- Ownership Structure

4.1.7 Numeric values of 1 to 3 have been assigned to each factor wherein lower the score, more comparable is the airport to CCSIA. Furthermore, an inverse of the proximity scores is used to calculate the 'asset' beta of CCSIA

4.1.7.1 ***Re-lever the asset beta to obtain the equity beta:*** *The asset beta of the CCSIA is relevered using the Hamada equation to obtain the equity (re-levered) beta. As the re-levered beta is a function of D/E or gearing ratio, the beta value changes whenever the D/E or gearing ratio changes. A gearing ratio of 48:52 is considered. This has been derived from the gearing ratios set by the regulators at different comparable international airports.*

4.1.7.2 ***Risk Free Rate:*** *An average of daily yield for 10 years of the 10-year Government of India security has been considered as the risk-free rate.*

4.1.7.3 ***Equity Risk Premium:*** *To avoid any bias, an average of equity risk premiums computed by a list of studies and standard market indices are taken for the analysis. The list of the same is provided as follows:*

- Prof Damodaran's estimate of ERP as of January 2021 based on ratings of sovereign bonds.
- Prof Damodaran's estimate of ERP as of January 2021 based on ratings of sovereign bonds.
- Forward looking ERP of India as estimated in a study conducted in April 2019 by Grant Thornton
- ERP published by Incwert Valuation Chronicles in June 2020
- ERP computed based on Nifty 50
- ERP computed based on Sensex.

4.1.8 As is clear from above, a well-defined systematic approach which appropriately captures the risks specific to CCSIA has been used for computing reasonable rate of CoE for CCSIA.

4.1.9 Further we would like to point out that IIM B study considered 12 airports, out of which only two airports belong to developing countries. Airports in developing markets are exposed to each of these risks differently when compared to developed markets. Following are the risks which the airports in developing market have to face:

4.1.9.1 ***Demand Risk*** *– Apart from the economic conditions which affect demand, demand for air travel is also highly elastic with respect to air fare in India and other developing economies. Any increase or decrease in air fare due to fuel prices or other input costs results in relatively higher traffic volatility.*

4.1.9.2 ***Counterparty Risk*** *– Airports in developing countries typically derive a major part of their revenue from aeronautical services, as against the developed markers where non-aeronautical revenue is higher.*

4.1.9.3 ***Regulatory Risk*** *– Regulations in developing countries are still evolving and are not stable.*

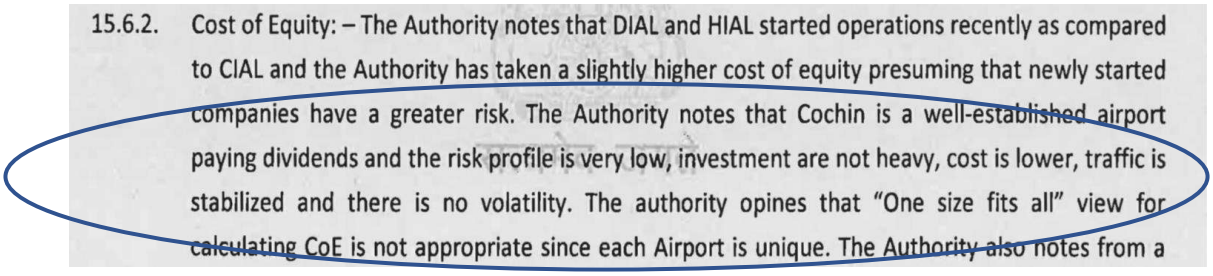
4.1.10 Asset beta of airports in developing countries is consistently higher than the asset beta of airports in developed economies. This can be demonstrated by the data provided in the IIM B study in which the asset beta for Sydney airport is 0.40 whereas the asset beta for Airport of Thailand is 0.86. This shows the quantum of variation in risk perception between developed and developing countries.

4.1.11 Study done by PwC includes airports from both developed economies like France, Spain and Switzerland and developing economies like Mexico, Malaysia, Thailand. Following are the asset betas of various airports as per study:

| S.No | Airport Operator | 5-year asset beta on 5 year average DER | 5-year asset beta on latest DER |
|---|---|---|---|
| 1. | Sydney Airport Holdings Private Limited | 0.692 | 0.719 |
| 2. | Auckland International Airport Limited | 1.030 | 1.052 |
| 3. | Flughafen Zurich | 0.865 | 0.838 |
| 4. | Groupe Aeroports De Paris | 0.922 | 0.922 |
| 5. | Aena | 0.102 | 0.121 |
| 6. | Asur (Aeroporto Del Sureste) | 1.338 | 1.340 |
| 7. | Københavns Lufthavne | 0.423 | 0.416 |
| 8. | Grupo Aeroportuario Del Centro Norte S.A.B. De C.V. Adr | 0.960 | 1.020 |
| 9. | Grupo Aeroportuario Del Pacifico, S.A.B. De C.V | 1.430 | 1.428 |
| 10. | Aeroporto Guglielmo Marconi Di Bologna S.P.A | 0.642 | 0.649 |
| 11. | Fraport Ag | 0.686 | 0.669 |
| 12. | Airport Of Thailand Public Limited Company | 0.984 | 1.002 |
| 13. | Malaysia Airport Holdings Berhad | 0.848 | 0.893 |
| 14. | Flughafen Wien Ag | 0.527 | 0.610 |
| 15. | Gruppo Toscana Aeroporti | 0.457 | 0.455 |

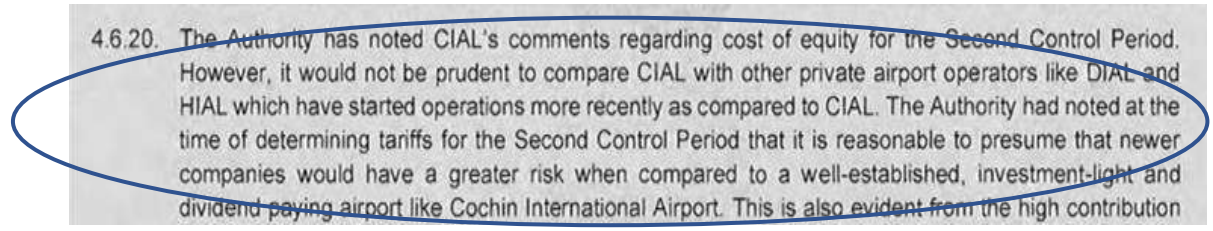
4.1.12 As is evident from table above, asset betas of airports in Mexico like Grupo Aeroportuario Del Centro Norte, Grupo Aeroportuario Del Pacifico, in Thailand like Airport of Thailand have asset betas of more than 1.

4.1.13 Further, we would like to give reference to para 15.6.2 of the Cochin Airport's Second Control Period Tariff Order No.7/ 2017-18 wherein Authority has taken the stance that newer airports which have higher risks need to be **adequately compensated by higher cost of equity and one size does not fit all**. Contents of the order are reproduced below



15.6.2. Cost of Equity: – The Authority notes that DIAL and HIAL started operations recently as compared to CIAL and the Authority has taken a slightly higher cost of equity presuming that newly started companies have a greater risk. The Authority notes that Cochin is a well-established airport paying dividends and the risk profile is very low, investment are not heavy, cost is lower, traffic is stabilized and there is no volatility. The authority opines that "One size fits all" view for calculating CoE is not appropriate since each Airport is unique. The Authority also notes from a

4.1.14 The same point is again acknowledged by the Authority in Tariff Order No 08/2021-22 for CIAL for the Third Control Period. The relevant extract is provided as: -



4.6.20. The Authority has noted CIAL's comments regarding cost of equity for the Second Control Period. However, it would not be prudent to compare CIAL with other private airport operators like DIAL and HIAL which have started operations more recently as compared to CIAL. The Authority had noted at the time of determining tariffs for the Second Control Period that it is reasonable to presume that newer companies would have a greater risk when compared to a well-established, investment-light and dividend paying airport like Cochin International Airport. This is also evident from the high contribution

TKIAL is a new Concession Agreement and by the logic of the Authority, TKIAL has to have higher return than the Cochin Airport (CIAL).

**4.1.15 We hereby request AERA to accept the CoE as submitted by TKIAL in the MYTP supported by an in-depth study conducted by an independent consultant PwC as per CAPM methodology prescribed under AERA Guidelines.**

## 4.2 AERA proposal as 8.2.5 to 8.2.11 on page 174 of CP relating to Cost of Debt

*8.2.5 The Authority notes that TKIAL has considered Cost of debt at 12% for the Third Control Period based on its current borrowing rate from a related party and based on Adani Airport Holdings Limited's all-in borrowing cost of 12.10%.*

*8.2.6 Since the Airport has not obtained any credit rating from an external rating agency, there is no direct comparable entity or market data for determining cost of debt for TRV.*

*8.2.7 However, the Authority recommends that the Airport bring in further efficiencies in its cost of borrowing by leveraging its parent entity's financial strength in order to reduce the interest rates. This suggestion is also in keeping with the spirit of PPP whereby it is expected that the financial strength of PPP airports will be maintained at an optimal level and their cost of capital will be within reasonably allowable limits. TKIAL should avail the synergies and benefits owed to it by its strong shareholding and balance sheet of its Parent companies and therefore work towards bringing down the cost of debt to the same level as other PPP airports.*

*8.2.8 The Authority also notes that the average cost of debt of the other five PPP airports viz., DIAL, MIAL, GHIAL, BIAL and CIAL is 8.96%.*

*8.2.9 Accordingly, the Authority has considered the Cost of Debt of 9% for the computation of Fair Rate of Return. The Authority also directs TKIAL to ensure that Related Party transactions, if any, with respect to borrowing of funds are benchmarked with most optimum rates available and is well justified.*

*8.2.11*
*With respect to the Notional gearing ratio of 48:52, the Authority would like to reiterate that FRoR is computed on the basis of cost of equity and Cost of Debt. It had determined the Cost of Equity based on the IIM Bangalore's independent study reports for other PPP Airports whereas the Cost of Debt was* ***computed after considering the average bank lending rate of public sector banks and scheduled commercial banks as per the Reserve Bank of India's publication of December 2022*** *and the Cost of Debt of five other PPP airports viz., DIAL, MIAL, GHIAL, BIAL and CIAL. Since the debt equity mix had been decided by the Authority considering the efficient capital structure and the interest of all the Stakeholders, the notional gearing ratio of 48: 52 will not be trued up during the tariff determination for the next Control Period.*

**Comments by TKIAL**: -

4.2.1 TKIAL has considered Cost of debt at 12% for the TCP based on its current borrowing rate from Adani Airport Holdings Limited (AAHL) which in turn has availed borrowing from global institutions like Standard Chartered Bank, Barclays Bank PLC, Canara Bank, Siemens and Union bank.

4.2.2 However, the authority has proposed the cost of borrowing to be considered at 9% p.a. being the average of the other five PPP airports viz. DIAL, MIAL (Mumbai), GHIAL, BIAL and CIAL (ranges from 7.80% to 10.30%).

It is to be noted that AERA has allowed cost of debt of over 12% in the FCP for various PPP airports.

Refer Para 84 TDSAT judgement of BIAL dated 16th December 2020

*84. BIAL is aggrieved by the tariff order for the first control period because the Authority has maintained a ceiling in respect of cost of debt for* ***Rupee Term loan at 12.5%***

Refer Para 14.5 from FCP tariff order dated 20th April 2012 for DIAL

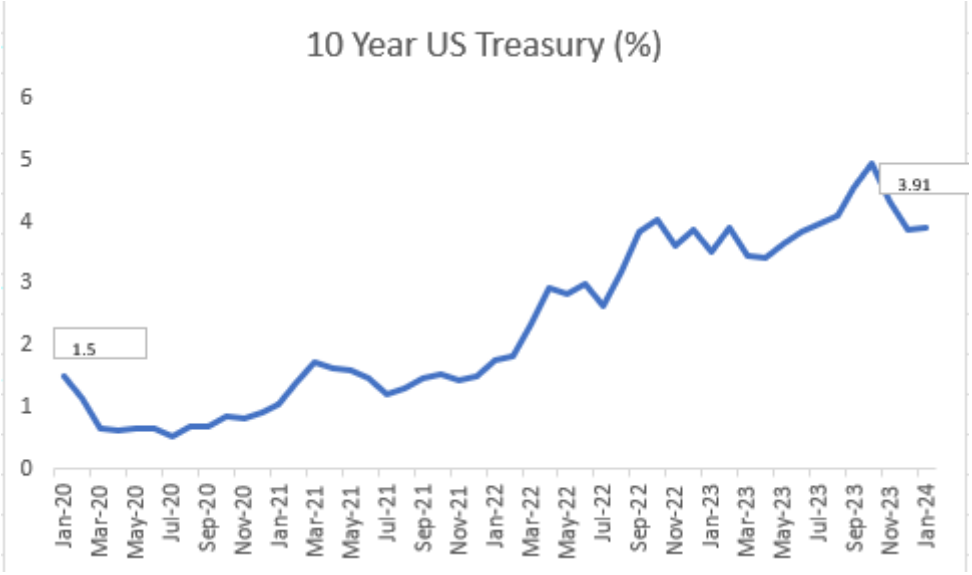
Decision No. 12. Decision on Cost of Debt (for years 2011-12, 2012-13 and 2013-14)

*12.a. The Authority decided to consider **the actual cost** of Rupee Term Loan, paid by DIAL for the years 2009-10 and 2010-11 for the period 2011-12 to 2013-14. **The cost of debt is taken at 12.17% pa.***

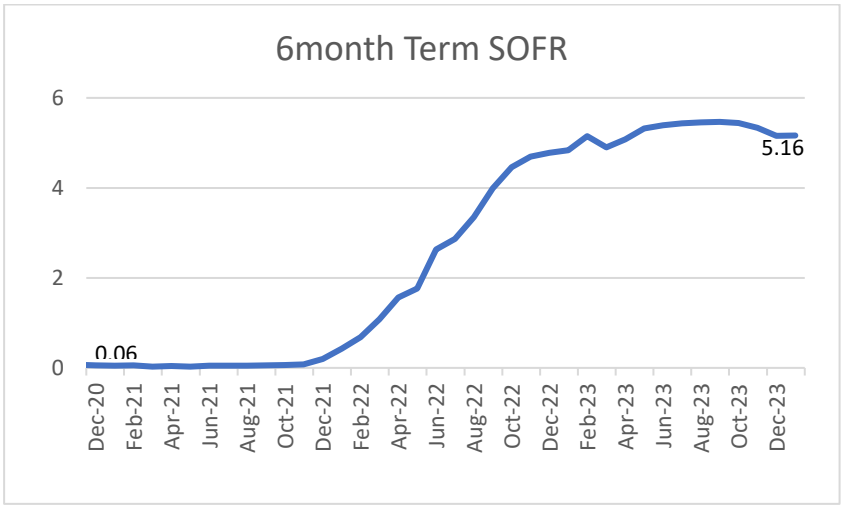
**4.2.3** It is to be noted that TCP tariff orders of above-mentioned PPP airports were issued during the period from December 2020 to August 2021. The interest rates have increased significantly in India and globally after the same which are explained in detail in subsequent paragraphs. Hence, comparing the same with current TKIAL`s cost of debt is not logical. **The change in the global and domestic interest rates after the said period is provided in the following paragraphs:**

**4.2.3.1 Global Increase in Interest Rates:**

Given the changing economic scenarios across the globe the central banks of the countries have been increasing their benchmark rates. Below chart details 10 years US Treasury movement, where it is evident that the benchmark rates have been increasing constantly leading to increase credit spreads and cost of the borrowing globally:

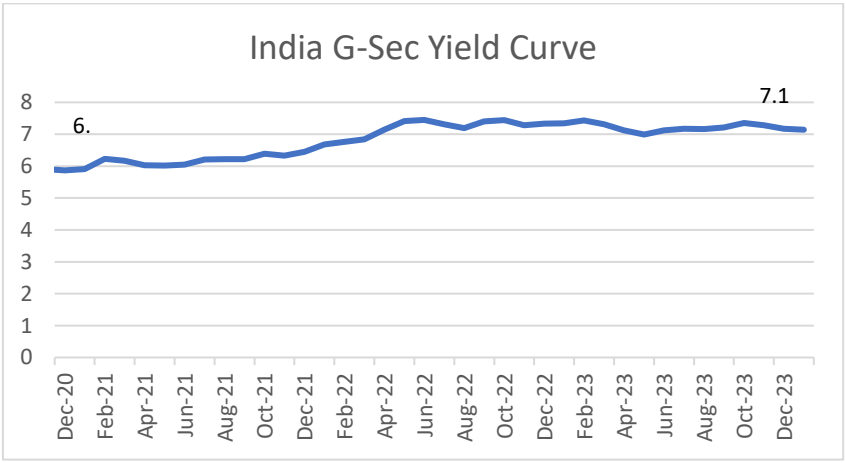


4.2.3.2 **Secured Overnight Financing Rate (SOFR)**, has also increased materially (~5.10%) in the said period:

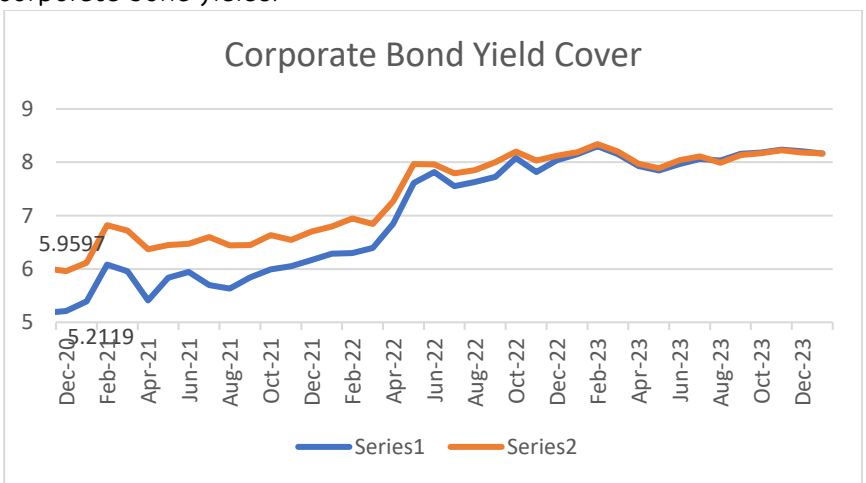



**4.2.3.3** ***Increase in Domestic Interest Rates in India:***

Since May-2022, the Reserve Bank of India has increased Repo Rate by 2.50% leading to cost of domestic borrowing becoming dearer in India. Following chart depicts increasing trend in 10-year Indian government securities yields:




Following chart depicts increasing trend in 5-year and 3-year AA rated corporate bond yields:



#### 4.2.3.4 *Uncertainty in Geo-Political Scenario:*

Geopolitical tensions and higher uncertainty. Russia's actions and the responses of other countries have sharply increased the level of geopolitical risk, weakening confidence and likely heralding a period of high policy uncertainty. The war could destabilize the region further because of uncertainty about potential escalation, spillovers of economic and political stresses to other countries, and additional sanctions or other policy responses. The risk of large-scale cyber security events linked to heightened geopolitical tensions—including attacks targeting public infrastructure and financial systems—has also increased. High policy uncertainty is associated with weaker investment and trade as firms seek to hedge against adverse outcomes.

#### 4.2.3.5 *Higher inflation and accelerated monetary policy tightening:*

The inflationary pressures caused by surging commodity and food prices may accelerate monetary policy tightening, heighten the risk of stagflation, and increase poverty and inequality. Market-based measures of long-term inflation expectations in the United States and Germany have reached their highest levels on record. While the U.S. Federal Reserve was expected to implement several policy rate increases this year even before the war, higher inflation and inflation expectations may warrant a steepening of this monetary tightening cycle. Similar pressures may emerge in the euro area and in EMDEs. Global financial conditions have already tightened considerably since February. A further tightening will put pressure on EMDEs with pre-existing financial vulnerabilities such as elevated debt, large foreign currency-denominated debts, sizeable near-term debt rollover requirements, and twin current account and fiscal deficits. EMDE commodity importers with weaker credit ratings are especially susceptible to escalating financial strains.

Impact on Financial Markets

Equity volatility has spiked, especially in Europe, while debt and equity flows have turned sharply negative and sovereign spreads have risen for commodity importers.

#### 4.2.3.6 *Equity market volatility has risen markedly:*

Equity volatility in the United States (as proxied by the VIX Index) also increase substantially in the month following the start of the war, though has since declined somewhat. Global stock prices fell sharply in early March but have largely recovered.

#### 4.2.3.7 *Sovereign borrowing costs have increased:*

U.S. 10-year government bond yields have risen considerably, reflecting a range of factors including higher expected inflation. Spreads on EMDE bonds have not widened significantly on average, although bond issuance by EMDEs across February-March was weaker than in the same period of any year since 2016. EMDE-wide averages mask substantial divergence between groups. Excluding Russia, Ukraine and Belarus, sovereign spreads are lower for commodity-exporting EMDEs since the eve of the invasion, but substantially higher for commodity importers. Debt and equity flows since February 2022 have generally remained positive in LAC and strengthened in MNA—both

commodity exporting regions—while turning sharply negative in other regions.

4.2.4 Rationale of Cost of Debt at TRV:

4.2.4.1 Considering the current profile of operation and outlook, the rating of TRV will be lower than the investment grade. Interest Rate by lenders is fixed on the risk profile, Cashflow generating capacity, other parameters including credit rating both internal (by Lenders) and by Rating Agencies.

4.2.4.2 The option of raising funds at TRV was not possible without Corporate Guarantee support from Adani Group. Borrowing with Corporate Guarantee of Adani Group in turn amounts to Borrowing at Holding Company level.

4.2.4.3 We would also like to highlight the fact that the Borrowing costs for Government owned Entity and Private Sectors entity are different. Lenders are more comfortable in lending to Government entity since repayment is backed by sovereign guarantee. (which carries highest Rating). Whereas in case of private sectors, lending comfort is driven from Industry outlook, cashflow generating capabilities, external and internal rating.

4.2.4.4 The linking of cost of debt with Weighted Average Lending Rate of Public Sector banks and commercial banks of **Dec-2022 as given in the CP** is not appropriate because of the following reasons: -

a. Weighted Average Rate means average rate across Rating grades (AAA to BB) and loan duration. It ignores the basic premise of lending rate which is based on external rating and internal rating and duration of specific loan.
b. A major portion of borrowings by PSU Bank is to State and Central Government Companies and Departments which carries lower interest considering that those are considered as Sovereign rating.
c. The interest rate for lending for priority sectors (which constitutes Agriculture and other Areas) have concessional rate of Interest under various schemes of State and Central Government.
d. With inclusion of all the above, the average rates become lower. Comparing the said average with a private corporate borrowing rate will not be appropriate.
e. The Authority has referred to outdated Dec-22 publication whereas the CP is released in February 2024. Based on the latest information the benchmark lending rates have already been raised.

4.2.4.5 To have efficiencies in terms of quantum, maturities, and interest rates, borrowing at AAHL was availed in the form of External Commercial Borrowings for funding requirement of various Airports.

4.2.4.6 Further AAHL combined with Airport SPVs is domestically rated as A+/Stable by India Ratings, which at TRV Level will be lower than investment grade.

4.2.4.7 The transition of the Airport from AAI to TRV happened during the COVID impacted period. This has negatively affected the revenue and cash flow of TRV and its credit worthiness.

4.2.4.8 We believe that TRV will be able to demonstrate the competitive advantage of Private sector in the operation of Airport which will in turn be reflected in the borrowing cost going forward. Keeping this in mind, we at present have locked up rates of borrowing for a period of 3 years only to enable us to take advantage of reduced ROI going forward with synergy of operations.

4.2.5 Considering the fact that the debts raised by AO are as per RBI guidelines from reputed global Banks, reducing the cost by AERA than the actual rate of borrowing by the AO is not in line with AERA Guidelines and, according to us, is arbitrary and prejudicial to the interest of AO and airport development.

4.2.6 Further, Clause 5.1.4 of the AERA Guidelines – 'Cost of Debt', categorically lays down that the Authority shall consider forecasted cost of "existing debt" based on a review of its sources, procedures and the methods used for raising such funds. In the instant CP, the Authority has noted the actual cost of debt of AO is 12% which should have been considered as per AERA Guidelines.

**4.2.7 As per the MIAL TDSAT Order for SCP and TCP, it has been decided that actual cost of borrowing should be considered by AERA. Refer Para 313, 320 and 321 of the TDSAT Order**

*313. This contention of respondent no.1 is not accepted by this Tribunal mainly for the reason that there cannot be a fixed cost of debt for the entire 3rd Control Period of five years which is from 2019-2024. The cost of debt which is actually incurred by the appellant should have been considered by AERA. The cost of debt depends upon marginal cost of funds based lending rate and the time period within which the loan is to be repaid. Inflation is one of the most important factor for determination of market forces for further determination of MCLR rates. Moreover, the spread for the time within which loan is to be repaid depends upon the credit profile of the entity.*

*320. In view of this, **actual cost of debt shall be allowed by AERA for 3rd Control Period especially looking to the provisions of Section 13(1)(a)(i) of the AERA Act, 2008**. For the ready reference, Section 13(1) of AERA Act, 2008 reads as under: - "POWERS AND FUNCTIONS OF THE AUTHORITY*

*13. Functions of Authority. - (1) The Authority shall perform the following functions in respect of major airports, namely: - (a) to determine the tariff for the aeronautical services taking into consideration-- (i) the capital expenditure incurred and timely investment in improvement of airport facilities; (ii) the service provided, its quality and other relevant factors; (iii) the cost for improving efficiency; (iv) economic and viable operation of major airports; (v) revenue received from services other than the aeronautical services; (vi) the concession offered by the Central Government in any agreement or memorandum of understanding or otherwise; (vii) any other factor which may be relevant for the purposes of this Act: Provided that different tariff structures may be determined for different airports having regard to all or any of the above considerations specified at sub-clauses (i) to (vii); (b) to determine the amount of the development fees in respect of major airports; (c) to determine the amount of the passengers service fee levied under rule 88 of the Aircraft Rules, 1937 made under the Aircraft Act, 1934 (22 of 1934); (d) to monitor the set performance standards relating to quality, continuity and reliability of service as may be specified by the Central Government or any authority authorised by it in this behalf; (e) to call for such information as may be necessary to determine the tariff under clause (a); (f) to perform such other functions relating to tariff, as may be entrusted to it by the Central Government or as may be necessary to carry out the provisions of this Act." (Emphasis Supplied)*

*321. In view of the aforesaid provision, AERA ought to have allowed actual cost of debt incurred by the appellant especially looking to the fact that debt availed by this appellant is from reputed lenders.*

**4.2.8 Looking at above facts and TDSAT judgement, it is evident that the cost of borrowing of 12% requested by TKIAL is reasonable, comparable and as per actuals funding raised through third party. We hereby request the Authority to consider the same.**

# 5 Chapter 5 “Comments on Consultation Paper Chapter 9 - Inflation For The Third Control Period”

## 5.1 AERA proposal as per clause 9.2 on page 176 of CP relating to Inflation for the Third Control Period

*9.2.2 Accordingly, the Authority proposes to consider the actual Wholesale Price Index (All Commodities) inflation in FY 2022-23 and the mean of Wholesale Price Index inflation forecast (All commodities) for FY 2023-24 till FY 2026-27 as given in the 85th Round of survey of professional forecasters on macroeconomics indicators of RBI, for the Third Control Period for TRV.*

*9.2.3 The Authority assumes that the inflation rate would be stable and remain constant from FY 2024-25 till FY 2026-27. Accordingly, the following table shows the inflation rates as proposed by the Authority for the Third Control period:*

**Table 153: Inflation rates proposed by the Authority for the Third Control Period**

| Particular | FY23 | FY24 | FY25 | FY26 | FY27 |
|---|---|---|---|---|---|
| WPI Inflation | 9.42% | 0.30% | 3.80% | 3.80% | 3.80% |

**Comments by TKIAL**: -

5.1.1 In respect to inflation considered by the Authority, we would like to submit as follows:

5.1.1.1 Inflation considered for FY 2023-24 is only 0.3%, which is abnormally low. To avoid repetition reference is invited to comments at 3.2.3 relating to averaging inflation during the abnormal period.

5.1.1.2 Also, in view of long-term strategy, TKIAL has tied up with various vendors with an annual increase in cost ranging from 4% to 5%. Considering 2 main contracts (1. Technical Package (R&M) and 2. Non-Technical package (Housekeeping)) awarded to vendors include a clause of 4% Y-o-y increase. As the main cost element for contractors is the salaries & wages to be paid to their employees, this was the minimum that they expect as an annual increase at the end of various rounds of negotiations. AERA has proposed a 6% growth in Employee cost which is subject to comment raised in this document.

5.1.1.3 In case any inflation cost is considered below 5% would mean that the Airport Operator would be at loss in recovering the genuine and legitimate cost of O&M expenses.

5.1.2 Hence, we request the Authority to consider at least 5% inflation cost for FY 2023-24 and onwards.

# 6 Chapter 6 “Comments on Consultation Paper Chapter 10 - Operation And Maintenance (O&M) Expenses For The Third Control Period”

## 6.1 AERA proposal as per clause 10.2.3 to 10.2.13 on page 180-183 of CP relating to Allocation of O&M expenses to Aeronautical and Non-Aeronautical activities

*TKIAL had submitted all O&M Expenses as 100% Aero while the Authority has applied various allocation ratios for various O&M Expenses to arrive at the Aeronautical O&M Expenses.*

*Table 158 below indicates the summary of the various allocation ratio considered by the Authority:*

| Expense Category | Allocation as per TKIAL | Allocation as per the Authority | Allocation %* |
|---|---|---|---|
| Manpower costs: AAI employees (Up to Deemed Deputation Period) | Aeronautical | EHCR - AAI Employees | 98.89% |
| Manpower costs: AAI employees (Deficit Employee Cost) | Aeronautical | Aeronautical | 100.00% |
| Manpower costs: TKIAL employees | Aeronautical | EHCR - TKIAL Employees | 96.44% |
| Utility Expenses - Electricity Cost | Aeronautical | Aeronautical | 100.00% |
| Utility Expenses - Water & Fuel Cost | Aeronautical | GBR | 97.57% |
| IT expenses | Aeronautical | GBR | 97.57% |
| Rates & taxes | Aeronautical | TBLR | 90.00% |
| Security expenses | Aeronautical | GBR | 97.57% |
| Corporate Allocation | Aeronautical | EHCR - TKIAL Employees | 96.44% |
| Administrative Expenses - Collection charges on UDF | Aeronautical | Aeronautical | 100.00% |
| Administrative Expenses - Others | Aeronautical | GBR | 97.57% |
| Insurance | Aeronautical | GBR | 97.57% |
| R&M | Aeronautical | GBR | 97.57% |
| Other operating expenses | Aeronautical | TBLR | 90.00% |
| Independent Engineer Fees | Aeronautical | Aeronautical | 100.00% |
| Runway recarpeting | Aeronautical | Aeronautical | 100.00% |
| Fuel O&M expenses | Aeronautical | Aeronautical | 100.00% |
| Cargo O&M expenses | Aeronautical | Aeronautical | 100.00% |

**Comments by TKIAL**: -

**6.1.1 In order to avoid repetition of comment, please refer to 1.3.2 and 3.11 for our request for considering 100% Aero allocation.**

## 6.2 AERA proposal as per clause 10.2.16 and 10.2.17 on page 184-195 of CP relating to Manpower Cost of AAI and TKIAL Employees

*10.2.16 Manpower Expenses of AAI employees*

*....*

Further, the Authority proposes to revise the 10% Y-o-Y increase in Manpower costs claimed by TKIAL to 6% for the remaining four (4) tariff years of the Third Control Period as approved by the Authority for other similar airports.

*10.2.17 Manpower Expenses of TKIAL*

*....*

*The Authority has analysed the Employee Headcount projected vis-à-vis the functions of each department mentioned in Table 164 and proposes the following revisions in Aeronautical Employee Headcount projected by TKIAL for the Third Control Period:*

*i. Security department – The Authority notes that TKIAL will be outsourcing certain activities pertaining to the Security department. Hence, the Authority proposes to consider only 50% of the Aeronautical Employee Headcount of the Security department, projected by TKIAL, for the last three tariff years of the Third Control Period.*

*ii. Airside Management – The Authority notes that the Headcount projected by TKIAL for all the tariff years is on the higher side considering that the requisite facility and manpower for ground handling (outsourced) and VDGS system is already in place. Further, the activity of bird chasing has been outsourced by TKIAL. However, considering the increase projected in the ATM traffic during post-pandemic recovery in the current Control Period, the Authority proposes to increase the number to thirty (30) employees, thirty-five (35) employees and forty (40) employees respectively in the last three tariff years as against 42, 44 and 44 employees respectively estimated by TKIAL.*

*v. Inline Baggage Screening system (ILBS) – The Authority notes that TKIAL has proposed deploying 54 employees in FY 2024-25 and 73 employees each for FY 2025-26 and FY 2026-27 in this department. The Authority proposes to rationalize the headcount such that the number of employees increases at the same rate as the growth in traffic during the three tariff years.*

*.....*

The Authority also proposes to rationalize the growth rate by considering only 6% Y-o-Y increase for all four (4) tariff years, starting from FY 2023-24 in line with what has been considered for Manpower Expenses of AAI employees.

**Comments by TKIAL**: -

6.2.1 In respect to the Authority's rationalization of Security manpower headcount, we would like to submit as follows:

6.2.1.1 we had submitted detailed justification along with role-wise requirement of number of in-house security team strength.

6.2.1.2 AAI had been running Security only as Pass Section. However, there are various activities which need to be performed by TKIAL like CISF Documentation, Airport Security Program, Kerbside Management, Traffic Management, Airport Operator Security Control Room, Security System Maintenance, Encroachment outside and perimeter area, Intelligence and Vigilance Gathering, Avsec Training and Compliances, Landside Operations, BCAS Compliance requirements.

6.2.1.3 TKIAL has planned for on-roll 14 employees with following composition:
1 CSO, 2 Pass Section, 2 Avsec Audit and *Compliances, 4 Loss Prevention and Automation,* 4 landside operations, 1 Security Risk Assessment and Process compliance.

6.2.1.4 The Authority has rationalized the manpower for Security function with clear disregard to the requirement of various roles essential for smooth airport operations.

6.2.2 In respect to the Authority's rationalization of Airside Management manpower headcount, we would like to submit as follows:

6.2.2.1 We had submitted detailed justification along with role-wise requirement of number of in-house Airside Management team strength.

6.2.2.2 TKIAL is responsible for maintaining and operating Airside including Runway, Taxiways, Approach Areas, Apron Management Service, Airside safety, aerodrome safeguarding and aeronautical information services. During the period AAI operated the airport, additional resources were utilized from other departments.

The composition is as below:

a. Head Aero Operations - (1 Headcount) Lead the Airside Operations, Apron control, AOCC and ARFF for TIA.

b. AOCC (1 Lead and 12 Associates) - Responsible for allocation of resources such as parking bay or aerobridge, check-in counter and baggage belts, and also control the Flight Information Display System (FIDS) for the passengers.

c. Baggage Make up Area (BMA) / BHS / BBA Operations - 1 lead supported by 3 Shift Managers - Responsible for ensuring availability of systems round the clock.

d. In charge Airside Operations supported by 4 Duty managers and 12 Airside Executives - Round-the-clock operations. Inspects and patrols all airport facilities, grounds, and properties to ensure regulatory compliance. Prepares detailed reports of daily operations, unusual incidents/accidents, hazardous conditions, and inspections.

e. Aerodrome Licensing and DGCA Compliance - 1 lead with 2 associates required for handling and responding to DGCA queries. Documentation and coordination for meetings with respect to observations and their compliance. Continuous monitoring and follow-up of Civil Aviation Requirement (CAR). Handling DGCA inspection and License renewal processes

f. ADP/AVP Management - 1 lead supported by 2 associates - Responsible for vehicle movements at the airside and authorizing driving permits for airside vehicle movement.

g. Wildlife & Hazard Mgmt. - 1 lead supported by 2 associates - Responsible for monitoring and recording wildlife activities at the airport and mitigation plan.

6.2.3 In respect to the Authority's rationalization of Screeners for Inline Baggage Screening system (ILBS), we would like to submit as follows:

6.2.3.1 We had submitted a detailed assessment of ILBS screeners based on required screening levels, screening time requirement and required number of screeners in line with BCAS requirements. For quick reference the same is provided below.

ILBHS Screening Manpower Assessment at Trivandrum Airport

| Airport | No of Bags p | OOG X-BIS | L 2 Work Station | L 3 ReCheck Work Station & ETD Check | L 3 Standalone XBIS | L 4 Physical Check | Virtual Level 4 | SUPVR | Reliever / Rotation | Total | Total with Week Off / Trg / Leave | Total certified Staff Required |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Normal Requirement T 2 | | | | | | | | | | | | |
| Shift A | 604 | 1 | 4 | 1 | 2 | 2 | 2 | 1 | 2 | 15 | 4 | 19 |
| Shift B | 864 | 1 | 6 | 1 | 2 | 2 | 2 | 1 | 2 | 17 | 5 | 22 |
| Shift C | 1506 | 1 | 10 | 1 | 2 | 2 | 2 | 1 | 2 | 21 | 6 | 27 |
| Total | | | | | | | | | | | | 68 |
| 1 month additional provision as T2 will become integrated after domestic traffic is moved to T2 | | | | | | | | | | | | 6 |
| | | | | | | | | | | | Total | 73 |

Current Assessment

| | Time | International | | | |
|---|---|---|---|---|---|
| | | No. of Flights | No. of Pax | Bags/Pax | No. of Bags |
| C Shift | 00:00 | 0 | 0 | 0 | 0 |
| | 01:00 | 1 | 180 | 1.6 | 288 |
| | 02:00 | 2 | 360 | 1.6 | 576 |
| | 03:00 | 2 | 227 | 1.6 | 364 |
| | 04:00 | 4 | 941 | 1.6 | 1506 |
| | 05:00 | 4 | 747 | 1.6 | 1195 |
| A Shift | 06:00 | 0 | 0 | 0 | 0 |
| | 07:00 | 2 | 378 | 1.6 | 605 |
| | 08:00 | 0 | 0 | 0 | 0 |
| | 09:00 | 0 | 0 | 0 | 0 |
| | 10:00 | 1 | 186 | 1.6 | 298 |
| | 11:00 | 1 | 152 | 1.6 | 244 |
| | 12:00 | 0 | 0 | 0 | 0 |
| | 13:00 | 0 | 0 | 0 | 0 |
| | 14:00 | 0 | 0 | 0 | 0 |
| B Shift | 15:00 | 0 | 0 | 0 | 0 |
| | 16:00 | 0 | 0 | 0 | 0 |
| | 17:00 | 1 | 189 | 1.6 | 303 |
| | 18:00 | 1 | 189 | 1.6 | 303 |
| | 19:00 | 3 | 540 | 1.6 | 864 |
| | 20:00 | 2 | 369 | 1.6 | 591 |
| | 21:00 | 1 | 180 | 1.6 | 288 |
| | 22:00 | 0 | 0 | 0 | 0 |
| C Shift | 23:00 | 1 | 180 | 1.6 | 288 |

6.2.4 In respect to Y-o-Y salary increase, we would like to submit our analysis as follows: -

1. All India AAI Employees salary growth
2. TRV Airport AAI Employees Salary Growth
3. Analysis of Select Employee Cost Paid by TKIAL to AAI from COD
4. Analysis of latest orders issued by the Authority

### 6.2.4.1 All India AAI Employees salary growth

Avg salary per employee of all India AAI employee is Rs. 25 lakhs in FY22-23 and the CAGR increase in avg cost per employee from FY13 to FY23 is 8.8%. After excluding the effect of 2 years' COVID period, the CAGR increase from FY13 to FY23 comes to 11.1%.

| | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | CAGR FY13 to FY23 | CAGR FY13 to FY23 Excluding impact of COVID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of Employees | 18,573 | 18,036 | 17,465 | 17,370 | 17,484 | 17,536 | 17,487 | 17,364 | 16,779 | 16,188 | 16,061 | | |
| | | | | | | | | | | | | | |
| **Cost (Rs Crs)** | | | | | | | | | | | | | |
| Pay & Allowances | 1,192 | 1,696 | 1,777 | 1,936 | 2,011 | 2,131 | 2,249 | 2,731 | 2,312 | 2,370 | 2,779 | 8.8% | 11.2% |
| Other Staff Cost | 469 | 581 | 894 | 625 | 631 | 1,375 | 1,732 | 1,462 | 1,003 | 1,141 | 1,133 | 9.2% | 11.7% |
| PF & Other Funds | 338 | 134 | 143 | 152 | 162 | 185 | 1,228 | 329 | 257 | 375 | 381 | 1.2% | 1.5% |
| Less Recovery of operational funds | - | (14) | (12) | (14) | (16) | (46) | (51) | (41) | (66) | (183) | (288) | | |
| **Total Cost (Rs Crs)** | **2,000** | **2,397** | **2,802** | **2,699** | **2,788** | **3,645** | **5,158** | **4,481** | **3,505** | **3,702** | **4,006** | 7.2% | 9.1% |
| Year on Your Growth in cost | | 20% | 17% | -4% | 3% | 31% | 42% | -13% | -22% | 6% | 8% | | |
| | | | | | | | | | | | | | |
| **Avg Cost per employee (Rs Crs)** | **0.11** | **0.13** | **0.16** | **0.16** | **0.16** | **0.21** | **0.29** | **0.26** | **0.21** | **0.23** | **0.25** | 8.8% | 11.1% |
| Year on Your Growth in avg cost cost | | 23% | 21% | -3% | 3% | 30% | 42% | -13% | -19% | 9% | 9% | | |

*Source :- AAI Annual Reports*

### 6.2.4.2 TRV Airport AAI Employees Salary Growth

Avg salary per AAI employee at Thiruvananthapuram Airport is Rs. 15 lakhs in FY21-22 and the CAGR increase in avg cost per employee is approx 8.6% in

last 5 years from FY17 to FY22. After excluding the effect of 2 years' COVID period, the CAGR increase from FY17 to FY23 comes to 14.8%.

| | | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 (upto COD) |
|---|---|---|---|---|---|---|---|
| Employee Cost (Table 21 of the O&M Study) | Rs. Cr | 48.71 | 60.58 | 74.97 | 78.42 | 58.01 | 33.30 |
| No. of Aero Employees (Table 8 of the O&M Study) | No. of Employees | 498 | 484 | 482 | 470 | 451 | 419 |
| Avg Cost per employee | Rs. Crs per Employee p.a. | 0.10 | 0.13 | 0.16 | 0.17 | 0.13 | 0.15 |
| Year-on-Year Growth in Avg Cost | % | | 28% | 24% | 7% | -23% | 15% |
| CAGR Employee Salary Cost Increase (FY17 to COD) | % | 8.6% | | | | | |
| CAGR Employee Salary Cost Increase (FY17 to COD) After excluding 2 years COVID period | % | 14.8% | | | | | |

*Salary for FY22 is provided for 6.5 months in the CP as the Airport was transferred to TKIAL on COD. Hence for comparative purposes the cost is annualized.

Kindly refer Para 3.4.4.2 of the Study of Efficient Operation and Maintenance Expenses for TRV, Thiruvananthapuram provided as Annexure to the CP whereby the Authority has themselves acknowledged the growth in cost in the previous years.

*3.4.4.2 Key findings are detailed below:*

*• In the First Control Period (FCP), payroll expenses showed significant growth with a CAGR of 9.44%, outpacing both passenger traffic and ATM.*

*• In SCP, payroll expenses continued to rise at a higher rate with a CAGR of 17.20%, surpassing the growth*

*rates of both passenger traffic and ATM.*

### 6.2.4.3 Analysis of Select Employee Cost paid by TKIAL to AAI

The Avg cost per employee in FY23-24 (upto Feb'24) has increased by 19% CAGR over FY21-22 from Rs. 17.7 Lakhs p.a. in FY21-22 to Rs. 25.09 Lakhs p.a. in FY23-24 (upto Feb'24).

| Month | Invoice (Rs Crs) | Employee Count | Avg Annual Cost per employee (Rs Lacs) |
|---|---|---|---|
| Oct'21 | 2.27 | | |
| Nov'21 | 4.24 | 293 | 17.35 |
| Dec'21 | 4.23 | 293 | 17.32 |
| Jan'22 | 4.41 | 292 | 18.13 |
| Feb'22 | 4.22 | 292 | 17.33 |
| Mar'22 | 4.36 | 292 | 17.93 |
| **Total FY 21-22** | **23.72** | **292** | **17.70** |
| Apr'22 | 5.62 | 291 | 23.19 |
| May'22 | 5.33 | 289 | 22.12 |
| Jun'22 | 5.28 | 285 | 22.25 |
| Jul'22 | 5.62 | 285 | 23.64 |
| Aug'22 | 5.24 | 276 | 22.76 |
| Sep'22 | 5.15 | 276 | 22.38 |
| Oct'22 | 5.48 | 275 | 23.90 |
| Nov'22 | 5.24 | 275 | 22.85 |
| Dec'22 | 5.40 | 275 | 23.55 |
| Jan'23 | 5.72 | 275 | 24.96 |
| Feb'23 | 5.52 | 274 | 24.20 |
| Mar'23 | 5.32 | 271 | 23.56 |
| **Total FY 22-23** | **64.91** | **279** | **23.27** |
| Apr'23 | 5.80 | 270 | 25.77 |

| Month | Invoice (Rs Crs) | Employee Count | Avg Annual Cost per employee (Rs Lacs) |
|---|---|---|---|
| May'23 | 5.35 | 264 | 24.33 |
| Jun'23 | 5.23 | 262 | 23.93 |
| Jul'23 | 5.50 | 260 | 25.39 |
| Aug'23 | 5.10 | 257 | 23.80 |
| Sep'23 | 5.14 | 257 | 24.01 |
| Oct'23 | 5.68 | 256 | 26.62 |
| Nov'23 | 5.45 | 256 | 25.54 |
| Dec'23 | 5.39 | 255 | 25.38 |
| Jan'24 | 5.60 | 255 | 26.33 |
| Feb'24 | 5.29 | 255 | 24.89 |
| | - | | |
| **Total FY 23-24** | **59.52** | **259** | **25.09** |

**It is evident from the above analysis that the avg annual cost per AAI employees has been increasing at a rate of 19%.**

#### 6.2.4.4 Analysis of recent orders for ISPs.

It is important to note that AERA has allowed a 16% increase in payroll expenses in the recently approved order for ISP Order No. 37/2022-23 dated 06th January 2023. The relevant extract from the said order is as follows: -

*5.5.2 The Authority notes from the submission of DCSC that during pandemic period, payroll expenses were low and many welfares activities I trainings etc. were deferred. Now with the improvement in the situation from the pandemic, ex ns in post Co vid period, including FY 2022-23, are expected to reach back to their normal levels. The ISP further submitted that Y-0-Y increase in payroll expenses have been projected after considering the factors like periodic increase in minimum wages notified by the Govt. Authorities from time to time, corresponding increase in other statutory components like EPF, ESI etc. The Authority, also noted at consultation stage that Cargo Handling is a specialized job and requires skilled & trained manpower at the Cargo Terminals. Further, during Covid, there is a shortage of required skill set. ISP further submitted that in order to address the issue of manpower attrition, the annual escalations in payroll expenses are projected in a very holistic manner and paid as per the industry practice.*

A similar kind of statement has been made by the Authority in Order No. 32/2022-23 dated 29th December 2022 whereby the increase in cost is allowed by 10% year on year.

*5.9.2 The Authority notes from the submission of CDCTM that during pandemic period, payroll expenses were low and many welfares activities I trainings etc. were deferred. Now with the improvement in pandemic situation, expenses in post Covid period, including FY 2022-2 3, are expected to reach back to their normal levels. The ISP further submitted that Y-0-Y increase in payroll expenses have been projected after considering the factors like periodic increase in minimum wages notified by the Govt. Authorities from time to time, corresponding increase in other statutory components like EPF,*

*ESI etc. The Authority, also noted at consultation stage that as per the CDCTM, Cargo Handling is a specialized job and skilled & trained manpower is deployed at the Cargo Terminals. As per the ISP, post Covid, there is a shortage of required skill set. ISP further submitted that in order to address the issue of manpower attrition, the annual escalations in payroll expenses are projected and paid as per the industry practice.*

6.2.5 TKIAL is a new AO who needs to build its manpower to run the Airport operations. TKIAL needs to hire all people from outside who come at 25%-30% higher salaries. According to a recent Michael Page report titled "Talent Trends 2021," better remuneration is the top reason for changing jobs. The report highlights that job seekers on an average expect around 20% salary hike at middle levels and 19% increase at director, Vice President and CXO levels from their current or last salary drawn. Even non-managerial level employees' expectations are an average of 20%."

6.2.6 Further, EY's report on "Future of Pay" issued recently in March 2024 (refer Annexure 3 for full report) mentions the following:
"**India Inc. is set for an average salary increase of 9.6% in 2024, similar to the actual increase in 2023**. Overall attrition dropped to 18.3% in 2023 (from 21.2% in 2022) and is set to gradually decline over the next few years as companies prioritize cost management and employee wellbeing, stabilizing the workforce amidst high talent demand.

In light of India's position as a global hub for technology and outsourcing services, the EY report highlights that e-commerce is expected to have the highest salary growth in 2024, at 10.9%, followed by financial services with a projected growth of 10.1%. Professional services' salary is projected to grow by 10% in 2024, suggesting a rebound as companies invest in strategy alignment to navigate global business complexities. The impact of **real estate and infrastructure** emerging as a growth sector is also visible, as **increments continue to be stable at 10**%."

6.2.7 TKIAL would like to highlight the fact that Airport Operators face difficulties while hiring a new workforce. This is because the suitable personnel available for the aviation sector is very limited. While it is comparatively easier to get workforce for accounts, finance, administration etc., it is very difficult to get skilled workforce for airside and terminal operations, engineering and maintenance and safety. To obtain and retain competent employees, it is imperative to compensate them well. The AERA has also supported the same point while providing a 15% increase in payroll cost of ISPs in latest orders as already discussed in 6.2.4.4 above.

6.2.8 Based on the above analysis, we had requested for annual 10% increase in avg cost per employee. However, AERA has considered an increase of 6% only.

6.2.9 **We request the Authority to provide at least 10% YoY increase in avg cost of salaries for all employees i.e. AAI and TKIAL Manpower. Also, we request AERA to consider the manpower numbers for Security, Airside Management and ILBS Screeners as submitted by TKIAL.**

## 6.3 AERA proposal as 10.2.29, 10.2.38 and 10.2.54 on page 197, 200 and 204 of CP relating to Year-on-Year growth rate for expenses

*10.2.29*
*In respect of the Y-o-Y growth rate claimed by TKIAL, the Authority proposes to revise the same as per inflation rates proposed in Table 153 across the remaining four (4) tariff years of the Third Control Period.*

*10.2.38*
*Further the Authority observes that Salary cost constitutes the major portion of the Corporate Cost and hence, the Authority proposes to rationalize the increase claimed by TKIAL to 6% Y-o-Y across all the remaining four (4) tariff years in the Third Control Period, which is in line with the increase proposed for Manpower expenses in Table 167.*

*10.2.54*
*The Authority notes that TKIAL has incurred actual expenses of Rs. 17.96 crores for FY 2022-23 as against the projected amount of Rs. 19.00 crores in the MYTP. It is observed that the majority of the actual expenses have been incurred towards MESS, ESS, maintenance of Terminal area and horticulture expenses for which TKIAL has already issued the LOA / Contract to the third-party vendor. Considering the same, the Authority proposes to consider the actual expenses of Rs. 17.96 crores for FY 2022-23 and the base cost of the LOA/Contracts issued of Rs. 19.99 crores for FY 2023-24. However, in respect of Y-o-Y growth rate claimed, the Authority notes that TKIAL has sought increase in line with the increase in passengers. The Authority notes that these costs do not increase in line with growth in traffic. Hence, the Authority proposes to consider increase for future years in line with the rate of inflation proposed in Table 153 together with the increase towards Terminal Area increase as proposed in para 10.2.14.*

**Comments by TKIAL**

6.3.1 TKIAL, in its MYTP submission, had claimed that the Corporate Allocation expenses and IT expenses increase with the increase in line with increase in employee expenses as these costs are driven primarily based on employee headcount numbers. Accordingly, TKIAL had proposed that Corporate Allocation expenses and IT expenses increase with the same proportion as the increase in TKIAL employee headcount.

6.3.2 Further, as the Corporate Allocation expenses mainly consists of salary cost and accordingly, the increase in corporate allocation expenses should be two-factored:
One, for increase in the Y-o-Y increase in salary cost
Two, for increase in headcount at the corporate level

In this case, the authority has missed out applying the ratio for increase in employee headcount at the corporate level (which can be considered in line with increase in TKIAL employee headcount).

Kindly refer below to the analysis done to present the TKIAL corporate cost allocation with difference percentage increases. It is evident that the cost increase applied by TKIAL is based on realistic assumptions whereas the cost increase of 6% adopted by the Authority is irrational.

**TRV Corporate Cost Allocation based on DIAL growth factors**

| | AERA Order FCP | | | AERA Order SCP | | | | AERA Order Projections | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 | FY23 | FY24 | |
| Private Airport Operator | | | | | | | | | | | | | 10 year CAGR |
| DIAL Corporate Cost Allocation (Rs Crs) | 27 | 35 | 54 | 54 | 76 | 85 | 91 | 96 | 117 | 141 | 171 | 207 | 19.4% |
| Increase in initial years | | 31% | 55% | 0% | 40% | 12% | 8% | 5% | 22% | 20% | 21% | 21% | |

**TRV extrapolopated Corporate Cost Allocation in difference scenarios**

| | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | Total |
|---|---|---|---|---|---|---|---|
| TRV MYTP filed numbers based on employee growth rate | 7 | 15 | 30 | 35 | 40 | 42 | **169** |
| If DIAL growth in initial years are extrapolated | 15 | 20 | 30 | 30 | 43 | 48 | **186** |
| If 20% CAGR (DIAL 10 year CAGR is applied on TRV) | 15 | 18 | 22 | 26 | 31 | 37 | **149** |

FY22-23 being first full year of operations. Its numbers are used to extrapolate future year projections based on DIAL growth trajectory.

6.3.3 TKIAL, in its MYTP submission, had considered employee headcount increase ratio as growth ratio for IT expenses as majority of the IT expenses were linked to the number of employees (e.g. IT system licenses, IT end-user services etc.). Also, in view of various recent initiatives of MOCA for digitalization including the esteemed project on DigiYatra which aims to provide a seam-less, contact-less and hassle-free paperless journey, the IT Operations cost tends to increase by a great proportion.
**In this case also, the Authority has missed out applying appropriate expense growth ratio for increase in IT expenses.**

6.3.4 Similarly, TKIAL had claimed that the Security Expenses and Other Operating Expenses increase with the increase in line with increase in passengers at the airport as these costs are driven primarily based on amenities required for passengers. Accordingly, TKIAL had proposed that Security Expenses and Other Operating Expenses increase with the same proportion as increase in TKIAL employee headcount.

Kindy refer the various references from Study of Efficient Operation and Maintenance Expenses for TRV, Thiruvananthapuram provided as Annexure to the CP whereby the Authority has themselves acknowledged the growth in cost is always higher than growth in passenger traffic.
*3.4.8.2 It can be observed from Table 23 and Figure 4 that the CAGR of A&G expenses grew at a rate higher than the respective growth in Traffic of passenger and ATM, for both the First and Second Control Periods. Further, it is observed that the CAGR of SCP (35.17%) is higher than the CAGR of FCP (18.92%).*

*It can be observed from Table 31 and Figure 6, the CAGR of Utility and Outsourcing Expenses grew at a rate higher than the respective growth in Traffic of Passenger for both the First and Second Control Periods. However, it is observed that the CAGR of SCP (11.62%) is lower than the CAGR of FCP (12.64%) indicating a reduced growth rate in the expenses.*

6.3.5 Further, in view of recent initiatives of MOCA/BCAS on increase in security screening infrastructure along with TKIAL's plan to increase quality of housekeeping of available infrastructure, the operational cost of security expenses and other operating expenses (housekeeping) increases. Further, as the security and housekeeping related services are manpower intensive services, the same increases in line with increase in salary and wages cost.

6.3.6 **In view of the above, we request AERA to consider reasonable expense growth ratios, based on relevant cost driver of such expenses (ie. Applying Employee Headcount Growth similar to TKIAL and Salary growth of at least of 10% per annum for Corporate Allocation Expenses, Growth factor equivalent to Employee Headcount Growth for IT**

**expenses, Growth factor equivalent to Passenger Growth for Security Expenses and Other Operating Expenses) subject to true-up on actual basis, instead of applying only terminal area or inflation increase.**

## 6.4 AERA proposal as 10.2.14 on page 183 of CP relating to One Time escalation claimed by the AO

*One time escalation claimed by TKIAL for various expenses in FY 2025-26 has been analyzed by the Authority. The Authority notes that TKIAL has claimed a one-time increase of 6.24% in line with the proposed increase in the area of the Terminal Building. However, the Authority is of the opinion that the increase in the expenses will not be directly proportional to the increase in the Terminal Building area, due to technological innovation, advancements and economies of scale. Hence, the Authority proposes to consider 2/3rd (i.e., 4.16%) of the escalation rates claimed by the AO (6.24%) for expenses such as Utilities, IT, Security and Other Operating expenses. However, for Rates & Taxes, the Authority proposes to consider the one-time escalation at 6.24% as claimed by the AO due to increase in terminal building area as mentioned in Table 159. As per Authority's proposal the expansion of Terminal-II by 19,500 sqm is expected to be capitalized in FY 2025-26 (refer Para 7.3.41iii)h). The Authority expects this expanded portion of Terminal-II to be fully operationalized in FY 2026-27. Therefore, the Authority proposes to consider one time increase in FY 2026-27 as against the FY 2025-26 consider by TKIAL in its submission.*

*Table 160: One-time escalation in FY 2025-26 as claimed by TKIAL and proposed by the Authority*

| One-time Escalation | Claimed by TKIAL | Proposed by the Authority |
|---|---|---|
| **Year of escalation** | **FY 2025-26** | **FY 2026-27** |
| Utility expenses | 6.24% | 4.16% |
| IT expenses | 6.24% | 4.16% |
| Rates & taxes | 6.24% | 6.24% |
| Security expenses | 6.24% | 4.16% |
| Other operating expenses | 6.24% | 4.16% |

### Comments by TKIAL

6.4.1 It is to be noted that it is a practice whereby AERA has allowed increase in utilities and other operating expenses (housekeeping) in proportion to increase in terminal area for the Airports which enjoys economies of scale and are future technology ready. For your kind reference the details are tabled below:

| Airport | Control Period | AERA Order No. | Reference |
|---|---|---|---|
| Hyderabad | Third Control Period | 12/2021-22 dated 31st August 2021 | Utilities and Housekeeping expenses increased in proportion to the increase in Terminal Area. Terminal area is increasing from 117,000 sq mtr to 365,809 s mtr i.e. 213%<br><br>*Extract from the order*<br>*Utility Costs*<br>*7.2.27 The Authority had reviewed the submissions made by HIAL with regard to the utility expenses and is of the opinion that there is a merit in the argument that expansion at the airport shall res ult in increase in utility related expenses. The Authority proposed to* |

| Airport | Control Period | AERA Order No. | Reference |
|---|---|---|---|
| | | | *consider the utility cost projected with FY2020 as the base year.*<br><br>*7.2.40 The Authority proposed to consider the aforementioned revision in the projection methodology for housekeeping expenses for projections of aero housekeeping cost with FY2020 as the base year.*<br>*Further, the Authority approved expansion of the terminal as a driver for the housekeeping cost and*<br>*therefore accepts HIAL's consideration that increase in housekeeping cost due to expansion has to*<br>*be factored for the operational months for expanded terminal.*<br><br>*7.4.11 HIAL commented that it agrees to Authority's approach for increasing the housekeeping cost in*<br>*proportion to the increase in terminal area in line with expansion, 80% of the housekeeping is fixed in nature and maintenance and upkeep of the infrastructure has to be ensured irrespective of the traffic levels. Hyderabad Airport has an integrated terminal and doesn't have flexibility to shut down a section of the terminal.* |
| Chennai | Third Control Period | 38/2020-21 dated 04th February 2022 | Utilities expenses increased in proportion to the increase in Terminal Area. Terminal area is increasing by 33%<br><br>*Extract from the order*<br>*9.2.8. The Authority had noted that there would be a 33% net increase in terminal building area in FY 2022-23 after capitalization of modernization of Chennai International Airport, Phase II (NITB Part - I). Along these lines the Authority had proposed a 33% net increase power charges in FY2022-23*<br><br>*9.5.6 It may be noted that the Authority has decided on a 33% increase in power charges after considering the recommended operational efficiencies at the airport.* |
| Trichy | First Control Period | 55/2020-21 dated 22th October 2020 | Housekeeping expenses increase in proportion to the increase in Terminal Area. Terminal area is increasing from 14,450 sq mtr to 73,535 i.e. 410% |

| Airport | Control Period | AERA Order No. | Reference |
|---|---|---|---|
| | | | *Extract from the order*<br>*12.2. II AAI has proposed an additional 10% increase in Watch & Ward charges and 460% increase in Upkeep charges in the FY 2022-23, due to operationalization of the New Terminal Building. AAI has clarified that there will be a composite maintenance contract for the entire NTB based on unit area. The Authority finds the same to be reasonable, considering the size of the New Terminal Building.* |

6.4.2 **In view of the above, we request AERA to proportionately increase the utility expenses, IT expenses, Security expenses and other operating charges (housekeeping charges) in line with proportionate increase in terminal area ~ 6.24%.**

## 6.5 AERA proposal as 10.2.62 and 10.2.63 on page 205 onwards of CP relating to Amortization of runway recarpeting expenses.

*10.2.62 The Authority notes that the TKIAL has submitted a base cost of Rs. 78.43 crores as the cost of runway recarpeting in the submission on the proposed capital addition during the Third Control Period. The Authority proposes to consider this base cost along with indexation amounting to Rs. 81.65 crores as the cost of runway recarpeting and proposes to amortize the same over five (5) years as detailed in Authority's Order No. 35/2017-18 dated 12th January 2018. Accordingly, the Authority has considered the cost for the years FY 2024-25, FY 2025-26 and FY 2026-27.*

*10.2.63 The Authority also notes that the cost incurred on runway recarpeting is proposed to be amortized over five (5) years as per Order No. 35/2017-18. Accordingly, a return equal to FRoR is proposed to be provided on the unamortized portion of runway recarpeting expenses.*

**Comments by TKIAL**: -

6.5.1. While it is noted that the Authority has duly considered a return equal to FRoR on the unamortized portion of runway recarpeting expenses, the authority has missed out considering Soft Cost and IDC on the said capex.

6.5.2. We would like to submit that there is no reason to believe that there will not be any soft cost (in terms of design, technical services, PMC and other components of soft costs as per our submission for soft cost) and interest during construction period. In this case, it is just that the PCN value of the Runway is not increasing and hence the expenditure (which is otherwise of capital nature and would have included soft cost and IDC) is being amortized over a relatively lesser period as defined in AERA Order No. 35/2017-18.

6.5.3. **Hence, we request the Authority to consider Soft Cost and IDC on the capital expenditure of Runway Recarpeting in the calculation.**

## 6.6 Our submission on Page 142 of MYTP relating to Security Other (Counter Drone system)

*Bureau of Civil Aviation Security (BCAS) had directed the Indian Airports to implement Counter drone technology/solution for Surveillance, detection and Neutralization of drones/ UAVs vide AVSEC Circular no 02/2020 dated 11th February 2020 and vide addendum dated 09th February 2021 to the said circular. However, the above-mentioned Circular has been subsequently withdrawn by BCAS vide Order No. CAS-6(11)/2018/ Div-I/RPA/ (Part2)/ 180940 dated 23rd February 2022. For the time being, the numbers provided in this MYTP are exclusive of such expenses as the circular has been withdrawn. In future, TKIAL may require to incur expenses relating to counter drone subject to revised guidelines.*

*We request AERA to kindly true-up such expenditure on actual incurrence basis in the tariff determination of the next control period. However, if revised guidelines are issued before tariff approval by AERA, we will provide details of likely expenditure for consideration and inclusion of the same in ARR by AERA.*

**Comments by TKIAL**: -

6.6.1 **In line with below mentioned Para 28.5.2 of the Concession Agreement, we understand that the cost towards any additional security requirement like the one for Counter-Drone Systems will be duly considered the Authority at the time of determination of tariff for next control period.**

*28.5.2 Additional costs, if any, or reduction thereof arising from Change of Scope, change in Specifications and Standards, security requirements or compliance with new international obligations having the force of Applicable Law may be reviewed by the Regulator, for the purposes of revision of the Aeronautical Charges. Any such review by the Regulator shall include consideration of the revenues for and in respect of Aeronautical Services, in accordance with the Applicable Permits issued for the Project.*

6.6.2 Also, a similar comment for considering the same based on actuals at the time of true up was mentioned in the Tariff order No. 40/2023-23 for Ahmedabad Airport.

6.6.3 **Hence, we request the Authority to kindly provide a similar clarification for TKIAL in the final tariff order.**

## 6.7 AERA proposal as 10.2.37 and 10.2.38 on page 200 of CP relating to Corporate Cost Allocation

*10.2.37 The actual cost allocated to TKIAL for FY 2022-23 is Rs. 16.55 crores. The Authority notes that the actual cost submitted for FY 2022-23 was Rs. 16.53 crores and therefore proposes to consider same as compared to the projected cost of Rs. 15.00 crores. However, the Authority observes that the aforementioned projected cost includes the allocated costs of legal team of AEL and AAHL, which is in addition to the cost of employees of Legal department available at TRV, already considered under the manpower expenses of TKIAL (refer Table 166 above) and is not justified. Hence, the Authority proposes to exclude Rs. 0.18 crores from the Corporate Allocation cost submitted by TKIAL and allow the remaining amount of Rs. 16.35 crores for FY 2022-23.*

*10.2.38 Further the Authority observes that Salary cost constitutes the major portion of the Corporate Cost and hence, the Authority proposes to rationalize the increase claimed by TKIAL to 6% Y-o-Y across all the remaining four (4) tariff years in the Third Control Period, which is in line with the increase proposed for Manpower expenses in Table 167*

**Comments by TKIAL**: -

6.7.1. **To avoid repetition of comments on in-house legal team, please refer the comments provided in 1.3.1.**

6.7.2. **Since the major portion of the Corporate Cost Allocation is comprising of Salary and Increase in manpower, we request Authority to provide increase as combination highlighted in point 6.2 and 6.3.2.**

## 6.8 AERA proposal as 10.2.49 to 10.2.52 on page 203 of CP relating to Repairs and Maintenance

*The Authority is of the view that TRV is a brownfield airport, wherein Capital Additions have been newly proposed for the Third Control Period. The newly constructed/installed assets need lesser maintenance than the already commissioned ones in use. The Authority, therefore, proposes to consider actuals for FY 2022-23 and restrict the total repairs and maintenance expenses claimed by TKIAL to 6% of the Opening Net block of Aeronautical Assets for the respective FYs.*

**Comments by TKIAL: -**

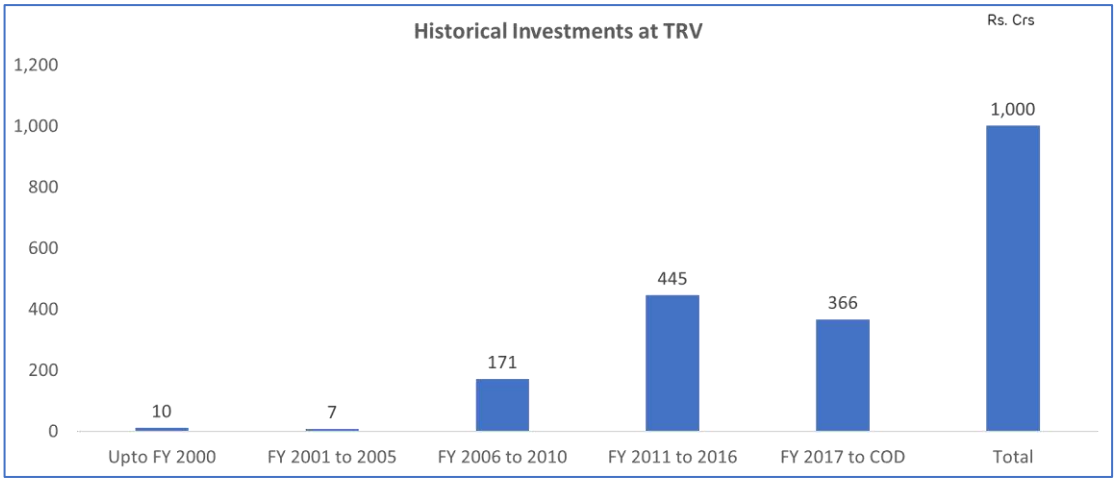
6.8.1 In respect to R&M Expense: - AERA has restricted R&M expenses to 6% of the opening RAB without any basis. R&M expenses depend on various factors like age of the existing assets, frequency of the use of assets (single/double/triple shift), local geographic and weather conditions.

6.8.2 RAB is a depreciating building block. RAB amount depreciates each year based on depreciation rate applied. In case R&M is computed as percentage of the RAB, it results in reduction of R&M amount. Whereas in actuals, as the asset gets older the R&M expenditure increases to maintain the efficiency of the operations.

6.8.3 In order to understand the issue highlighted above, about ever-increasing Gap between the projected R&M vs notional R&M based on 6% of Opening RAB, the following example may be referred to: -

| Particulars | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Opening Net Block | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 |
| Dep Rate | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Dep on Gross Block | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Closing Net Block | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 |
| 6% of R&M Exp on Opening Net RAB (as suggested by AERA) (A) | 6.00 | 5.70 | 5.40 | 5.10 | 4.80 | 4.50 | 4.20 | 3.90 | 3.60 | 3.30 |
| Projected R&M Cost based on age of asset (B) | 6.00 | 6.00 | 7.00 | 7.00 | 8.00 | 8.00 | 9.00 | 9.00 | 10.00 | 10.00 |
| Difference (A - B) | - | (0.30) | (1.60) | (1.90) | (3.20) | (3.50) | (4.80) | (5.10) | (6.40) | (6.70) |

6.8.4 It is evident from the Joint Fixed Reconciliation signed by AAI and TKIAL (refer the graph below) that the last major capital expenditure was incurred by AAI during financial year 15-16. This clearly demonstrates that the Fixed Assets at the Airport are very old, which requires and justifies higher repairs & maintenance costs to achieve efficiency.




6.8.5 We would like to highlight the operative portion from Tariff orders for other similar Airports.

*Calicut Order No. 39/2021-22 dated 11th February 2022 and Pune Order No. 45/2021-22 dated 17th March 2022 mentioned that "As most of these assets are newly constructed / installed during the last 5 years and are also covered under warranty clauses. the same may need only minimum repairs and maintenance. Hence, the Authority decides to allow repairs-and maintenance expenses for the Second Control Period only to the extent of 6% of the RAB (opening net block of the Second Control Period) or the actual expenses whichever is less."*

In the case of Calicut/Pune, the Authority recognized that most of the assets are newly constructed and hence the Authority has put a cap of 6% of Opening RAB. While in the case of TKIAL, most of the assets are old or very old, hence TKIAL R&M expenses would anyways be higher than 6% of opening RAB.

6.8.6 In addition, we would like to submit that Repairs and Maintenance expenses for FY23-24 are either incurred or committed. These are expenses which need to be incurred for maintaining safe operations at the Airport.

6.8.7 **We request AERA to consider the R&M expenses on an actual basis at the time of true-up without any notional capping.**

# 7 Chapter 7 “Comments on Consultation Paper Chapter 11 - Non-Aeronautical Revenue For The Third Control Period”

## 7.1 AERA proposal as 11.2.2 to 11.3.2 from page 216 onwards of CP relating to Non-Aeronautical Revenues

*11.2.2 The Authority notes that TKIAL undertook a two-stage tendering process through e-tender mode vide Request for Proposal (RFP) dated 17th August 2021.*
*11.2.3 The Authority, in this regard examined the extract of the relevant clauses of the RFP which read as under:*
*.*
*.*
*.*
*11.2.4 The Authority on review of the qualifying criteria as specified by TKIAL observes the following*
*. AERA observation of restrictive criteria*
*.*
*.*
*11.2.5 Pursuant to the above RFP, two prospective bidders had submitted their proposals to TKIAL. Based on technical qualification, financial parameters and evaluation criteria provided under the RFP, Adani Airport Holdings Limited (AAHL) was selected as the Service Provider, TKIAL, then entered into a Master Services Agreement with AAHL. The Authority notes that the revenues projected by TKIAL are based on the said Agreement.*
*11.2.6*
*11.2.7 The Authority also observed that the NAR projected by TKIAL for the Third Control Period is significantly lower as compared to that of other PPP airports (DIAL, MIAL, BIAL, GHIAL, CIAL), wherein the NAR projected by such PPP airports are at least 50% of the total O&M expenses projected by them for the respective Control Period. Whereas in the case of TRV, the Authority notes that the NAR projected by TKIAL for the Third Control Period is Rs. 102.76 crores, which is minuscule as compared to the O&M expenses submitted by TKIAL which is Rs. 1,752.35 crores (refer Chapter 10).*
*11.2.8*
*11.2.9*
*11.2.10*
*11.2.18 Based on the above considerations, the Authority has estimated the total non-aeronautical revenues for the Third Control Period for TRV as follows:*
*i. The NAR earned by AAI in FY 2019-20, which is a pre-COVID year, is considered as the base for estimating the NAR for TRV for the Third Control Period.*
*ii. The Authority has considered the actual revenue earned by TKIAL for FY 2022-23.*
*iii. Further, the Authority notes that the actual NAR for FY 2022-23 includes Space rental from Govt. agencies amounting to approximately Rs. 0.08 crores and proposes to consider the same. The Authority also proposes to consider the revenue from space rental to Govt. agencies from FY 2023-24 based on the terms of the agreement with the respective agencies.*
*iv. The Authority proposes not to consider Rs. 0.58 crores of Notional Income on Security Deposit as it relates to IND AS adjustment.*
*v. The Authority proposes to consider the Rs. 0.43 crores of AEP Charges as part of the Non-Aeronautical Revenue.*
*vi. The Authority also proposes to consider the revenue from space rentals of approximately Rs. 1.56 crores from the agencies providing aeronautical services as*

*Aeronautical revenue and not be considered as part of the NAR for the Third Control period.*

*vii. The NAR of FY 2019-20 i.e., Rs. 87.11 crores have been assumed for FY 2023-24, as the traffic is expected to reach the pre-COVID level of FY 2019-20 by FY 2023-24 (as explained in Chapter 6).*

*11.2.19 The Authority proposes to increase NAR Y-o-Y in line with inflationary increase given in Table 153 for the remaining tariff years of the Third Control Period. The Authority also takes cognizance of the fact that with the refurbishment of existing Terminal-II has been allowed to be undertaken in the Third Control Period and therefore proposes to consider the additional increase of 6.24% as submitted by TKIAL to the NAR in FY 2026-27 (refer para 10.2.14).*

*11.2.20.*

*11.2.21.*

*11.2.22*

*11.3.1*

*11.3.2 Non-Aeronautical Revenue will not be trued up at the time of tariff determination of next control period if it is lower than that proposed by the Authority in Table 194.*

**Comments by TKIAL**: -

7.1.1 Such a course of action would vitiate the very purpose of the open competitive bidding and undermine the well-established judicial principles in this regard. It is settled in law that the price discovered through open bidding has to be taken at face value and there is no reason to disbelieve such a price. The Authority should not obliviate the entire bidding process on the premise that the price discovered could have been better as the price discovered through the bidding process is highest amongst bidders who submitted their financial proposal. It is well known that even in insolvency / liquidation proceedings, business /assets are sold at lower price than the value / benchmark of the business / assets. Therefore, we request the Authority to relook into their approach to extrapolate the non-aeronautical revenue on a notional basis. The only test which applies is the fairness with which the bidding process was conducted. As long as there is no procedural irregularity, the outcome of the open competitive bidding process cannot be altered to achieve a particular requirement. It is submitted with respect that even the courts of law do not interfere with the outcome of the open competitive bidding process as long as the process is not vitiated by arbitrariness, illegality and unfairness. It is important to note that TKIAL has followed all the rules and regulations mandated to conduct the bidding under the Concession Agreement and under Section 13 (a) (vi) of the AERA Act.

7.1.2 TKIAL has insulated the consumers from negative market risks through the open competitive bidding process. Further and more importantly, no potential bidder has raised any issue with respect to their interest being jeopardized or having been denied equal participation in the entire bid process. The argument of the Authority that the principles of the Public Procurement Guidelines should be applied to the process of selecting the Master Service Provider for Non-Aeronautical Services is not substantiated to demonstrate as to how the process adopted by TKIAL of procurement of services vitiated the established principles of procurement process generally adopted in the country.

7.1.3 The bid criteria were designed to achieve the highest standards of service and fiscal responsibility. The requirement for experience with a built-up area is to ensure that the bidder has substantial experience in handling large-scale projects, which is essential for efficient airport operations. The turnover criterion crore was set to ensure that the Master Concessionaire has the financial capability to effectively manage a complex airport operation.

7.1.4 Secondly, there is no provision in AERA Guidelines 2011 for notional increase in the Non-Aeronautical revenues while determining tariffs. Section 13(1)(a)(v) of AERA Act categorically states the word "revenue", has to be actual revenue and not notional revenue. It is submitted that neither the AERA Act nor Clause 5.6 of the AERA Guidelines envisages the concept of "notional" revenue/cost being ascribed by the Authority.

7.1.5 TDSAT has ordered in the case of DIAL and HIAL that Market Driven rates and actuals results need to be considered by the Authority. Refer below extract from TDSAT Orders

**HIAL TDSAT Order dated 14th February 2024**

*380. In the absence of any claims of procedural irregularities, fraudulent conduct, or malicious intent, AERA lacks the jurisdiction to intervene in the capital expenditure decisions made for this significant expansion project. It is beyond AERA's scope to revise or override a legally sound and valid contract between HIAL and the foremost successful bidder. Consequently, this Tribunal does not uphold the arguments presented by the counsels for respondent no.1 and respondent no.2 seeking the disallowance of a portion of the capital expenditure incurred by HIAL for the enhancement project designed to expand the capacity of RGIA, Hyderabad to 34 MPPA.*

*381. Looking to Section 13(1)(a)(i) of AERA Act, 2008, AERA cannot rely on any notional or estimated price when the actual price is available for the expansion project in question. AERA has relied upon estimated cost for the project in question given by the consultant – RITES - appointed by AERA, ignoring the actual "Market Discovered Price" (MDP) arrived at through competitive bidding process. 382. This is an error committed by AERA and hence, impugned order dated 31.08.2021, of disallowing part of capital expenditure undertaken by this appellant for phase expansion of RGIA, to increase capacity to 34 MPPA is hereby quashed and set aside.*

*385. Once, this committee is approving the need, nature, and expenditures of construction that perhaps there is little or practically no scope of interference by AERA and that too with the help of some consultant's report under the guise of "efficient cost". If this type of interference by AERA is permitted by this Tribunal, then it tantamount to sitting in appeal against the decision of the committee which is a multi-member committee.*

**DIAL TDSAT Order dated 21st July 2023**

*Para 165"…The cost which is arrived at for Phase 3A expansion for IGIA, Delhi through global bids invited is giving real and efficient cost. It is a market discovered price through competitive and transparent bidding process. As per Section 13 (1)(a) (i) of the AERA Act, 2008, it was a power coupled with a duty vested in AERA to determine the tariff for the aeronautical services taking into consideration, "the capital expenditure incurred and timely investment in the improvement of airport facilities" which is on*

*"actual basis" meaning thereby, if the actual capital expenditure is incurred by the appellant, the same has to be considered by AERA as per aforesaid provision of AERA Act and it cannot be so easily brushed and set aside by AERA under the guise of "the efficient cost".*

**7.1.6 In light of above, we request the Authority to accept the Non-Aeronautical Revenues as projected by the AO which is in line with the contract entered based on market discovery rate and also allow for true-up on actual basis without providing any minimum floor.**

# 8. Chapter 8 “Comments on Consultation Paper Chapter 12 - Taxation For The Third Control Period”

## 8.1 AERA proposal as 12.2.2 from page 222 of CP relating to Taxation for the TCP Revenues

*12.2.2 Therefore, the Authority is of the view that: -*

- *Non-Aeronautical revenues (30%) should not be treated as a subsidy for the airport operator as the airport operator has already earned it from Non-Aeronautical services and is meant as a cross subsidy to the airport user.*
- *The consideration of 30% Non-Aeronautical revenues as part of revenues from Aeronautical services would result in undeserved enrichment to the airport operator effectively reducing the cross-subsidy benefit to the airport user from the present 30% Non-Aeronautical income.*

**Comments by TKIAL:**

8.1.1 As per AERA guidelines 5.5.1 as provided below, corporate tax paid on ***income from assets/ amenities/ facilities/ services*** (emphasis) taken into consideration for determination of Aggregate Revenue Requirement (ARR) will be considered for calculation of taxation component of ARR. Clause 5.5 of the AERA Guidelines is reproduced below:

5.5. Taxation (T)

5.5.1. Taxation represents payments by the Airport Operator in respect of corporate tax on income from assets/ amenities/ facilities/ services taken into consideration for determination of Aggregate Revenue Requirement.

5.5.2. The Authority shall review forecast for corporate tax calculation with a view to ascertain inter alia the appropriateness of the allocation and the calculations thereof.

Explanation: For avoidance of doubt, it is clarified that any interest payments, penalty, fines and other such penal levies associated with corporate tax, shall not be taken into consideration for calculation of Taxation.

*"5.5. Taxation (T)*

*5.5.1. Taxation represents payments by the Airport Operator in respect of corporate tax on income from assets/ amenities/ facilities/ services taken into consideration for determination of Aggregate Revenue Requirement.*

*5.5.2. The Authority shall review forecast for corporate tax calculation with a view to ascertain inter alia the appropriateness of the allocation and the calculations thereof.*

*Explanation: For avoidance of doubt, it is clarified that any interest payments, penalty, fines and other such penal levies associated with corporate tax, shall not be taken into consideration for calculation of Taxation."*

8.1.2 Income from Non-Aeronautical services are used in calculating the overall ARR. Therefore, in order to calculate the taxation under the regulatory framework, income from Non-Aeronautical services as proposed by AERA in the CP need to be considered. In case, the Authority does not consider income from Non-Aeronautical services for the purposes of taxation, it will be in contradiction to its guidelines.

**Latest TDSAT judgement for DIAL, MIAL and HIAL dated 21st July 2023, 06th October 2023 and 14th February 2024 respectively**

DIAL TDSAT Order Para 140 and 141

*140. AERA's contention that including S- Factor in calculation of Tax will result in an artificial tax benefit and overstate aeronautical tax is also misconceived and misleading. S factor has been considered in aeronautical Profit & Loss to arrive at Aeronautical Profit Before Tax (PBT) and the allocation of actual tax paid by DIAL is in the ratio of Aeronautical and Non-Aeronautical PBT and thus will not result in creation of artificial tax. Further, inclusion of S Factor in Tax and consequent consideration of S Factor as aeronautical revenue will provide true aeronautical profit and accurate base to calculate 'T'.*

*141. AERA's observation regarding reduction in the level of cross subsidy is also misconceived in as much as the non-aeronautical revenue cross subsidizes aeronautical revenue and the tax is only resultant on the profit earned and thus, the cross subsidy is nothing but a part of recovery of eligible aeronautical revenue only and thus has to be considered while drawing aeronautical Profit & Loss."*

MIAL TDSAT Order Para 398

*"398….. It has been further observed by AERA in the impugned order that as and when MIAL will pay the Income Tax for the 3rd Control Period in the true up process in the next control period, the said amount of tax will be taken into consideration. This observation is also devoid of any merit for the reason that in the formula of target revenue as stated hereinabove, the component of an amount equal to "T" has to be added and the methodology to calculate "T" is an amount equal to corporate taxes on earnings pertaining to aeronautical services (including the amount upon "S" factor), irrespective of the fact that whether actually the taxes are paid or not. The payment of tax to income tax authority and calculation of target revenue are two different things. The formula of a target revenue is an agreed formula as per the agreements between the appellant and the Government of India. Thus, the T factor is equal to an amount of corporate taxes. AERA has presumed that T is equal to amount of corporate taxes paid by the appellant. This definition cannot be amended nor the formula can be amended by AERA. AERA has presumed that T=corporate taxes paid by appellant. This addition of the words, neither in the definition nor the formula is permissible because it is an agreement between the appellant and the Government of India. We, therefore, quash and set aside observations of AERA, so far as they are related to exclusion of "S" factor as part of aeronautical base, while determining aeronautical taxes (i.e. T). We, hereby hold to include "S"-factor as part of aeronautical revenue base while determining aeronautical taxes (i.e. T)."*

HIAL TDSAT Order Para 423 and 424

*423. The aforesaid facts of the matter have not been properly appreciated by AERA, and therefore, the decision of AERA not to consider 30% of Non-Aeronautical*

*Revenue (NAR) as part of Aeronautical Revenue Base for computation of aeronautical taxes is incorrect, improper and unjustified.*

*424. We, hereby direct AERA to consider (i) the calculation of "T" on 30% of Non-Aeronautical Revenue because it partakes the character of Aeronautical Revenue in calculation of ARR as per the aforesaid formula,*

**8.1.3 We hereby request the Authority to add 30% of Non-Aeronautical revenues while determining the tax.**

# 9. Chapter 9 "Comments on Consultation Paper Chapter 14 - Aggregate Revenue Requirement (ARR) For The Third Control Period"

## 9.1 AERA proposal as 14.2.2 to 14.2.4 from page 226 onwards of CP relating to ARR

*14.2.2 The Authority notes that the AO has on-going capital expenditure projects and other planned works, which has resulted in a higher ARR for the Third Control Period. The traffic estimates for the current control period have also been made on the backdrop of the recovery from the impact caused by COVID-19 pandemic. The existing traffic base may not be sufficient for the complete recovery of ARR in the current Control Period and that this would require a significant increase in tariff, which in the present times is likely to adversely impact the recovery of air traffic. Further, a significant increase in Aeronautical tariff, is also attributable on account of the fact that the new Aeronautical tariff proposed by the Authority may be implemented only by the first quarter of next Financial Year, thereby resulting in lesser tariff years being available for recovery of the ARR.*

*14.2.3 In this regard, the Authority had drawn reference to the guiding principles issued by the International Civil Aviation Organization ("ICAO") on charges for Airports and Air Navigation Services (ICAO DoC 9082), which lays down the main purpose of economic oversight which is to achieve a balance between the interest of Airports and the Airport Users. This policy document categorically specifies that caution be exercised when attempting to compensate for shortfalls in revenue considering its effects of increased charges on aircraft operators and end users. The said policy document also emphasizes balancing the interests of airports on one hand and aircraft operators, end users on the other, in view of the importance of the air transport system to States. This should be applied particularly during periods of economic difficulty. Therefore, the policy document recommends that States encourage increased cooperation between airports and aircraft operators to ensure that the economic difficulties facing them all are shared in a reasonable manner. This may also be read in conjunction with the objectives of the National Civil Aviation Policy (NCAP) 2016, which intends to provide affordable and sustainable air travel for passengers/ masses. As per para 12 (c) of the NCAP, "In case the tariff in one particular year or contractual period turns out to be excessive, the Airport Operator and the Regulator will explore ways to keep the tariff reasonable and spread the excess amount over the future." The above has also been conveyed by AERA vide its Order No. 14/2016-17 dated 12th January 2017.*

*14.2.4 Determination of Aeronautical charges and UDF requires a delicate balance between cost recovery and its potential impact on air traffic demand. This balance is crucial for the financial viability of the airport and its ability to sustain operations while also ensuring that the tariffs remain competitive enough to attract and retain airlines and passengers. Therefore, the Authority, based on the Tariff Rate Card to be submitted by TKIAL would decide the balance between cost recovery and its potential impact on air traffic demand.*

**Comments by TKIAL**: -

9.1.1 We request the Authority to take cognizance of the following facts: -

**Investment mobilization through Privatization**

9.1.1.1 In the last 30 years investments of approx. Rs. 1,000 Crs has been made in the Thiruvananthapuram Airport, the last major expansion being in the year 2012.

9.1.1.2 Considering the potential demand and operational requirements, AAI planned for the expansion of terminal in FY2017-18 itself which was allowed by the Authority in the tariff order for SCP.

9.1.1.3 TKIAL has earmarked various investments including but not limited to what was envisaged by AAI, and it is mobilizing investments of approx Rs 4,000 crores during the control period.

**Financial Position of the Airport**

9.1.1.4 In respect to the financial position of the Airport, it is to be noted that: -

9.1.1.4.1 Thiruvananthapuram Airport has been incurring losses since privatization. TKIAL has incurred losses in FY22 and FY23 totaling ~Rs. 162 Crs. TKIAL is likely to incur losses of Rs. 100 Crs in FY24.

9.1.1.4.2 There are certain obligations under the Concession Agreement which are to be met like payment of Adjusted Deemed Initial RAB to AAI, reimbursement of select employee salaries to AAI, monthly concession fees payments to AAI, maintenance of service standards for operation and development. ***Out of total ARR proposed of NPV Rs. 2,260 Crs, approx. 35% (Rs. 789 Crs) relates to true-up amount for AAI.***

9.1.1.4.3 The existing debt of the company is based on cash flow assumptions including full recovery of the ARR. In case it does not happen, the credit profile of the company will further erode, and it will have cascading impact leading to higher cost of debt. This will ultimately translate into a higher FRoR.

**Unserved consideration**

9.1.1.5 In the proposed CP, substantial amounts relating to justified projects and operational expenditure are already proposed on actual incurrence basis without taking its impact in current ARR. It is expected that YPP in the next control period will be equal or more than the proposed YPP in the CP. Therefore, any shortfall in recovery of ARR is not going to serve any purpose other than causing undue cash flow burden to TKIAL.

9.1.2 Further the shortfall in recovery amount is to be trued-up along with carrying cost in the next control period which will also be higher burden on the passengers.

**Economic and viable operations**

9.1.3 As per AERA Act 2008, Clause 13 (a) (iv) Functions of Authority, the Authority need to consider the economic and viable operations of the Airport while determining the tariffs.

**9.1.4 Latest TDSAT judgement dated 14th February 2024 for HIAL. Refer Para 489 to 492**

*489. No such direction has been issued by Central Government under Section 42 of the AERA Act, 2008, in consonance with NCAP, 2016. Moreover, eligible ARR has been determined by AERA itself in accordance with AERA Guidelines, 2011, and, therefore, it cannot be said to be "excessive". Thus, para 12(c) of NCAP, 2016, does not permit AERA to postpone the partial recovery of Aggregate Revenue Requirement (ARR) for the next Control Period.*

*490. It is also to be kept in mind that ARR is to be utilised on capital expenditure projects undertaken by the Airport Operator. There is a systematic operation of work and operational expenditures which can be recovered through the levy of regulated*

*charges determined by AERA and, therefore, the recovery of ARR in a given Control Period is necessary for economic and viable operation of major airports.*

*491. 'Moreover, looking to Section 13(1)(a)(i) of the AERA Act, 2008 mandates AERA to determine tariff for aeronautical services taking into consideration the "Capital Expenditure incurred and timely investment in the improvement of the airport facilities". There is also violation of Tariff Guidelines Clause 6.2 by AERA if postponement of recovery of ARR is allowed because "Y, Yield per Passenger, calculated by AERA must be equal to ARR divided by Volume estimated in the tariff year.*

*492. Meaning thereby to if the recovery of part of ARR is to be postponed, there will be mismatch of ARR and "Y". We, therefore, quash and set aside the decision of AERA to postpone the part of recovery of ARR in the next Control Period and direct AERA to allow Airport Operator to recover ARR during the Control Period.*

**9.1.5 In light of the above, we earnestly request the Authority to allow full recovery of ARR. In the case full recovery of ARR is not allowed it will jeopardize the efficient operations of the Airport and adversely impact the ability of AO to mobilize funds to meet required Capital Expenditure. Further non-recovery of full ARR will create litigation issues with concessioning authority i.e. AAI as ARR includes 35% of AAI true-up.**

## 9.2 AERA proposal as 14.2.5 page 227 of CP relating to Tariff Card for TCP

*14.2.5 The Authority notes that, it is necessary to have the individual year wise tariff card laying down the different aeronautical charges and the workings for the aeronautical revenues, in order to have a constructive stakeholder discussion and hence TKIAL is directed to submit the detailed Annual Tariff proposals in line with the ARR and Yield arrived at by the Authority within 7 days of issue of the Consultation Paper.*

**Comments by TKIAL**: -

9.2.1 The tariff card was submitted to the Authority on 19th February 2024 and subsequently published by the Authority vide Public Notice No. 36/2023-24 dated 20th February 2024.

9.2.2 We request the Authority to make suitable adjustments in the ARR after considering the impacts of the requests raised in this document.

9.2.3 In the tariff card we have requested, and we re-iterate that "***the tariff card has multiple variables like concession agreement obligation to pay true-up to AAI which is almost 35% of total ARR and final ARR amount, mix of tariff structure (Landing Charges vs UDF) and effective date of new rates. We therefore request the Authority to kindly provide TKIAL an opportunity to discuss the ATP, once the final ARR is determined."***

# 10. Chapter 10 "Annexures"

i. Annexure 1 – CPWD Office Memorandum for GST rate increase
ii. Annexure 2 – ACRP Report
iii. Annexure 3 – EY Report on Future of Pay

**Annexure 1**

आत्मनिर्भर भारत

सत्यमेव जयते
भारत सरकार
केंद्रीय लोक निर्माण विभाग
तकनीकी अनुप्रयोग एवं मानक एकाई
कमरा सं0 418 ए–विंग, निर्माण भवन, नई दिल्ली।
टैलीफैक्स–011–23062339 ईमेल–delsetascsq.cpwd@nic.in

संख्या: 158 /SE(TAS)/GST/ 2022/ 331-ह्रि० दिनांक: 10 /08/2022

## कार्यालय ज्ञापन

**(No. SE/TAS/GST/20)**

**Sub: Increase in GST rate of Works Contracts for Central Government, State Government, Union Territory and a Local Authority.**

1. The Government of India, Ministry of Finance (Department of Revenue) vide Notification No. 03/2022- Central Tax (Rate) dated 13 July, 2022 has made amendments to notification No. 11/2017-Central Tax (Rate) dated 28.06.2017 by omitting entries against serial number 3, in column (3) (a) items (iii), (iv),(v),(va),(vi) and (ix) and the corresponding entries relating thereto in column (4) and(5) in the original notification No. 11/2017-Central Tax (Rate) dated 28.06.2017, thereby the existing concessional rate of GST@12% for Central Government, State Government, Union Territory and a Local Authority has been withdrawn and now the applicable rate of GST is 9 (CGST) + 9 (SGST) =18% on construction services covered under S. No.3 (i f) at page No. 6 and under S. No.3 (xii) at page No. 15 of Notification No.11/2017-Central Tax (Rate) dt 28 June, 2017 for Central Govt., State Govt., Union Territory and a Local Authority **with effect from 18th July, 2022**

2. The Delhi Schedule of rates 2021 was formulated with the concessional GST rate of 12% applicable for works provided to Central Government, State Government, Union Territory, a local authority, Governmental Authority or a Governmental Entity.

3. Now the revised rate of GST @ 18% is applicable on works contract for Central Government, State Government, Union Territory, a local authority, Governmental Authority or a Governmental Entity. Hence, a multiplying factor of 1.0633 on the estimated amount worked out based on PAR 2021/DSR 2021 shall be applicable for working out the amount of Preliminary Estimate and Detailed Estimate with effect from 18th July 2022. The calculation table is as under.

| **Multiplying factor Calculation Table** | | | |
|---|---|---|---|
| A. Calculation detail when applicable rate of GST was 12% in DSR 2021 | | | |
| 1. | Bare rate (without GST) of material, Labour, Sundries, POL and T&P etc. | A | |
| 2. | Add 1% water charges on "A" | 0.01A | |
| 3. | Sum after adding water charges @ 1% on "A" | 1.01A | |
| 4. | 12% GST on works contract by reverse calculation method (multiplying factor 0.1405) | 0.1419A | May refer OM No. SE/TAS/GST/07 dt 08.11.2017 |
| 5. | Sum after adding GST | 1.1519A | |
| 6. | 15% CP & OH on "1.1519A" | 0.1728A | |
| 7. | Sum after adding 15% CP & OH | 1.3247A | |
| 8. | Labour cess @ 1% on "1.3247A" | 0.0132A | |
| 9. | Gross Total after adding 1% labour cess, Total (W1 )= | 1.3379A | |

| | | | |
|---|---|---|---|
| | (B) Calculation detail when 18 % GST is applicable w.e.f.18th July 2022 | | |
| 1. | Bare rate (without GST) of material, Labour, Sundries, POL and T&P etc. | A | |
| 2. | Add 1% water charges on "W" | 0.01A | |
| 3. | Sum after adding water charges @ 1% on "W" | 1.01A | |
| 4. | 18% GST on works contract by reverse calculation method (multiplying factor 0.2127) | 0.2148A | May refer OM No. SE/TAS/GST/16 dt 28.05.2018 |
| 5. | Sum after adding GST | 1.2248A | |
| 6. | 15% CP & OH on "1.2248A" | 0.1837A | |
| 7. | Sum after adding 15% CP & OH | 1.4085A | |
| 8. | Labour cess @ 1% on "1.4085A" | 0.0141A | |
| 9. | Gross Total after adding 1% labour cess, Total (W2 )= | 1.4226A | |
| | | | |
| | **Hence, Multiplying Factor = 1.4226A / 1.3379A = 1.0633** | | |

**Illustration :**

If the estimated cost of P/E or D/E worked out based on PAR 2021or DSR-2021 = W

Hence, amount of P/E and D/E with applicable rate of GST @ 18%
in place of 12% = W x 1.0633=1.0633 W
Add applicable cost index (BCI) of the station, say 10% =0.10633 W
Grand Total=1.16963W

4. The estimated cost put to tender in the NIT shall be worked out in the above manner and combining with the cost of non-schedule items if any, worked out on market rate as per OM No. SE/TAS/GST/16 dt 28.05.2018. (Copy enclosed)

5. The revised P/E may be sent to client department in case A/A& E/S is not yet received. The revised P/E may also be sent to client department for additional liability on account of GST for remaining work beyond 17th July 2022 where works are in progress.

This issue with the approval of competent authority.

Encl. As above

(एस. एन. जायसवाल) 19/08/22
कार्यपालक अभियता (टास)
सी.एस.क्यू. के.लो.नि.वि., नई दिल्ली

(Issued from E-file No. 9137648)
(के.लो.नि.वि. वेवसाइट के द्वारा)
सभी विशेष महानिदेशक/अपर महानिदेशक /मुख्य परियोजना प्रबन्धक/मुंख्य अभियन्ता/परियोजना प्रबन्धक/ अधीक्षण अभियन्ता/कार्यपालक अभियन्ता के0 लो0 नि0 वि0 तथा लो0 नि0 वि0 दिल्ली के सभी अधिकारियों को सूचना एवं आवश्यक कार्यवाही हेतु।

CENTRAL PUBLIC WORKS DEPARTMENT

**OFFICE MEMORANDUM**

**SE/TAS/GST/ 07**

**ISSUED BY AUTHORTY OF DIRECTOR GENERAL, CPWD**

NIRMAN BHAWAN, NEW DELHI DATED : 08.11.2017

**Sub:- Clarification of GST -Regarding**

Considering the various representations made by the Builder Associations of different regions with a view to mitigate the problems faced by contractors, it has been decided to adopt the following guidelines due to imposition of Goods and Services Tax (GST) with effect from 01.07.2017. **This is in supersession to this office O.M. No SE/TAS/GST/05 Dated 27/09/2017:-**

<table>
<tr><th>S.No.</th><th>Work Position</th><th>Action to be taken</th></tr>
<tr><td>1.</td><td>Method of calculation of market rates (wherever applicable) for extra items/substitute items /deviation items beyond the permissible limit, Justifications etc executed after the commencement of GST with effect from 01/07/2017</td><td>The agency will submit the details of statement along with Analysis of rates as per model calculation sheet along with necessary authenticated documentary proofs to Engineer in Charge.<br><br><u>Model Calculation Sheet</u>
<table>
<tr><td>1.</td><td>Bare rate (without GST) of Material, Labour, Sundries POL and T&P etc.</td><td>"W"</td></tr>
<tr><td>2.</td><td>Asdd 1% water charges on "W"</td><td>"A"</td></tr>
<tr><td>3.</td><td>Sum after adding Water Charges @1% on "W"</td><td>"WC" = (W+A)</td></tr>
<tr><td>4.</td><td>Add 12% GST applicable on work contract, by reversible method (multiplying factor 0.1405)</td><td>"B" = (0.1405*WC)</td></tr>
<tr><td>5.</td><td>Sum after adding GST</td><td>"X" = (WC+B)</td></tr>
<tr><td>6.</td><td>Add 15% CP & OH on "X"</td><td>"C"</td></tr>
<tr><td></td><td>Sum after adding 15% CP&OH</td><td>"Y"= (X+C)</td></tr>
<tr><td>7.</td><td>Add labour cess @1% on "Y"</td><td>"D"</td></tr>
<tr><td>8.</td><td>Gross total after adding 1% labour cess</td><td>"Z"=(Y+D)</td></tr>
</table></td></tr>
</table>

Note:- (1) Multiplying factor 0.1405 considered for reversible calculation of GST so that 12% GST on gross amount excluding 1% labour cess is worked out.

(2) This model calculation is applicable only for GST @12% on Work contracts.

This issues with the approval of DG, CPWD.

8/11/2017

Superintending Engineer (TAS)
CSQ, CPWD. Nirman Bhawan,
New Delhi

**No158/GST/SE(TAS)/CPWD/2017/** 258-62 **dated** 8/11/2017

**Copy to:-**

1. All the SDGs, all the ADGs, All the CEs CPWD/ E-in-C (PWD) GNCTD through CPWD web site for information please.

Superintending Engineer (TAS)

**OFFICE MEMORANDUM**
**No. DG/SE/GST/ 16**
**ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD**
**NIRMAN BHAVAN,NEW DELHI** **Dated:-** 28/05/2018

**Sub:- Clarification of GST – Regarding.**

In continuation to OM SE/TAS/GST/07 dated 8-11-2017 it has been decided to adopt the following guidelines in case applicable GST on works contract is 18 % .

| S.No. | Work Position | Action to be taken |
|---|---|---|
| 1. | Method of calculation of market rates (wherever applicable) for extra items/substitute items / deviation items beyond the permissible limit, justification etc executed after the commencement of GST with effect from 01/07/2017. **(This model calculation is applicable only where the GST is @ 18% on Work Contracts. )** | The agency will submit the details of statement along with Analysis of rates as per model calculation sheet along with necessary authenticated documentary proofs of Engineer- in – charge. **Model Calculation Sheet** |

| | | |
|---|---|---|
| 1. | Bare rate (without GST) OF Material Labour, Sundries POL and T&P etc. | "W" |
| 2. | Add 1% water charges on "W" | "A" |
| 3. | Sum after adding Water Charges @1 % on "W" | "WC"=(W + A) |
| 4. | 18% GST applicable on work contract by reversible method (multiplying factor 0.2127) | "B"=(0.2127*WC) |
| 5. | Sum after adding GST | "X"=(WC+B) |
| 6. | 15 % CP & OH on "X" | "C" |
| 7. | Sum after adding 15 % CP&OH | "Y"=(X+C) |
| 8. | Labour cess @1% on "y" | "D" |
| 9. | Gross total after adding 1 % labour cess | "Z"=(Y+D) |
| | | |

Note :-1.Multiplying factor 0.2127 considered for reversible calculation of GST so that 18 % GST on gross amount excluding 1 % labour cess is worked out.

28/5/2018
Superintending Engineer (TAS)
CSQ CPWD, Nirman Bhawan
New Delhi
Dated 28/05/2018

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Superintending Engineer (TAS)


# Airport Capital Improvements: A Business Planning and Decision-Making Approach (201

## DETAILS

64 pages | 8.5 x 11 | PAPERBACK

ISBN 978-0-309-30808-3 | DOI 10.17226/22259

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## SUGGESTED CITATION

National Academies of Sciences, Engineering, and Medicine 2014. *Airport Capital Improvements: A Business Planning and Decision-Making Approach*. Washington, DC: The National Academies Press. https://doi.org/10.17226/22259.

AIRPORT COOPERATIVE RESEARCH PROGRAM

# ACRP REPORT 120

# Airport Capital Improvements: A Business Planning and Decision-Making Approach

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*Subscriber Categories*
Aviation • Construction • Economics

Research sponsored by the Federal Aviation Administration

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2014
www.TRB.org

## AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), Airlines for America (A4A), and the Airport Consultants Council (ACC) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

Once selected, each ACRP project is assigned to an expert panel, appointed by the TRB. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including airport professionals, the intended users of the research products. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, ACRP project panels serve voluntarily without compensation.

Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

## ACRP REPORT 120

Project 01-19
ISSN 1935-9802
ISBN 978-0-309-30808-3
Library of Congress Control Number 2014951769



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**AIRPORT COOPERATIVE RESEARCH PROGRAM**

*are available from:*

Transportation Research Board
Business Office
500 Fifth Street, NW
Washington, DC 20001

*and can be ordered through the Internet at*

http://www.national-academies.org/trb/bookstore

Printed in the United States of America

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The research reported herein was performed under ACRP Project 01-19 by MCR Federal, LLC and its subcontractors Hoyle, Tanner & Associates, Inc. and Fennick McCredie Architecture, Ltd. The principal investigator was Joakim Karlsson of MCR Federal, LLC. The other authors of this report are Scott Allard and Rohit Viswanathan, PMP, of MCR Federal, LLC; Robert Furey, PE, of Hoyle, Tanner & Associates, Inc.; and Jonathan McCredie, AIA, of Fennick McCredie Architecture, Ltd.

The research team would like to express its gratitude to the members of the ACRP Project 01-19 panel for their valuable input and support throughout this project and the many individuals, agencies, and organizations who contributed to the airport construction cost database.

# FOREWORD

By Lawrence D. Goldstein
Staff Officer
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*ACRP Report 120: Airport Capital Improvements: A Business Planning and Decision-Making Approach* provides a guidebook to cost estimating for airport capital planning, supported by a spreadsheet-based cost-estimating model. The guidebook and the accompanying model are designed to help airport operators, aviation/transportation agencies, and other industry stakeholders understand cost-estimating practices, including risks and sources of uncertainty.

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Annual airport capital investment needs have recently diminished somewhat but are still expected to average approximately $14 billion annually over the next several years (ACI North America: *Airport Capital Development Needs 2013–2017*). Working to meet this need, individual airports, state and local agencies, and the Federal Aviation Administration are all dependent on individual case-by-case engineering cost studies and the bid process when estimating, planning, and budgeting for airport capital improvement projects. The engineering, planning, and finance staffs at airports do not always have access to necessary and sufficient information to prepare accurate capital cost estimates. In particular, many smaller airports often do not have staff to perform these functions and must, as a result, rely on external consulting expertise.

An additional problem in preparing cost estimates is a lack of consistency, standardization, and accuracy across the airport industry. This often precludes comparisons of project cost estimates that, by necessity, must take into account variations in regional costs, state and local conditions, or varying levels of technical expertise. The result is a high risk of inaccurate cost estimates, which can cause project cancellations and inefficient distribution of capital funds at the state level. Further, unique conditions at any given airport make simple comparison with similar projects at other airports often difficult if not problematic. Experience indicates that increased availability of relevant data can facilitate the capital budgeting process and improve overall project cost estimating, project planning, and implementation, while resulting in a more efficient and effective approach to developing an airport capital improvement program.

*ACRP Report 120* provides a model and database for estimating the cost of construction projects regularly proposed in an airport's capital improvement plan. The particular approach presented as an outcome of this effort applies parametric cost estimating, using historical cost data to determine cost-estimating relationships (CERs). The CERs are mathematical functions that link construction cost to independent variables that represent key cost drivers. The CERs were developed using multivariable regression analysis conducted on a database of historical cost data collected for this study.

The model supports construction projects representing both the horizontal domain (i.e., projects that are not buildings and are primarily related to the airfield) and the vertical

domain (i.e., buildings). The resulting analytical approach incorporates a spreadsheet-based cost model, with application to a total of eight project types. The model allows the user to enter airport information, project definitions, and cost drivers to generate a cost estimate. Cost estimates are also adjusted for inflation and geographical variations in construction cost at the state level. The cost model was assessed using statistical metrics of quality of fit, and validated using a case-study approach. Limited availability of historical cost data in a usable form presents the greatest challenge to implementing parametric cost estimating for airport construction projects and puts constraints on the robustness of the model. Building on the research, this guidebook includes recommendations for data collection practices intended to help overcome these constraints to support a more comprehensive and robust model in the future.

# CONTENTS



Note: Photographs, figures, and tables in this report may have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

SUMMARY

# Airport Capital Improvements: A Business Planning and Decision-Making Approach

This guidebook presents a cost-estimating approach that can be used to quickly and efficiently develop cost estimates for airport construction projects during the capital planning phase. The goal is to provide a model that produces consistent, standardized, and accurate cost estimates, employing a user interface that requires minimal training and cost-estimating experience. The guidebook describes the basic principles of cost estimating and the specific methodology applied—parametric cost estimating. This methodology uses multivariable regression analysis to derive mathematical relationships between construction cost and independent variables that describe key cost drivers.

This project includes an accompanying cost-estimating tool developed in Microsoft® Excel™. This tool can be used by airports to implement the proposed approach. It supports the preparation of cost estimates for eight different types of airport construction projects. Use of the tool requires no formal training in cost estimating and requires no software other than Microsoft Excel.

## Background

The objective of this project was to develop and test an analytical approach to prepare cost estimates for airport construction projects, both in the horizontal and vertical domains. The proposed cost-estimating model is primarily intended for the capital planning phase, when uncertainty is high. At the same time, capital planning requires accurate cost estimates in order to optimize the use of scarce airport funding resources. This highlights the need for a standardized, consistent, and easy-to-use cost model, especially for smaller airports without extensive engineering resources.

## Approach

The proposed approach was to use a parametric cost-estimating technique in which costs are correlated with observed data from historical construction projects. In this approach, multivariable regression analysis was used to model cost through mathematical functions known as cost-estimating relationships (CERs). The CERs model cost as a function of key cost drivers represented by candidate independent variables (CIVs). The variables are considered candidates because they are selected using subject matter expert input and are then tested for statistical validity and reasonableness.

The output of the model is a cost estimate for a single project or a portfolio of projects, with both a point estimate and a low-high range that takes into account the uncertainties and risks associated with cost estimating. The costs are adjusted for inflation and incorporate regional

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variations in construction costs. The inputs to the model that are necessary to prepare a cost estimate are values for the cost drivers represented by the CIVs for the project type in question. The CIVs are the independent variables in the CERs, which represent the analytical component of the model. Additional data required to be entered by the user include the geographic location of the project and the proposed year of construction.

## Cost-Estimating Tool

The historical cost data collected during the course of this study was filtered, analyzed, and implemented in a database. The cost database was used in the statistical analysis that resulted in the CERs that form the backbone of the cost model. A cost-estimating tool titled ACCE—the Airport Capital Cost Estimation tool—was implemented in Microsoft Excel. The tool incorporates CERs for eight different types of common airport construction projects. Six of these are in the horizontal domain and two in the vertical domain.

ACCE is provided as companion software to this guidebook. A quick reference guide is reproduced in Appendix B. The ACCE user interface is designed to guide the user through the necessary steps to develop a cost estimate. In the input step, the user enters contact information, airport information, and project-specific data. ACCE displays a running cost estimate, which is updated as the project's inputs are changed. When the inputs are finalized, the user can switch to the reporting module. The report generator allows for the preparation of a cost-estimating report which documents the input data and presents a low, high, and best cost estimate. Additional features allow for exporting and printing the results, as well as the ability to prepare what-if analyses by altering one or more project inputs.

ACCE can be used by airports of any size to prepare cost estimates for the construction project types supported by the tool. Note, however, that due to limitations encountered during the data collection phase, ACCE should be viewed as a proof-of-concept tool used primarily to develop initial cost estimates for planning purposes. Actual construction costs may differ substantially from the estimates provided by the model. The estimates produced by the software should not be used as the sole means to evaluate the cost of a proposed airport construction project.

## Findings

The data collection resulted in the development of CERs for eight airport construction types. The CERs were validated both using statistical metrics describing quality of fit, as well as a case study validation analysis. The user interface provides a simple but effective mechanism for members of the airport community to interact with the cost model. While the model validation shows that the performance of the cost model varies, this is to be expected given the relative small size of the underlying database.

Although the project objective of producing a cost database and model based on parametric cost estimating has been met, the resulting model is limited in its scope and robustness. This guidebook includes recommendations for future work, focusing on addressing the limited availability of historical construction data in a usable electronic format. The recommendations provide guidance on future data collection efforts, including specific suggestions for the type of data to be collected.

CHAPTER 1

# Introduction

## Objective

As part of its capital planning and master planning activities, airports are required to prepare cost estimates for proposed construction projects. These are presented and distributed to a number of stakeholders, including governing boards, state and regional transportation agencies, and the regional offices of the Federal Aviation Administration (FAA). The cost estimates can be developed by the airports' own staff, with varying levels of expertise and experience, by external consultants, or by planners and engineers at other agencies. These estimates are typically developed prior to any significant feasibility, investigative or preliminary design work being performed. The resulting accuracy of the estimates is therefore mixed and as the projects move into the execution phase, the initial cost estimates are often far removed from the actual construction costs. In turn, inaccurate cost estimates can lead to outright project cancellations or inefficient distribution of limited airport capital funds.

The importance of managing construction cost estimating and the risks associated with inaccurate estimates are reflected in the financial markets' evaluations of airports. For example, one national credit rating specifically takes into account "risk and complexity of [an airport's] capital programs," including "level of construction risk in capital projects" (Krummenacker et al. 2011, p. 13). The main risk is identified as construction cost escalation caused by delay, with specific risk factors listed as follows:

- Scope changes between design and completion
- Outdated or inaccurate cost estimates
- Project complexity
- Material or labor cost escalations
- Poor bidding procedures
- Contractor management/oversight issues
- Environmental concerns
- Community concerns

Another source of uncertainty is the presence of geographical (i.e., regional) variations in construction costs. These can be substantial and are caused by a number of factors, including labor supply, raw material costs, access to transportation, energy costs, and regulatory standards, with an emphasis on environmental regulations. A cost-estimating model must be able to take regional variations into account, both during the development and calibration of the model and during the cost-estimating phase.

The existence of a standardized cost-estimating model should allow airports to mitigate some of these risks. At the same time, it must be recognized that a number of these risks cannot be addressed even by the most exhaustive cost-estimating model. For example, an otherwise

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accurate cost estimate could be rendered ineffective by unusually demanding environmental regulations, fluctuations in market conditions, or inadequate construction management.

Only 139 of the 3,355 airports identified in the National Plan of Integrated Airport Systems (NPIAS) are classified as hub airports (FAA 2012). In other words, over 95% of airport sponsors represent non-hub commercial and general aviation airports, which tend to have no engineering staff on board. Consequently, most airports do not have any in-house cost-estimating experience or expertise. Even hub airports often rely on engineering consultants to provide cost-estimating and bidding services. Lack of access to cost-estimating expertise is another reason why there is a perceived need for a software-based cost model.

Investment decisions for large acquisitions within the FAA Air Traffic Organization require a benefit-cost analysis (BCA), in which a standardized cost estimate is compared against monetized benefits. This is not the case for the majority of airport capital projects and, consequently, the approach for developing airport capital cost estimates can vary considerably. The lack of a standard methodology and the limited cost-estimating resources available to airports result in substantial challenges. One challenge arises from substantial variation between the cost estimates obtained in the capital planning phase and the actual costs reported in the bidding phase or after the close-out of the construction projects. Airports also suffer because the resulting variations tend to be biased toward underestimating the overall cost. The potential result is that anticipated projects must be scaled back, delayed, or cancelled.

Cost estimates for airport capital improvement plans (ACIPs) are often first prepared during the development of the airport master plan, airport layout plan, or in support of the capital planning process of the relevant state aviation agency or the FAA. Often, the design data available at the time the first cost estimate is developed is limited to a conceptual layout, the approximate size, the location on the airport, and little else. The time frame for construction of the facility being estimated can vary from a few months to 20 years or more. At this point in the process, a rough order of magnitude estimate is the best that can be expected, due to the limited data available.

Airport projects are often complex: "Airport projects have a whole series of special systems which are seen nowhere else, on an enormous scale" (Merkel and Cho 2003). It is clear that two separate but related problems must be addressed: (1) improving the accuracy of the cost estimate as calculated from current and relevant cost data and (2) improving the specificity of the project scope and unique conditions which must be entered into the model by the user. The problems are linked: The accuracy of the result is completely dependent upon the specificity of the scope. The dual challenges of providing sufficient accuracy and specific scoping vary in their characteristics, depending on the type of project. Some project types have greater potential for significant deviations, and therefore more potential for improvement.

Before discussing cost estimating in more detail, it is necessary to clarify what the terms "horizontal" and "vertical" mean in the construction industry and how they relate to airport projects. Horizontal construction refers to projects that involve work on a road, bridge, traffic signal, water or sewer main, or any other improvement to land that is not a building (Massachusetts Certified Public Purchasing Official Program 2001, p. 2). Applied to airports, roads and bridges are substituted with runways and taxiways, traffic signals are substituted with airfield lighting, and so on. Examples of horizontal airport construction include runways, taxiways, aircraft aprons, security fences, and airfield lighting. Conversely, vertical construction is defined as work on a building. Examples of vertical construction on airports include terminal buildings, hangars, and facilities for storing airport equipment, such as snow removal equipment (SRE) and aircraft rescue and fire fighting (ARFF) vehicles.

The objective of this research project was to develop an interactive construction cost-estimating model and associated database for airport capital projects, along with a guidebook documenting

best practices for cost estimating and guidance on using the cost model and database. The model should cover common airport construction projects, both in the horizontal and vertical domains. It should make use of existing databases and take into account regional cost factors and inflation. Finally, it should be flexible in its use, for example, by allowing for database updates and the ability to generate reports in Excel, PDF, and other formats.

## How to Use this Guidebook

This guidebook is designed to provide a practical approach for developing cost estimates for airport construction projects. The guidebook contains the following:

- Information and background material on cost estimating intended to expand the reader's knowledge base. The guidebook describes best practices for cost estimating, as well as specific material on the parametric cost-estimating approach. This material will also aid the reader who wants to understand the methodology used by the cost-estimating tool.
- A primer and quick reference guide to ACCE—the Airport Capital Cost Estimation tool. ACCE represents the implementation of the cost model and database developed as part of this project. The ACCE cost model is implemented as a self-contained Microsoft Excel application that accompanies this guidebook.
- Recommendations for future work, with a focus on overcoming limitations on data availability that constrain the effectiveness and robustness of the cost model as currently implemented.

The material in this guidebook is organized to provide a logical path leading up to the use of ACCE to support cost estimating for airport construction projects. This guidebook is organized as follows:

- Chapter 1 provides an overview of the guidebook, objectives, information for the reader, and background material.
- Chapter 2 covers the fundamentals of cost estimating, as applied to the airport domain. This chapter identifies best practices, as well as specific challenges to cost estimating in the horizontal and vertical domains, respectively.
- Chapter 3 provides detailed information on parametric cost estimating: the cost-estimating methodology that was adapted for this project. The chapter provides guidance on the selection of CIVs, the development of CERs, and testing and validating the resulting cost model.
- Chapter 4 describes the development of the historical cost database, including a description of the database structure, approaches to collecting data, as well as challenges and limitations.
- Chapter 5 is a guide to ACCE, the Microsoft Excel-based application developed to implement the cost model and database for this project. It describes how to define a project, what data needs to be entered by the user, how the tool should be used, and the meaning of the data contained in the output—the cost-estimating report. Particular attention is spent on how to interpret the results and identifying the limitations of the cost model.
- Chapter 6 summarizes lessons learned, drawing both on internal findings from the research project and results from the validation of the cost model. Recommendations for future work are also included in this chapter.

Reference material has been placed in appendices to the main guidebook. Appendix A contains detailed information on the CERs for each of the project types supported in the cost model. Appendix B contains the ACCE Quick Reference, which is a concise user guide to the cost model.

Note that a full understanding of the material in this guidebook is not necessary for the purpose of using ACCE. The information provided is intended to explain the selected cost-estimating methodology and how it is implemented in ACCE. It provides background material to help the user understand the inner workings of the model. This, in turn, should help the user better

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understand and explain the resulting cost estimates. For readers who are interested in quickly getting started with ACCE, the following sections are recommended:

- Chapter 5: ACCE—Airport Capital Cost Estimation Tool
- Appendix B: ACCE Quick Reference Guide

## Who Can Use this Guidebook?

This guidebook can be used by all airports who are considering construction projects within their ACIP. While ACCE itself supports a specific subset of project types, the best practices presented in the guidebook apply more broadly.

When developing cost estimates, it will be useful to have participation and input from a broad range of functional areas at the airport. The areas of responsibilities that should be represented include the following:

- **Management:** Executive leadership, policy, overall compliance with airport mission.
- **Operations:** Operational and certification requirements, efficiency, safety.
- **Maintenance:** Maintainability and sustainment of infrastructure.
- **Emergency Response/Law Enforcement:** Operational and certification requirements, safety, security.
- **Planning:** Capital improvement planning, funding, land use compatibility.
- **Finance:** Finance, funding, airport use agreements.
- **Environmental:** Impacts on noise, wetlands, air quality, water quality, wildlife, other environmental areas of concern.

At larger airports, these functional areas may be represented by separate individuals or departments. Conversely, at a general aviation airport, the airport manager may be solely responsible for all of the listed functions.

The guidebook and accompanying cost model can also be used by decision makers and planners at regional, state, and federal agencies with oversight over airport funding. For example, state aviation planners can use the tool to validate cost estimates submitted by airports in their requests for state and federal funding.

The decision support tool requires certain hardware and software to be available. These include a computer running Microsoft Excel (version 2007 or later).

## Related ACRP Projects

This study is one of several projects conducted within the Airport Cooperative Research Program (ACRP) intended to support airports in planning for and funding capital projects. While this particular study focuses on cost estimating, it is valuable for airports to be familiar with the broader literature on finance, BCA, and innovative methods related to capital planning. This emerging body of research includes the following ACRP projects:

- ***ACRP Report 21: A Guidebook for Selecting Airport Capital Project Delivery Methods.*** This ACRP report provides guidance on three different types of project delivery methods for airport projects: design-bid-build (DBB), design-build (DB), and construction manager at risk (CMR). The report provides a two-tiered decision support approach for selecting an appropriate method. The report describes the advantages, disadvantages, and cost efficiencies of each of the three methods. The two-tiered project delivery selection framework can be used by airport owners and operators to evaluate the pros and cons of each delivery method and

select the most appropriate method for their project. Tier 1 consists of an analytical delivery decision approach designed to help the user understand the attributes of each project delivery method. The goal is to decide whether the delivery method is appropriate for the airport's specific circumstances. Tier 2 uses a weighted-matrix delivery decision approach that allows airports to prioritize their objectives and, based on the prioritized objectives, select the delivery method that is best suited for their project. This report is useful for evaluating the effects that each delivery method has on the construction cost estimation process.

- ***ACRP Report 49: Collaborative Airport Capital Planning Handbook.*** This handbook provides guidance to those in the airport community who have responsibility for, and a stake in, developing, financing, managing, and overseeing the ACIP and the individual projects included in it. This guidance is useful to help to prioritize the projects in the ACIP, which influences the selection of project types to be modeled. It also creates a framework for using the ACCE tool in a collaborative fashion that results in constructive communication between internal and external stakeholders.

  The findings of *ACRP Report 49* were used in this project to refine the list of candidate projects for inclusion in the cost model. Two key principles were applied: (1) to focus on projects with high potential for reducing the uncertainty in cost estimating and (2) to focus on projects with potential for a high return-on-investment for the airport sponsor.
- ***ACRP Synthesis of Airport Practice 1: Innovative Finance and Alternative Sources of Revenue for Airports.*** This synthesis study discusses alternative financing options and revenue sources for funding capital projects. The report discusses existing and potential funding sources, newly developed revenue sources, and a review of privatization options. A solid understanding of funding availability is important, since there is a strong relationship between funding sources and the feasibility of including a project in the ACIP. The report may also help airports implement projects for which cost estimates have been developed using the ACCE tool.
- ***ACRP Synthesis of Airport Practice 13: Effective Practices for Preparing Airport Improvement Program Benefit-Cost Analysis.*** This synthesis study describes successful assessment techniques that can be used by airports in performing BCAs to quantify benefits for projects needing more than $5 million in Airport Improvement Program (AIP) discretionary funding. The synthesis includes a literature review, a review of BCAs submitted to the FAA for AIP funding, and an evaluation and summary of successful practices. While the focus is on the assessment of benefits, a framework for categorizing costs is presented. This study also provides a conceptual framework for how to use cost estimates to formally prioritize investments under consideration.

CHAPTER 2

# Best Practices for Estimating Construction Costs

This chapter provides general guidance on cost estimating for airport construction projects. It discusses basic terminology, best practices, and challenges.

## Basic Principles of Cost Estimating

Cost estimating is a dynamic process, encompassing interdependencies and integration with system engineering, benefit analysis, requirements, risks, schedule, and implementation planning. Lifecycle cost estimates include the total costs to acquire, implement, operate, maintain, technology refresh, and dispose of the proposed acquisition. The elements of such cost estimates include costs for both capital expenditures and recurring expenses for operations and maintenance. However, when developing construction cost estimates for an ACIP, only the initial capital expense is usually considered. This is because one main purpose of the ACIP is to align construction needs with the availability of capital funding. Many, if not most, of the sources for airport capital funds, including the federal Passenger Facility Charge (PFC) program and AIP, only provide funds for the initial planning, design, permitting, and construction, and not for recurring maintenance costs.

When a proposed investment consists of the procurement of commercial off-the-shelf (COTS) products, a cost estimate is relatively easy to obtain. This is because the cost can simply be determined by using the purchase price or a quote provided by one or more potential vendors. However, for anything other than a straightforward COTS procurement, cost estimating becomes much more complex. In the airport domain, construction usually requires significant planning, design, and engineering activities. Frequently, airport construction projects require facility needs analysis, site surveys, geotechnical investigation, environmental analysis, and permitting. Construction is usually preceded by site preparation activities, which can be extensive. Each of these cost elements can be complex enough to require substantial engineering and analysis. These cost estimates of construction and acquisition costs developed for ACIP are typically provided by the airport's engineer (in-house or through a consultant appointment).

More in-depth information and best practices are also available in existing reference material, for example, the U.S. Government Accountability Office's *Cost Estimating and Assessment Guide* (GAO 2009). FAA's guidance on BCAs for airport projects also covers cost-estimating principles (FAA 1999).

### Benefit-Cost Analysis

The BCA is the broadest type of cost-estimating document and is used to justify specific capital planning decisions. The BCA is used to evaluate the lifecycle economic value of proposed

public investments. It works by comparing streams of economic benefits over time with streams of costs, and then expresses the difference in terms of a number of metrics. These metrics include the discounted net present value (NPV), benefit-cost (B/C) ratio, internal rate of return (IRR), and payback period. The BCA provides a straightforward and consistent way to compare, rank, and select among competing alternatives that may differ in timing and/or scale. The key issues addressed by a BCA for a proposed investment decision include the following:

- Whether the economic benefits of a proposed project justify its economic costs
- Which alternative should be selected
- What the priorities and schedules should be for the selected projects

A BCA is required for projects funded through AIP grants of at least $10 million, when paid for using discretionary funds or letters-of-intent. In practice, this means BCAs are not required for most AIP-funded projects. BCAs are also not required for projects paid through other funding mechanisms, such as bonds or PFC funding. Guidance for conducting BCAs for airport projects is provided by the FAA (1999) and in *ACRP Synthesis of Airport Practice 13: Effective Practices for Preparing Airport Improvement Program Benefit-Cost Analysis* (Landau & Weisbrod 2009).

## Cost-Estimating Analyses

Cost-estimating analyses cover all other types of studies focused strictly on the development of cost estimates. There are four commonly used methodologies to develop cost estimates (American Association of State Highway and Transportation Officials 2009):

1. **Parametric estimates.** Parametric estimates are developed by applying CERs that relate an independent non-cost variable such as runway length to a dependent cost variable such as amount of site work required. CERs are developed by quantifying hypothetical relationships between independent and dependent variables based on engineering experience, developing a database of actual historic variables, and performing statistical analyses of the relationship between the independent and dependent variables.
2. **Estimating using historical bid prices.** This method uses data from recently awarded contracts as a basis for the unit prices on the project being estimated. Data from previously awarded projects is typically stored in a database for three to five years to provide historical data to the estimator. The more data that is available and the more effectively it is organized by project types, size, and locations, the better the estimate that can be produced. Unit prices are adjusted for specific project conditions in comparison to previous projects awarded. Adjustments are generally made based on the project location, size of the project, project risks, quantities, general market conditions, and other factors.
3. **Cost-based estimating.** Cost-based estimating is a method that relies on estimating the cost of each component to complete the work and then adding a reasonable amount for the contractor's overhead and profit. A cost-based estimating approach can take into account the unique characteristics of a project, geographical influences, market factors, and the volatility of material prices. Since contractors generally utilize a cost-based estimating approach to prepare bids, this method can provide more accurate and defendable costs to support the decision for contract award. Properly prepared cost-based estimates require significantly more in terms of effort, time, and skill to prepare than historical bid based estimating. For this reason, cost-based estimates are often prepared only for those items that comprise the largest dollar value of the project. In order to successfully implement cost-based estimating, the estimators must have expertise in construction methodologies including required equipment, manpower, material, and scheduling. Additionally, the nature of cost-based estimating requires that a significant degree of information regarding the project scope, size, materials, and systems has been developed. Therefore this method is usually implemented only after the design of the project has begun.

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4. **Risk/contingency analysis.** In addition to developing the most likely, or so-called "point," estimate, this method also addresses project risks and uncertainties. Using statistical techniques such as Monte Carlo analysis, risk analysis accounts for uncertainty surrounding the point estimate. The total risk-adjusted cost estimate for the project is derived by statistically adding the risk-adjusted costs for each of the contingent subelements that make up the project.

Parametric cost estimating was the approach used to develop the cost model presented in this guidebook. This methodology is described in detail in Chapter 3.

## Summary of Best Practices

The science of cost estimating is relatively mature and there is a large body of knowledge documenting approaches and best practices. A summary of the most relevant best practices is presented below, organized by key reference works.

### American Association of State Highway and Transportation Officials, *A Practical Guide to Estimating*

The American Association of State Highway and Transportation Officials (AASHTO) Technical Committee on Cost Estimating documents practical guidance on preparing final estimates, including recommended procedures and guidance on reviewing bids prior to award (AASHTO 2009). The guide draws on the expertise of AASHTO members and the agencies they represent to document the best practices in use by state agencies. This guide provides practical guidance on preparing final estimates. Of particular interest to this project is the discussion on the differences between cost estimation utilizing historical bid pricing and cost-based estimating. The guide contains an analysis and discussion of the importance of proper bid tabulation methods, as well as critical factors that affect cost estimating.

### Government Accountability Office, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP

The U.S. Government Accountability Office (GAO) has released a guide designed to help federal, state, and local government agencies develop more reliable cost estimates for government projects of all sizes. While the focus of the report is on federal acquisition projects, it contains extensive guidance on how to produce well-documented, comprehensive, accurate, and credible estimates. The report constitutes an exhaustive primer on the art and science of cost estimating, identifying the processes, key stakeholders, and best practices. Also included in this report is a large number of case studies. One of the case studies is from the field of aviation, but it is related to an FAA air traffic management system, not airport construction. Additionally, the report incorporates a thorough discussion of the identification and application of data sources, but does not identify any specific data sources applicable to airport construction projects. Generally, the report does not identify specific cost-estimating models or software packages.

### American Society of Professional Estimators, *Standard Estimating Practice*, 8th Edition

The American Society for Professional Estimators is one of two industry organizations identified by the U.S. Bureau of Labor Statistics as providing industry certification for professional cost estimating. This manual is a standard "how-to" guide for use by professional estimators

in the construction industry. It is updated on a regular basis to take into account new data and revised guidance.

## Airports Today: Existing Cost-Estimating Practices

As part of the research process that resulted in this guidebook, a broad literature review and stakeholder survey were conducted. One of the objectives of this effort was to identify existing practices in the airport community for estimating costs for construction projects in both the horizontal and vertical domains. Existing practices use proven methodologies that draw on procedures and guidance published by a number of entities, particularly professional organizations and state agencies. Cost estimating for vertical projects has an added layer of structure through the use of standard classification schemes, such as those provided by the Construction Specifications Institute (CSI 2011).

The two primary methods used today are estimation through historical bid prices and cost-based estimating. The parametric estimation methodology, which is common for large-scale programs in the FAA Air Traffic Organization, has generally not been applied to airport construction projects. Risk/contingency analyses are applied but often in a simplified manner. Examples include the application of contingency factors to line item quantities or the total cost estimate. Approximately half of survey respondents reported using cost-estimating contingency factors. However, there appear to be few, if any, standards for using such contingency factors. The survey results indicate that these range from 0% (no contingency factor) to 25%, or even 50% for certain project types (e.g., airport security projects). Since overall contingency factors can be applied on top of contingencies for line item quantities, the cumulative contingency can be substantial. The lack of established standards in this area results in potentially large variations.

Existing methods appear limited in their ability to accurately account for unique project conditions. These can significantly affect the estimate and can result in wide variations from initial cost assumptions to actual costs incurred on a particular project. Environmental planning and cost of mobilization are examples of areas that have specifically been identified as difficult to quantify.

The cost-estimating procedures are backed up by cost data drawn from a number of data sources. The two most common data sources are past bid tabulations and commercially available products. The practice of storing past bid tabulations is common. The literature survey and industry stakeholder survey did not reveal any particular weaknesses in the application of these data sources. Moreover, a number of agencies maintain their own cost data and eight survey recipients indicated a willingness to share this type of information for this research project. Nonetheless, for the purpose of developing a comprehensive cost model, three specific challenges present themselves in regards to the availability of cost data:

- Many of the most commonly used data sources are proprietary and cannot readily be distributed as part of a publicly accessible model.
- Data maintained by public agencies is distributed across a range of state and regional agencies.
- There is no standard format for data and in many cases the data is stored in formats that are notionally electronic but essentially represent digital versions of printed documents.

Use of computer models for cost estimating does not appear to be a common practice for airport construction. It is less clear whether this is due to the cost of commercially available models, the lack of suitable models, or the challenges in airport construction cost estimating not being easily solved through computer modeling techniques. It does, however, indicate potential for

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the development of an airport-specific model, provided the challenges identified are carefully considered and appropriate solutions identified.

A major finding of the survey was that at small airports, construction cost estimating is primarily accomplished through consultants. The most commonly estimated airport construction projects include terminals, runways, taxiways, and airfield lighting. While the majority of respondents store historical construction cost estimates, they are mostly stored in hard copy format. When electronic formats are used, a range of formats exist—there is no accepted file standard. Only a minority of survey respondents reported that they use online data to develop construction cost estimates.

## Challenges

All airports within the NPIAS maintain an ACIP including both vertical and horizontal projects. At smaller, general aviation airports, the needs tend to be well known, but the amount of funds available for airport improvements is often very limited. The typical general aviation airport often has much less AIP entitlement funds available than that which would be required to fund the multiyear list of capital projects in its ACIP. One unintended consequence is a potential pressure to keep cost estimates low. As an example, in order to keep a project viable and within funding limits, a low estimate may be used for capital planning, with the assumption that project scope can subsequently be cut in order to match available funds. This can create disconnects in the process for planning the use of limited funding and can result in the outright cancellations of projects.

Since capital planning is usually conducted at a regional or state level, weaknesses in the cost-estimating process can end up shifting or distorting priorities across an entire airport system. Although more detailed cost estimating would mitigate this risk, time and budget limitations typically prevent high-fidelity cost estimates in this phase of the cost-estimating process. One risk is that airports default to working with cost estimates that are based on little to no technical research and choose to direct their time and money toward needs that are perceived as more imminent and pressing. A parametric cost-estimating model, once established, can be utilized at low cost, taking relatively little time and effort to use. A benefit of this approach is that it has the potential for reducing some of the existing flaws in the cost-estimating process for capital planning.

The stakeholder outreach effort conducted as part of this project confirmed a general lack of formal cost-estimating procedures. For example, only 17.4% of respondents reported accessing online cost data for generating construction cost estimates and only 26.5% reported storing historical construction cost estimations. This suggests that many airports use educated guesses to establish initial cost estimates, with varying levels of credibility. Moreover, once an initial cost estimate is prepared, it can be hard to adjust the resulting number if it has been shared with funding agencies or provided as public information.

The results of these challenges are not always predictable and can lead to either overestimation or underestimation. The former can be just as problematic as the latter. In the case of overestimation, potential bidders can be influenced by publicly available budget levels that are not supported by sound cost-estimating practices. This can ultimately influence project costs, regardless of the level of refinement after the completion of the initial cost estimate.

To understand how to improve this process through the use of the cost model prepared for this study, a discussion of issues related to current cost-estimating practices is provided below. The discussion is categorized by horizontal and vertical project types, but it should be noted that many projects integrate both domains. Moreover, in many cases the basic procedures and lessons learned are similar and apply to both types of construction project.

## Cost Estimating for Horizontal Projects

Current practices for the cost estimating of horizontal airport construction projects are primarily taken from two of the categories identified previously: historical bid pricing and cost-based estimating. For a typical horizontal airport construction project, there are basic items that define the scope of work (SOW). The FAA provides a series of Advisory Circulars that define these items in their most basic form, utilizing an alphanumeric coding system. Some typical items and their codes are shown in Table 1. With these basic items established, an engineer can begin to identify planning-level components that will compose an estimate by extracting design data from preliminary planning or preliminary engineering design documents.

In some cases the only data available is an aerial-view planning document, which will provide proposed limits of improvements. In this case, there is a high probability of developing an inaccurate cost estimate. Conversely, in some cases, there is an abundant amount of data available such as aerial topographic survey, planning-level project layout data (taxiway alignment, aircraft apron size and geometry, width and length of runway extension, etc.), environmental data, and basic soils investigation data. In this case, a higher level of accuracy is likely.

The process of extracting design data from planning or engineering documents is referred to as "quantity takeoff" (QTO). The engineer is figuratively taking off key pieces of data from the design plans to create a list of pay items and a SOW. This process is typically conducted utilizing computer-aided design software and the three-dimensional models that are created during engineering design. The quantity data is then input into a spreadsheet, which begins the next step, assigning unit prices to the various item quantities.

At this point, a cost estimate can be developed using one of the two methods referenced earlier, historical bid pricing or cost-based estimating. The most common method in use for developing estimates for transportation projects is to use historical bid costs (AASHTO 2009, p. 31). As described previously, this is a process by which estimators collect cost data from previous, similar projects and apply unit prices based on averaging the results. Adjustments are made where necessary for factors such as the following:

- Topographic survey
- Soil investigations
- Wetland delineation
- Wildlife assessment
- Historic preservation
- Archaeological findings

It is incumbent on the designer to make allowances for various contingencies for each of these types of data collection until such a time that this data becomes available. This early cost-estimating process is sometimes problematic for owners as it often yields total project costs that appear to be unaffordable. However, if the engineer and owner can properly communicate the design and planning assumptions to funding agencies, there is a much better chance of the cost-estimating

**Table 1. FAA codes for horizontal airport construction.**

| Code | Designation/General Item Description |
|---|---|
| P | Pavements |
| D | Drainage |
| F | Fencing |
| L | Lighting |
| T | Topsoil/Seeding |
| M | Miscellaneous |

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**Table 2. Typical engineering design milestones for horizontal construction.**

| Estimating Milestones | Level of Design Involved |
|---|---|
| Planning Level | Basic geometry and project scope. Typically, no engineering alignments have been assigned. Right-of-way and data collection are not included. |
| 30% Design | Basic horizontal geometry. Right-of-way and property acquisition process is being started. |
| 60% Design | Refined horizontal geometry and initial vertical geometry. Initial site grading being started. Initial drainage and other major utility designs are being started. Right-of-way and property acquisition process is ongoing. |
| 90% Design | Final draft of horizontal and vertical geometry. Final grading is ongoing. Remaining utility designs are started. Electrical lighting, signage, and marking design are ongoing. Initial quantity takeoff estimate is started. |
| 100% Design | Geometry and grading is completed. Utility design is completed. Grading cross sections are generated. Right-of-way and property acquisition process is complete. Electrical lighting, signage, and marking design complete. Final quantity takeoff estimate is complete. Typical design details are finalized. |
| Bid Documents | Incorporate final owner and agency comments. Engineer assigns pay items and cross references all items of work on plans with specifications and proposal documents. |

process being successful at later stages. If this communication is not well executed, the project is often cancelled prematurely.

Beyond planning-level cost estimating, other stages of cost estimating typically occur at various milestones, based on overall project progress. Table 2 lists typical engineering design milestones and the levels of design associated with each one. Note that these milestones should be viewed as examples. The definitions of these milestones can vary from project to project or state to state.

The challenge for owners and funding agencies is that budgetary decisions for ACIPs are made at the planning-level stage. This is the stage when the least amount of data is available. This puts pressure on owners and engineers to make worst-case scenario assumptions, which are designed to provide a high level of contingency within the estimate. It is at this point in the process where a project requires justified costs with adequate proof, as well as an explanation of the assumptions, in order to support reasonable outcomes as the project continues through the design process.

## Cost Estimating for Vertical Projects

Existing construction cost-estimating practices for vertical airport construction projects can be understood by considering the following aspects:

- Types of project costs
- Method of organizing and allocating hard costs
- Method of assigning hard costs in relation to the stage of the project's completion
- Sources of hard cost and soft cost data
- Special conditions relevant to airport projects

These aspects are described in further detail in the following paragraphs.

The total costs to the sponsor of a vertical construction project are typically separated into two types: hard costs and soft costs. Hard costs represent those expenses related to the actual

construction of the building that are paid by the sponsor directly to a contractor or construction manager: material, labor, and fees (including overhead and profit). These hard costs typically represent 70% to 90% of the total cost of a vertical construction project. Soft costs include all other expenses necessary for the completion of the project that are not paid to the contractor or construction manager. These costs vary significantly depending on the unique characteristics for each project but generally include design fees for the architecture/engineering firm; costs of furniture and special equipment; fees incurred through local permitting agencies, utilities, and inspections; land acquisition costs; expenses incurred as part of a public procurement process; and administration costs incurred by the sponsor to oversee and administer the project in accordance with public requirements. Both types of costs must be considered when establishing a total budget for the project.

A key factor in accurate cost estimating is a standardized method of organizing and allocating costs. The construction industry has adopted a generally accepted format for cost estimating of vertical construction projects that is common across applications and used for both publicly and privately funded projects. CSI develops and maintains an organizational system that allocates all construction work into one of multiple categories (CSI 2011). Although some minor variations exist, the majority of architects utilize the CSI system of categorization when developing plans and specifications.

Under this standardized format, every major item of work is allocated to a particular category (termed "division of work"), which corresponds to a particular trade contractor. For example, all carpentry work on a project is categorized and defined under Division 6, electrical work under Division 16, etc. For larger projects, each division is further broken down into subcategories (termed "sections of work"). Using the example of carpentry (Division 6), rough carpentry is further categorized under Section 6100, finish carpentry as Section 6200, etc. By defining individual items of work using a standardized and detailed organizational format, a clear and standardized method of communication between the architect and the contractor is utilized in order to construct the project in accordance with the sponsor's expectations.

Originally developed to organize and standardize the definition of the work within the architect's construction documents, this same format has proven to be effective in organizing and standardizing the cost-estimating process. By utilizing the same categorization system, a more direct correlation between item of work and cost of work is achieved in a format easily understood by all parties. Other benefits of the system include the following:

- CSI categorization can be performed at any stage of the project design—from the earliest concept drawings through detailed design to construction—and as a post-construction audit.
- The system is easily expandable for more complex projects, or conversely can be collapsed to address smaller or simpler projects.
- Direct correlation of cost item to work item reduces misunderstandings and oversights of portions of the project by the estimator.
- Standardization allows for comparison to other past and current projects, and facilitates the creation and maintenance of a project cost information database.

However, there are limitations to the CSI allocation system that must be addressed. The CSI system does not provide a method to estimate soft costs. Also, the CSI system does not account for special circumstances that could affect the overall hard cost for the project, including escalation, phasing of the project, temporary work, special local conditions (i.e., a remote island location that would place a premium on transportation of materials and labor), and reasonable contingencies to account for the level of completion of the project documents.

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These additional cost factors are applied according to the experience and knowledge of the estimator.

Current industry practices include performing cost estimates of vertical construction projects at various stages of development during design. As for horizontal projects, estimates are typically performed during initial planning and at the 30% design, 60% design, and 100% design levels. The later estimates benefit from the greater level of detailed design and thus are usually more accurate. However, as described previously, project budgets are usually established during the very early stages of design and, sometimes, prior to any design work being completed. In these instances, arriving at a reasonable project budget is challenging.

It is typically advisable not to establish a project budget prior to any design or feasibility planning work being performed. However, this practice is not uncommon and is usually done with limited involvement from a design or construction estimating professional. Oftentimes the cost of a similar project constructed some years in the past and at a different location is used for budgeting. Because every project has varying conditions which affect cost and because of volatility in material and labor prices over time, this method is unreliable in establishing a reasonable project budget.

Where some initial design work or feasibility planning has been performed, a "square foot cost" method is often utilized to establish the project budget. At this stage, usually between the initial project planning and the 30% design stage, the project location, overall size of the building in square feet, and functions that the building will accommodate have been established. With this information, an overall cost per square foot is selected based on a database of projects that are in the same geographic region, accommodate the same functions, and incurred project conditions similar to those expected.

Cost databases are maintained by a number of organizations within the construction industry, the most well known and possibly most often utilized is *RSMeans Square Foot Costs Book*, which is updated annually (Reed Construction Cost, Inc. 2011). The accuracy of this method is dependent on the relevance of the precedent projects, the accuracy of the cost database, and the judgment of the estimator, especially in regards to the unique conditions of the project being estimated that differentiate it from the precedent projects.

For projects that have developed the design to the 60% level, most of the major risk factors to project cost, such as existing site conditions and local permitting hurdles, have been vetted through research and field investigations. There is also enough information contained in the documents to utilize the CSI method for allocating cost items, and material and labor unit costs can be established. As the documents are not complete, estimators apply a contingency factor to their estimate to account for the level of detail still under development. The proper contingency factor is established based upon the judgment of the estimator.

For estimates developed at the 90% or 100% levels, industry practice is to perform QTOs for each type of material used on the project, as defined in the construction documents. Unit costs for labor and material are then applied to each work item. The amount of detail provided at the 90% and 100% level, combined with the considerably short time frame between this estimate and the start of construction, usually result in a relatively low variance between the estimated cost and the actual construction bids received.

Hard cost databases are maintained by individual cost-estimating firms and through commercial providers of construction cost data. These databases are constantly updated and are used to create plausible estimates for each type of material and labor that may be used for a particular project. They are also adjusted according to geographic region. The databases do not provide guidance or methods as to cost adjustments necessary for unique project characteristics,

including those characteristics that are unique to airport projects. Soft cost databases are not prevalent in the industry. Instead, estimates of soft costs are usually developed by the sponsor, with the assistance of an architect or engineer.

Certain airport projects have unique characteristics that over time have resulted in variations on standard cost-estimating methods. In some cases, these alternative methods have proven to be effective. Examples include the following:

- **Parking garages:** At the planning through 30% design level, the industry has developed a metric of unit cost per space as an effective method for preliminary estimating for these structures. Databases are informally maintained by consulting firms specializing in this form of structure. The relative simplicity of the building type allows this metric to be reasonably accurate even at the early stages of planning and design. Key factors include the type of structural system, architectural treatment, and lobby amenities.
- **Terminal buildings:** At the planning through 30% design level, the standard unit cost per square foot method is applied. However, the unit cost varies for individual areas of the terminal, since some areas represent significantly higher cost per square foot than others. For example, public lobby space is significantly more expensive than office and support space. Also, baggage handling and security space costs must take into account the high costs of specialized equipment.

Airport projects also pose a number of special project conditions for which a standard and reliable method of establishing cost impacts is currently not prevalent in the industry. These conditions include:

- **Permitting:** Local permit requirements and processes vary considerably. Additionally, construction at public-use airports oftentimes utilizes federal funding sources. In these cases, federal requirements, which are in addition to state and local requirements, must be followed in relation to environmental permitting. As construction cannot proceed until all permits are completed, an extended federal permitting process can result in extended project schedules. These procedures also require public hearings and notification that can result in additional time spent and soft costs incurred responding to public input.
- **Operational continuity:** Many airport projects are renovations or expansions or involve some impact to ongoing airport operations. As airports must remain fully operational during construction, additional costs are often incurred related to phasing, temporary construction, and protection of passengers and employees during construction.
- **Security:** All airport property is designated as being either "airside" or "landside." Airside refers to areas of the airport for which special security access is required. These areas generally correspond to the Security Identification Display Area (SIDA). All personnel working in these areas must be pre-screened by the airport, obtain special training, and receive a SIDA identification badge before being allowed access. This process is both costly and time consuming, and results in increased costs to the contractor. In addition to the screening and badging of the labor force, many airports require any material deliveries to be searched prior to accessing the airside work area. Some projects, especially terminal building renovations, involve construction on both sides of the SIDA access barrier as part of the same project. Here, costs are incurred to relocate and maintain temporary SIDA barrier locations in order to allow for the work to proceed without affecting the flow of passengers and ongoing airport operations. The high level of technology used in establishing these barriers makes relocation quite expensive.
- **Federal safety requirements:** In addition to the security measures outlined previously, an airside project triggers additional safety requirements in accordance with FAA and Transportation Security Administration (TSA) regulations.

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- **Soft costs:** Many airport projects are renovations or expansions or involve some impact to ongoing airport operations. As airports must remain fully operational during construction, significant additional soft costs will be incurred related to phasing, temporary construction, and protection of passengers and employees during construction.

Vertical projects pose a significant challenge to early stage cost estimates. These are estimates developed prior to a design being initiated as part of a capital program. The complexity of these projects can result in significant variations of unit costs within particular areas of the project. Such elements are typically not fully understood until later in the design process. Therefore, early stage estimates for complex vertical projects are better supported by historical total-project-cost data for projects of similar size, scope, complexity, and cost-driver characteristics.

CHAPTER 3

# Parametric Cost Estimating

The parametric cost-estimating methodology consists of developing mathematical relationships between cost, the dependent variable, and a number of independent variables that are hypothesized to be the drivers for the cost. Strengths of the parametric cost-estimating technique include the following (GAO 2009, p. 108):

- Is reasonably quick
- Encourages discipline
- Provides a good audit trail
- Is objective, with little bias
- Has cost-driver visibility
- Incorporates real-world effects

Linear regression is the most widely used technique to develop parametric cost models. Historical values of dependent and independent variables are used to model a linear relationship between these variables. Once the model has been developed and tested, it can be used to make predictions, by letting the independent variables take on hypothetical values. In simple linear regression, the value of a single dependent variable is predicted from the value of a single independent variable. In this case, linear regression is equivalent to finding the best-fitting straight line through the historical data points. In multivariable regression analysis, multiple dependent variables are used. In this study, construction cost is regressed against several independent variables that represent the cost drivers for the project type in question.

The steps for implementing an airport construction cost-estimating model using parametric cost estimating include:

1. Identify CIVs for inclusion in the data collection process.
2. Develop CERs.
   a. Collect historical data and normalize to account for inflation and geographical variation.
   b. Hypothesize algebraic CERs for each project type, linking project cost to CIVs.
   c. Conduct statistical analysis of hypothetical CERs.
   d. Refine CERs and select most appropriate CER for each project type.
   e. Embed mathematical relationships into cost model.
3. Test and validate the cost model.

This process is described in more detail in the following sections.

## Identifying Candidate Input Variables

The first step in the process used to derive the cost model is the selection of CIVs. These represent the key independent variables that are hypothesized to drive the costs of a particular construction project type. They are referred to as candidate variables because their inclusion in

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the model is based on a hypothesis of a relationship between cost and cost driver. During the model development, the selection of CIVs is altered in an iterative manner, until a cost model is derived that is robust and meets the target statistical metrics of quality of fit. CIVs selected for use in a parametric cost-estimating model should meet the following criteria:

- They should have a logical relation to the project type.
- They should have a causal relationship to the construction cost.
- The value of variable should be quantifiable both during the collection of historical data and when using the cost model to prepare cost estimates.
- The variables should, preferably, be continuous variables.

Continuous variables are variables that have numerical values that can take any value within an allowable range formed by a minimum and maximum variable. In the case of a continuous variable, a value of two is twice as large as a value of one and a value of four is twice as large as a value of two. Examples of continuous variables include runway length, aircraft weight, floor space, and so on.

In contrast, discrete variables include variables such as airplane design group, which can take on the values I through VI, or two-state variables such as "yes/no." The fundamental problem with discrete variables is that one cannot tell with any mathematical certainty what the ratio is between terms such as "large," "medium," and "small." For example, if "large" is not twice "medium" and "medium" is not twice "small," the meaningfulness of the resulting mathematical model cannot be clearly stated.

The CIVs that were originally taken into consideration for inclusion in the data collection process are identified in the following list, along with brief explanations justifying their inclusion.

- **Aircraft approach category:** This value identifies the airport category (from A to E) based on the approach speed of the critical aircraft (design aircraft). The critical aircraft is usually taken to mean the most demanding aircraft that generates at least 500 annual operations.
- **Airplane design group:** This value identifies the airport category (from I to VI) based on the wingspan of the critical aircraft.
- **Airport size:** This value would be used to identify the overall complexity of the airport and could be represented by using a single continuous variable such as acreage, number of runways, maximum runway length, number of operations per year, or a discrete variable such as the Airport Reference Code.
- **Area:** This is a general sizing variable that would be used to support the cost estimates of new or renovated buildings or airport elements such as pavement surfaces and runway safety areas.
- **Federal Aviation Regulations (FAR) Part 139 category:** This category (from I to IV) determines the ARFF capabilities needed. The class is based on whether the airport has scheduled or non-scheduled service and whether it serves small or large air carrier aircraft. It applies only to commercial air carrier airports certified under FAR Part 139.
- **Discrete frequency:** This variable would be used to help estimate the cost to install weather reporting equipment.
- **Drainage type—above ground or below:** This two-state variable would be used to help estimate the cost to construct parking lots.
- **Obstruction type—equipment, tree, or ground:** This three-state variable would be used to characterize obstructions that would be removed as part of an airport improvement.
- **Height:** This variable would be used for estimating the cost to construct certain airport buildings.
- **Length:** This CIV, usually expressed in linear feet, would be used as a primary variable for estimating the cost of projects such as perimeter fencing.
- **Load rating:** This variable would be used to identify the maximum load that would regularly be placed on a runway by an aircraft. The rating is a combination of the maximum takeoff weight of the critical aircraft and the landing gear configuration.

- **Number of floors:** This variable would be used for certain airport buildings.
- **Number of intersections:** This variable would serve as a high-level proxy for the amount of signage associated with new runway, taxiway, or apron construction (see also "signs per intersection").
- **Number of navigational aids:** This variable would serve as a quantity variable which would be applied to the average cost per navigational aid (NAVAID) to reasonably estimate the total cost of all required new NAVAIDs.
- **Number of obstructions:** This variable would serve as a quantity variable which would be applied to the average cost to remove a typical obstruction to reasonably estimate the total cost to remove all required obstructions.
- **Number of spaces:** This variable would be used to estimate the construction cost of an airport parking lot and/or airport parking garage.
- **Number of systems:** This variable would be applied to new security systems, and also potentially to help estimate the cost of new NAVAIDs or certain guidance systems.
- **Number of vehicle gates:** This variable would be used to help estimate the cost to implement new security access systems and the cost to install perimeter fencing.
- **Runway approach type:** This three-state discrete variable would be used to determine the runway pavement markings required. The three states are visual, non-precision instrument, and precision instrument.

There is a direct relationship between the number of historical observations required to develop statistical meaningful CERs and the number of independent variables. Due to the extensive possible interactions between the CIVs, the number of required historical data points increases exponentially with the number of variables. For this reason, the number of CIVs must, in practice, be limited to those cost drivers that have the greatest influence on cost. There are a number of other variables not included as CIVs that have the potential to impact project cost. This is especially true for vertical construction projects, which by their nature involve a higher degree of complexity. The data collection and statistical analysis of the CERs were used to determine that the correct balance between data availability and number of variables has been reached.

The selection of CIVs (and project types) was an iterative process. The final list of CIVs is described in Chapter 4. A number of the originally proposed CIVs were not included in the model. The final selection was driven either by lack of data or other methodological reasons, such as the desire to limit the number of discrete variables.

## Developing Cost-Estimating Relationships

This step involves identifying and recording interactions between the project cost and the cost drivers represented by the CIVs. An interaction between driver variables exists when the effect of one is conditioned on the value of one or more of the others. These interactions are modeled as CERs, which are mathematical expressions of the relationships between construction cost and the CIVs. These CERs are developed through statistical analysis, using multivariable regression. In some cases, the number of data points and/or a data set that exhibits odd variances may prohibit the development of statistically valid CERs. In these cases, a CER may not be able to be developed or adjustments may be required to the functional specification or choice of CIVs. For this reason, particular care must be used when selecting the CIVs to try to only include variables expected to be causal factors.

The fundamental statistical technique used in linear regression is called least squares regression. There are several computerized least squares regression programs or modules. This study used the Analysis Toolpack, an add-on to Microsoft Excel. Least squares regression was chosen because the mathematical formulas used to minimize the variance have explicit formulas and the resulting

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formulas are linear. This method of linear regression fits a straight line through each data set to minimize the sum of the squares of the differences between the data points and the fitted line.

The process for developing the CERs included the following steps:

1. Develop hypothetical CER using airport planning, engineering, and subject matter expert (SME) input.
2. Develop a database of historical CIV values.
3. Plot data against CIVs to visually identify trends.
4. Test dependent variables against independent variables individually using statistical software.
5. Select promising independent variables.
   a. Test combinations (i.e., interactions between CIVs).
   b. Analyze statistical metrics:
      i. Logic
      ii. Coefficient of variation
      iii. Adjusted coefficient of determination (adjusted $R^2$)
      iv. F-statistic
      v. T-statistic
      vi. Robustness
      vii. Outliers
6. Refine and finalize CERs.

The first step involves identifying and recording potential interactions between cost and the CIVs. An interaction exists when cost is affected by the value of one or more CIVs. Throughout the process, particular care was taken to identify causal factors, based on knowing and understanding the real-world effects of a potential cost driver.

To illustrate the first step in this process, consider a hypothetical CER to estimate the cost of constructing or rehabilitating a runway. Assume that the following hypothetical CER was developed in consultation with airport engineers and SMEs on horizontal airport construction:

$$\textit{Cost} = f(\textit{Area, MTOW, GearConfig, PvmtType, FreezingIndex})$$

where

***Area*** is the surface area of the runway pavement to be constructed, measured in square feet (sq. ft.).
***MTOW*** is the maximum certificated takeoff weight of the design aircraft, measured in pounds (lbs.).
***GearConfig*** is the landing gear configuration, given by one of the following: single wheel, dual wheel, dual tandem wheel, or double dual tandem wheel.
***PvmtType*** is the pavement type, given by one of the following: asphalt (i.e., hot mix), portland cement concrete (PCC), or hybrid.
***FreezingIndex*** is the design freezing index value, measured in degree-days.

## Testing and Validation

The simplest and most commonly used statistical measure of the statistical fit between the dependent and independent variables is called the coefficient of determination. This represents the portion of the total variation in the dependent variable that is explained by variation in the independent variables. The coefficient of determination is commonly called "R-squared" and is denoted by $R^2$. A value of one indicates perfect correlation between the dependent and independent variables, whereas a value of zero indicates no detected correlation. However, note that correlation does not necessarily imply a causal relationship.

Table 3 provides a summary of statistical metrics that can be used to test the quality of fit and statistical significance of the model, along with rules-of-thumb for satisfactory performance. More detailed explanations of the statistical measures identified in Table 3 follow:

- **Logic:** Logic is used to develop hypotheses that are tentatively advanced to account for particular facts. Hypotheses are testable ideas or testable questions on some phenomenon of interest. The hypothesis can then be tested by collecting and analyzing data using inferential statistics.
- **Coefficient of variation:** This is the ratio of the standard deviation of a data set to its mean. This is a relative measure of the amount of dispersion there is in the statistical sample represented by the data set.
- **Adjusted $R^2$:** $R^2$ is also referred to as the coefficient of determination. This measures how much of the variability in the data is accounted for by the model (in this case, the CER). This is an indication of how well the outcomes are predicted by the model and measures overall quality of fit. Adjusted $R^2$ corrects the coefficient of determination to account for the fact that it otherwise appears to improve as more independent variables are added to the model.
- **F-statistic:** The F-statistic is used to test the overall regression analysis for the existence of a statistically significant relationship between the dependent and the independent variables.
- **T-statistic:** This is the ratio of a CIV's coefficient to its standard error. The ratio can also be expressed as a confidence level that demonstrates the probability that the coefficient is a significant predictor of the independent variable.
- **Robustness:** A measure of whether the statistical model is unduly influenced by small variations in the underlying data.
- **Outliers:** An outlier is a data point that is abnormally distant from the remainder of the statistical sample represented by the data set. These are usually excluded from the data set, since they may be caused by errors in the data or misunderstandings in the data collection process. A specific example might be a grant that is described as funding a runway construction project, but which in fact only funded the design phase. The cost for a design-only project would be much lower than the cost of the associated construction.

CERs should be elected based on quality of fit, statistical significance, and robustness of selected cost drivers. These qualities are sometimes traded against one another. Depending on the hypothesis undergoing test, the data can span a wide range of values, which can affect the robustness of the model. Other times, the data set may be confined to a more limited set in order to exclude statistical outliers. This reduces the variability of data (measured by the resulting F-statistic), tightening its prediction interval (measured as a function of the t-statistics associated with each CIV). This also helps match the engineering logic behind the proposed CER.

**Table 3. Statistical metrics for assessing linear regressions.**

| Measure | Criteria | Explanation |
|---|---|---|
| Logic | Make engineering sense | Valid estimator of cost because of causality |
| Coefficient of variation | CV < 20% | CER is a tight predictor of costs |
| Adjusted $R^2$ | $R^2 > 0.90$ | Good correlation between cost and cost drivers |
| F-statistic | F-Ratio > F* @ 90% CI | Regression equation is a better predictor of cost than the mean (average cost) |
| T-statistic | t > t* @ 90% CI | Correlation between cost and the independent variable is too great to have occurred by chance |
| Robustness | DF/N > 0.6 | Data points are not excessively influential |
| Outliers | No statistical outliers | No obvious data homogeneity |

Notes: CI = confidence interval; DF = degrees of freedom; N = number of observations, "*" is used to indicate critical value at a specified level of statistical significance (i.e., 90%)

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Each CER must be evaluated both statistically and subjectively, based on its applicability to the project type in light of other cost drivers and their effects on cost. Ease of collecting data should also be taken into account. In some cases, no statistically valid relationship may be able to be developed, due to the lack of correlation between cost and the proposed CIVs.

An additional technique that can be used to evaluate the accuracy and usefulness of a CER is case study validation. This consists of reserving data points from the data collection effort or, alternatively, collecting additional data strictly for use in the case study validation. The independent variables associated with each reserved data point are then entered into the CER, to calculate predicted costs. The predictions are then compared to the actual costs from the collection of case studies. If the CER predicts the actual costs of the reserved data within a reasonable range, the confidence in the CER's predictive ability is increased. After the case study validation is completed, the data reserved for this purpose can be incorporated into the database and used to update the model.

CHAPTER 4

# Developing an Airport Cost Database

As described in Chapter 3, parametric cost estimating relies on developing mathematical relationships between costs and cost drivers using historical cost data for previously completed projects. Consequently, a key step in implementing a cost model using the parametric cost-estimating technique is the establishment of a historical cost database. The following sections describe the analytical framework behind the development of the database used for this project. The discussion covers the selection of projects to be included, the database structure, data sources, the collection of data to populate the database, and the inclusion of adjustment factors for inflation and regional variations.

## Candidate Project Types

The list of candidate airport construction projects was derived using a combination of sources and considerations, including the following:

- AIP and American Recovery and Reinvestment Act (ARRA) grant histories for general aviation and non-hub airports.
- Survey responses from the industry stakeholder outreach effort.
- Recommendations from *ACRP Report 49: Collaborative Airport Capital Planning Handbook.*
- Input from the airport construction SMEs.
- Technical feasibility of encoding each project type in cost model.
- Data availability.

AIP and ARRA grant histories served as the starting point. Five-year grant histories for fiscal year (FY) 2005–2009 were used as a starting point (FAA 2011). These were filtered to focus on general aviation and non-hub airports. A relatively low number of project types account for the majority of projects funded. In order to constrain the database scope to a feasible level, the 75th percentile was selected as an initial cut-off point (as measured by the amount of federal funding). Non-construction projects, such as planning studies and land acquisition, were eliminated from consideration.

The candidate list was then augmented by comparing the initial list against survey responses obtained as part of the industry stakeholder outreach effort. Specifically, the list of candidate projects was augmented using responses to the survey question "What are the most common types of construction projects that you estimate?" Key findings from *ACRP Report 49: Collaborative Airport Capital Planning Handbook* (Cullen et al. 2011) were used to further refine the list of candidate projects. Two key recommendations from this study were applied:

- Focus on projects with high potential for reducing the cost-estimating uncertainty
- Focus on projects with high potential for return-on-investment (ROI) for the airport sponsor

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**Table 4. Candidate project types.**

| ro e t pe | are o ro e ts | are o ur e esponses |
|---|---|---|
| *Horizontal Construction Projects* | | |
| Airfield signage | N/A | 2. 0% |
| Construct or rehabilitate taxiway | 2.0 % | 0. 0% |
| Construct parking lot | N/A | N/A |
| Construct, expand, or rehabilitate apron | 9. % | . 0% |
| Construct, extend, or rehabilitate runway | 6. 2% | . 0% |
| Improve runway safety area | .00% | . 0% |
| Install airport visual system | .69% | N/A |
| Install NAVAIDs | . % | . 0% |
| Install perimeter fencing | .0 % | 2. 0% |
| Install weather reporting equipment | . % | N/A |
| Rehabilitate runway lighting | 2. 2% | 0.20% |
| Remove obstructions | .00% | 2. 0% |
| Runway pavement marking | N/A | 2. 0% |
| ecurity access systems | N/A | N/A |
| *Vertical Construction Projects* | | |
| Construct ARFF facility | N/A | .60% |
| Construct, expand, or rehabilitate terminal building | .2 % | 0. 0% |
| Construct parking garage | N/A | 2. 0% |
| Construct RE building | . % | . 0% |

Note: N/A = not available.

The list was reviewed and edited by the airport construction SME members on the team. For example, the AIP category "Construct Building" was expanded to include a list of specific vertical construction projects. A similar approach was employed to identify security-related projects, which otherwise are not adequately captured by the AIP and ARRA grant histories. The list was also reviewed for feasibility of implementation in the cost-estimating model. Table 4 represents the resulting initial list of candidate projects. The list identifies the project type, the percentage share of the AIP and ARRA grant histories, and the percentage share of survey responses.

During the course of the development of the cost model, this list was updated and refined in an iterative process. Projects were modified, added, or removed, driven primarily by data availability and feasibility of implementation. Parametric cost estimating relies on multivariable regression analysis, a statistical technique that, in general, yields more robust results with a large sample of data. Several project types were eliminated from inclusion in the model because of the lack of sufficient data. Table 5 lists the final selection of project types supported in the model, including the final number of data points (i.e., historical projects) collected.

**Table 5. Final project types.**

| Project Type | No. of Observations |
|---|---|
| *Horizontal Construction Projects* | |
| Construct or rehabilitate taxiway | 2 |
| Construct or rehabilitate apron | 29 |
| Construct, extend, or rehabilitate runway | |
| Install perimeter fencing | 2 |
| Install precision approach path indicator | 0 |
| Install weather reporting equipment | |
| *Vertical Construction Projects* | |
| Construct ARFF facility | 2 |
| Construct RE building | 2 |

## Selection of Candidate Independent Variables

The final selection was driven by hypothesized relationships between cost and cost drivers, availability of data, and methodological reasons such as the desire to limit the number of discrete variables. The CIVs that were included in the cost database are identified below, along with brief explanations justifying their inclusion:

- **Area:** This is a general sizing variable used to support cost estimates for pavement surfaces (i.e., pavement area) and buildings (i.e., floor area).
- **Landing gear configuration:** A discrete variable that describes the landing gear configuration of the design or critical aircraft. The landing gear configuration affects the distribution of an aircraft's weight and the resulting load on the pavement. Used to support cost estimates for pavement surfaces.
- **Length:** General sizing variable used to support cost estimates for fencing projects.
- **MTOW:** The maximum takeoff weight (MTOW) of the design or critical aircraft. Affects pavement load and is used to support cost estimates for pavement surfaces.
- **Number of systems:** This is a quantity variable that is applied against the average cost of a single installation of a visual or navigation aid. This is used in support of projects that may be installed in multiple locations on the airport, such as precision approach path indicator (PAPI) installations.

As described previously, the number of data points required increases with the number of CIVs included in the CERs. The final list of CERs was selected to achieve a balance between data availability and the number of hypothesized cost drivers.

## Historical Construction Costs

Historical construction costs are included in the database in order to establish a statistical relationship between cost and the cost drivers represented by the CIVs identified for each project type. In order to create CERs that are universally applicable, they must be controlled for both inflation and regional variation. Since year-to-year changes in prices affect the purchasing power of the funds used, construction must be normalized in order to use historical observations spanning a multiyear period. Similarly, since the CERs incorporate historical data across a broad range of geographical locations, costs must be normalized to take into account regional variations in the cost of construction.

### Adjusting for Inflation

Inflation data is used to control for variations in price levels across a broad range of project implementation dates. Since construction costs generally increase over time, all historical data are inflation adjusted. FY 2014 was selected as the reference year. This is an arbitrary choice but ensures that all cost data in the model have a common basis in terms of price level. Both input data used to determine the CERs and output data (i.e., cost estimates) are internally adjusted to FY 2014 price levels. This inflation adjustment is conducted at a national level; a separate geographic adjustment is included to take into account regional variations in cost (see the following subsection).

There are a number of commonly used indices available for adjusting inflation. Some of these are specifically intended for construction projects. Of these, a commonly used reference is the commercially developed RSMeans Construction Cost Index. However, in order to make the cost-estimating model freely distributable, cost indices that are not in the public domain were ruled out from consideration. Also, forecasts are generally not available for construction-specific cost indices. The cost-estimating model requires both historical and predictive inflation factors. For these reasons, the U.S. Bureau of Labor Statistics Consumer Price Index (CPI) and Gross Domestic

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Product (GDP) deflators provided by the Office of Management and Budget (OMB 2012) were used. CPI was used to inflation adjust historical data; whereas the OMB's forecast of GDP deflators is used to inflation adjust cost estimates for planned projects.

### Adjusting for Regional Variations

Construction costs can vary considerably by geographic location due to a number of factors, including transportation costs, utility costs, the cost of construction materials, the general price level of labor, and indirect costs due to regulatory processes such as permitting and environmental studies. A cost-estimating model must therefore be able to account for regional variations in price levels. This is particularly true if a national cost model is developed from historical data that spans a large number of geographic locations.

A challenge in compensating for regional variations is selecting the appropriate geographic unit. State-level adjustments allow for correcting a substantial amount of geographic variation. Correcting for variation at the state level is intuitive even to non-experts but can fail to account for more detailed variation, for example, at the county level or between urban and rural areas. While this argues for using a geographic unit with a finer level of distinction than state boundaries, in practice it is difficult to obtain construction-specific geographic adjustment factors without relying on commercial sources. For this reason, state-level factors published in the Department of Defense Facilities Pricing Guide (DoD 2011) were selected. These cover construction subject to Davis-Bacon wage requirements, which is generally relevant for airport construction projects that involve federal funding programs such as AIP grants or PFC funding. These adjustment factors specifically include airfield construction and provide separate rates for each state for construction and sustainment costs.

To normalize the cost data, a single state must be selected as an arbitrary reference point. All historical cost data are adjusted using adjustment factors that measure price levels relative to this state. When cost estimates are developed for future projects, initial calculations are conducted using the same reference state. In the final step, the cost estimates are converted to prices for the state in which the planned construction is to be conducted. While the choice of the reference state is arbitrary, for practical reasons, a state with price levels close to the national average is usually chosen. For this modeling effort, the State of Kansas was selected as the reference state. The adjustment factors for Kansas are 94% for construction and 91% for sustainment, relative to the national average (DoD 2011, p. 36).

## Database Structure

Establishing a functional and efficient database structure is a critical step in ensuring the database serves its purpose. The database structure should be functional in that it should capture all the relevant data needed to conduct the analysis. It should be efficient in that it should avoid duplication and should be easy to interpret and analyze.

In the case of the cost model, a simple tabular form with one table for each project type was used. The database was implemented in Microsoft Excel for the sake of simplicity. While a number of dedicated database applications are available, these are preferred only when either a very large database is developed or when the database consists of many nested tables with relationships that link data between tables. In this particular application, the size of the database is relatively small (the final database consisted of a total of 255 observations). Moreover, the only links that exist between data tables are the links to the adjustment factors for inflation and regional variation, as well as a table of landing gear configurations.

**Table 6. Database structure.**

| istori al Constru tion ata a les | |
|---|---|
| *Project Type* | *Data Table* |
| Construct or rehabilitate taxiway | Taxiway |
| Construct or rehabilitate apron | Apron |
| Construct, extend, or rehabilitate runway | Runway |
| Install perimeter fencing | Fencing |
| Install precision approach path indicator | A I |
| Install weather reporting equipment | eather |
| Remove on-airport obstructions (vegetation) | On-airport Veg Removal |
| Construct aircraft rescue and fire fighting facility | ARFF |
| Construct snow removal equipment building | RE ldg |
| n illar ata a les | |
| *Data* | *Data Table* |
| Inflation adjustment factors | Inflation |
| Regional variation adjustment factors | Geographic Adj |
| Landing gear configuration | Landing Gear |

The basic database structure is summarized in Table 6. The database consists of two main parts—historical construction data and ancillary data. The construction data portion of the database contains nine separate data tables, one for each project type. Note that while the project type "remove on-airport obstructions (vegetation)" is included in the database, no CER was developed for this project type and it is not represented in the final cost-estimating model. In addition, there are three tables for ancillary data.

The construction data tables share a similar structure, which consist of two basic parts. The first part is identical for each project type and consists of an identifier, location information, and basic project information such as a project description, year of construction, and total project cost. The structure of this portion of the construction data tables is shown in Table 7.

The second part of the construction data tables consists of the values for the CIVs for the project in question. Since each project type has different CIVs, the structure and number of fields vary from project to project. As an example, the structure for the runway construction project type is shown in Table 8.

**Table 7. Structure of construction data tables—basic project data.**

| iel | Exa ple |
|---|---|
| Record identifier | Data oint CETR 9 |
| Airport FAA identifier | MV |
| tate | MA |
| roject description | hift Runway 6-2 0 Northeast |
| ear | 20 0 |
| Total project cost | , 9 , 6 |

**Table 8. Structure of construction data tables—CIV values.**

| ***Project Type:*** Constru t exten or re a ilitate run a | |
|---|---|
| *iel* | *a le* |
| avement area | 0,000 F |
| MTO of design aircraft | 9 ,000 lbs. |
| Landing gear configuration | Dual wheel (D ) |

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## Data Collection

The parametric cost-estimating methodology relies on multivariable regression analysis, a statistical technique that results in a mathematical relationship between a dependent variable and several independent variables. In this application, the dependent variable is construction cost and the independent variables are the cost drivers represented by the CIVs. The goal is to include as many explanatory factors as possible, so that all of the key variables that affect construction cost are included. However, the more independent variables that are included in the functional form of the regression model, the greater the sample of historical observations must be. In other words, there is a tradeoff between the explanatory power of the model and the amount of data that is available and can be collected.

In the original model specification, the proposed CERs typically included five to six CIVs for each project type. For example, the runway CER included the following CIVs: pavement area, MTOW, landing gear configuration, pavement type, and design freezing index value. However, due to limited availability of data, the proposed CIVs had to be revised so as to include fewer independent variables. The process for identifying data sources, collecting data, and the outcomes of the data collection effort are described in the following subsections.

### Data Collection Methodology

The research plan for this project called for a data collection process that, whenever possible, relied on automated data retrieval processes. The focus of the data collection plan was to identify pre-existing, electronic data sources in spreadsheets and database formats. However, the stakeholder survey and the initial review of available data revealed several significant challenges in populating the database with construction costs and CIV values:

- Data is often stored in the PDF format, which is nominally an electronic format but cannot be used to automatically populate a database.
- In cases where construction project data is available in a usable electronic format, such as Microsoft Excel spreadsheets, the data usually does not include values for the required CIVs.
- Projects funded through federal grants often include several bundled construction projects, making it difficult or impossible to separate costs for specific projects.
- Federal grant histories only list the federal share and not the total construction cost.

These findings required a significant departure from the original plan of importing existing databases of cost and CIV values to form a comprehensive database. Instead, the data collection relied primarily on data entered manually, supplemented by some use of data in Microsoft Excel format. To facilitate manual data collection, spreadsheet templates were developed. Two separate data collection templates were developed, one for horizontal and one for vertical construction projects. The templates matched the structure of the cost-estimating database, by including a series of sub-templates, one for each project type. For each historical observation, fields for basic descriptive information were provided, such as a project description, location, and year of completion. Other data fields were used to store values for construction costs and the CIV values required for the proposed CER for the project type in question.

### Data Sources

The following data sources were identified and used in the data collection phase:

- Project data history from individual airports, including:
  - Data submitted by members of the ACRP Project 01-19 panel.
  - Data submitted by the survey recipients.
  - In-house data provided by the airport construction SMEs who participated in the study.

- Ancillary databases:
  - FAA, Airport Engineering Division, Aircraft Characteristics Data.
  - FAA, National Flight Data Center, Facilities Table.
  - FAA, National Flight Data Center, Runways Table.
  - FAA, Terminal Area Forecasts.
- AIP/ARRA grant histories.
- Manual collection of project close-out information at state departments of transportation and aviation agencies.
- Web searches, media articles, and other sources.

The AIP/ARRA grant histories include project descriptions, locations, and construction cost information for nearly 20,000 projects. However, they generally do not include any information on the required CIV values. The grant histories were therefore of very limited value in developing CERs. They were, however, useful for estimating the total number of projects that could potentially be incorporated into the historical construction cost database.

In addition to these sources, a number of data sources were identified and reviewed, but were ultimately not used in the database development. These included AIP annual reports and airport bond statements. These sources provided useful background information, but did not include data in a usable electronic format. While they included some CIV values in narrative form, incorporating this data would have required extensive manual processing and follow-up.

## CIV Reduction

The number of observations required for each project type in the database was primarily driven by the number of CIVs in the associated CER. Given the difficulties in obtaining data in suitable electronic format, the number of CIVs was reduced from the original model specification. The CERs that were carried forward to the model validation phase were reduced to no more than three CIVs, focusing on the primary causal cost drivers. In particular, most discrete CIVs were eliminated, due to the limitation of incorporating variables that do not take on continuous values.

In some cases, CERs feature CIVs that are functionally related and that can possibly be represented by a single variable. An example of the possibility of reducing the number of CIVs is landing gear configuration—a CIV identified as a potential cost driver for pavement projects. Landing gear configuration is included as a CIV because the pavement design depends on the pressure exerted by an aircraft through a tire's contact patch. The pressure is a factor of both the aircraft's weight (i.e., MTOW) and landing gear configuration. However, since the variation in aircraft landing gear design within any one type of configuration is relatively limited, it is possible to estimate factors for converting the MTOW for one specific landing gear configuration to another configuration. Such conversion factors have previously been published by the FAA, as shown in Table 9.

**Table 9. FAA factors for converting between landing gear configurations.**

| o Con ert ro | o | Multipl |
|---|---|---|
| ingle wheel | Dual wheel | 0. |
| ingle wheel | Dual tandem | 0. |
| Dual wheel | Dual tandem | 0.6 |
| Double dual tandem | Dual tandem | .0 |
| Dual tandem | ingle wheel | 2.0 |
| Dual tandem | Dual wheel | . |
| Dual wheel | ingle wheel | . |
| Double dual tandem | Dual wheel | . |

ource: FAA ( 99 ), p. 2 .

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These multipliers allow for the conversion from any combination of MTOW and a specific landing gear configuration to a single-wheel-equivalent MTOW. As an alternative to using this FAA guidance, it is also possible to derive conversion factors empirically by examining the relationship between the MTOW specified for different landing gear configurations for a broad range of aircraft models. As an example, Figure 1 shows the relationship between MTOW in the dual wheel (DW) landing gear configuration and MTOW in the dual tandem wheel (DTW) configuration for all aircraft models in the FAA Airport Engineering Division's aircraft characteristics data table. The data suggests a conversion factor of 1.84 (compared to a factor of 1.7 per the FAA guidance in Table 9).

## Results of Data Collection

Due to the limited data availability described previously, the data collection was conducted in several rounds, establishing an iterative process. After the supplemental data collection and elimination of partial data points, the number of total data points for use in CER development encompassed a total of 255 observations. This was sufficient to support CER development for all of the project types identified in Table 6, with the exception of "Remove on-airport obstructions (vegetation)." With only four observations collected, this project type was removed from further consideration. The results of the data collection are summarized in Table 10.

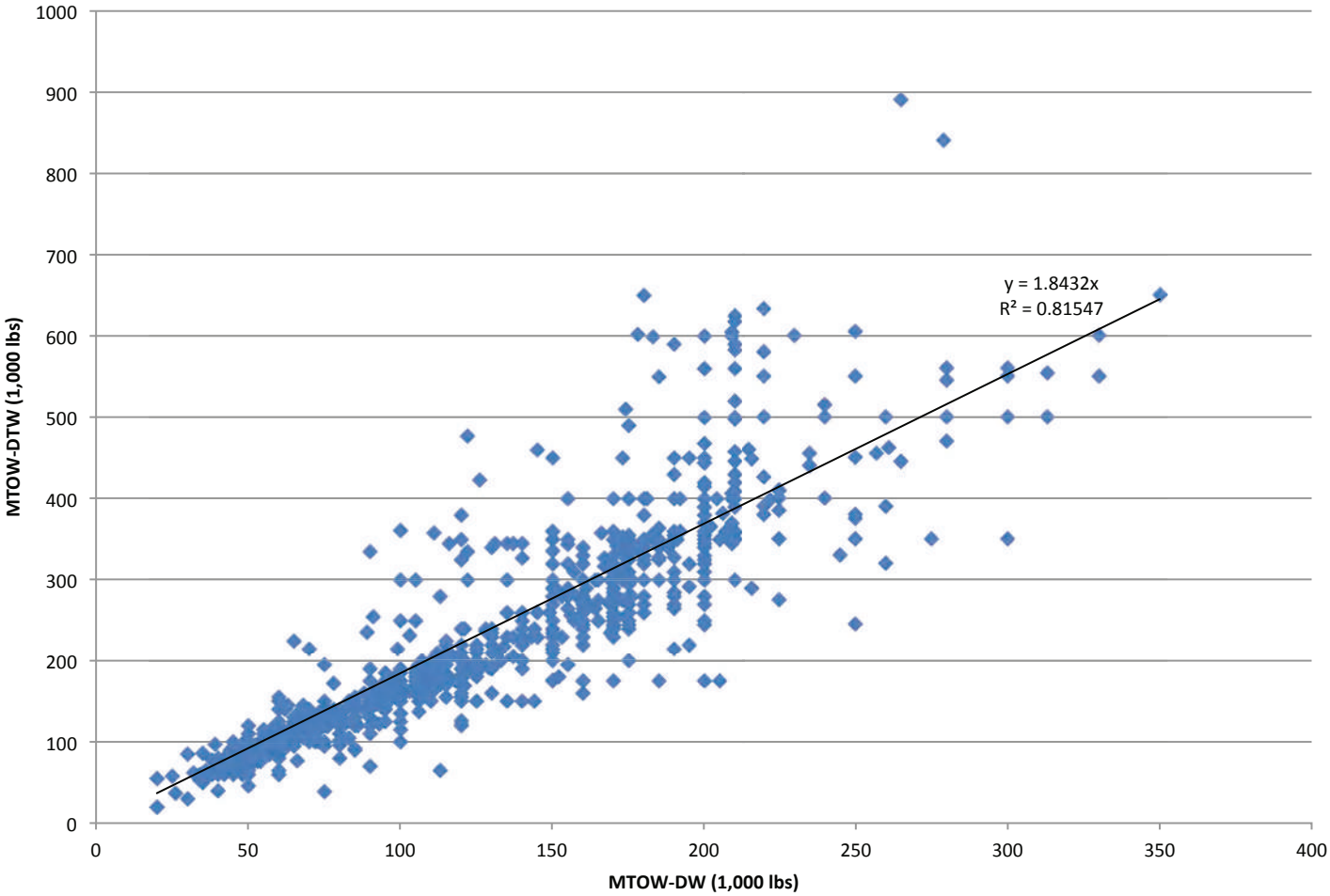


*Figure 1. Relationship between MTOW in DW and DTW landing gear configurations.*

**Table 10. Results of data collection.**

| ro e t pe | otal ata oints Colle te | otal ata oints se | iel |
|---|---|---|---|
| *or o tal o tr ct o Project* | | | |
| Construct or rehabilitate taxiway | 2 | 22 | .0% |
| Construct, expand, or rehabilitate apron | 29 | 22 | .9% |
| Construct, extend, or rehabilitate runway | | 0 | 62. % |
| Install perimeter fencing | 2 | | .0% |
| Install A I | 0 | | 0.0% |
| Install weather reporting equipment | | 2 | 90. % |
| Remove on-airport obstructions (vegetation) | | | |
| *ert cal o tr ct o Project* | | | |
| Construct ARFF facility | 2 | 2 | 9. % |
| Construct RE building | 2 | | .6% |
| *ll Project* | | | |
| otal | 2 | | |

The data set was analyzed for statistical outliers, which were removed prior to performing the multivariable regression analysis that establishes the CERs. Outliers were detected by identifying abnormal unit costs (i.e., cost per square foot of pavement), as well as other anomalies. For some observations, the project description did not provide sufficient clarity in regards to the scope and nature of the project. For example, in some cases, it was unclear from the description whether the cost was limited to a single project type or multiple project types covered by the same federal grant. Data points with problematic project descriptions were also removed as statistical outliers. Table 10 indicates how many of the collected data points were retained for CER development, as well as the overall yield (i.e., the share of data points that were actually used). The resulting CERs, along with plots of predicted versus actual cost for each data point used in the CER development, are documented in Appendix A.

CHAPTER 5

# ACCE—Airport Capital Cost-Estimation Tool

## Before Getting Started with ACCE

To ensure a smooth experience with ACCE, some preparations are necessary before running the application. These preparations include the collection of information that constitutes inputs to the cost-estimating approach. Since airport capital planning involves management, policy, planning, finance, and safety functions at the airport, the inputs should be vetted with relevant personnel and/or departments. Alternatively, ACCE can be run in a group setting to allow consensus discussion on the subjective inputs to the tool while it is being used.

Some of the inputs required by ACCE should be collected prior to starting. This includes the definition of the construction project(s) under consideration, consisting of a project description, planned construction year, and values for the cost drivers that are used in the CER for the project in question. It may also be useful to have a printed reference copy of the quick reference guide for ACCE, especially when using it for the first time. The guide is reproduced in Appendix B.

## ACCE Work Flow

The user interface is designed to ensure all relevant information is displayed and associated input is requested in a guided, logical sequence. This keeps the interface simple and allows a user to navigate intuitively through the tool. The input screen of the ACCE tool is divided into four sections (see Figure 2):

1. **Contact information:** This section allows the preparer to enter identifying information, including name, organization, e-mail, and a phone number. This information is optional.
2. **Airport data:** In this section, the user specifies airport information including three-letter FAA airport identifier, the state, and an airport description. Airport location information is used to geographically adjust cost estimates and to identify the project location.
3. **Project input:** This includes project-specific information such as the construction type and all relevant CIV values.
4. **Cost estimate:** This provides a running display of a range of cost estimates, identified as a low, most likely, and high estimates. If the project inputs are modified, the cost estimate is updated. Once the user is satisfied with the inputs, a report can be generated from this section.

### Airport Data

Airport data is necessary primarily to account for the regional variation in project cost. Having an airport identifier is also useful as a reference to help identify the cost estimate. This is particularly useful when cost estimates are generated for several different airports. The airport data section requires the three-letter FAA identifier to be entered, the two-letter state identifier,

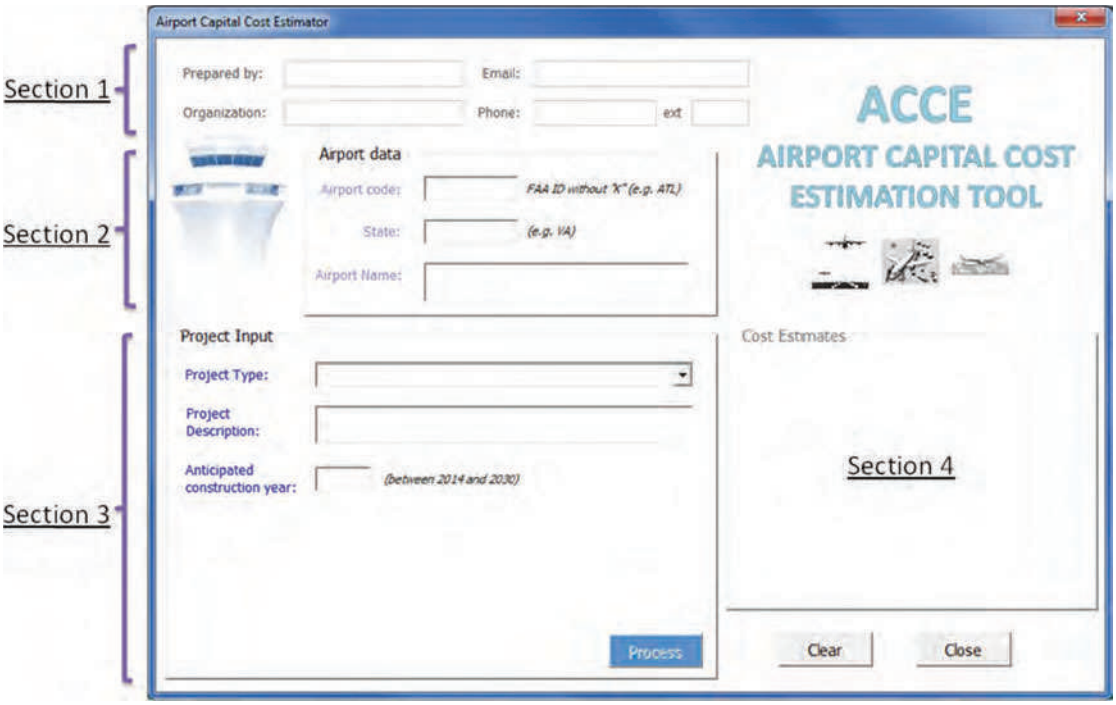


***Figure 2. ACCE main user interface.***

and the name of the airport. For NPIAS airports, the three-letter FAA code identifier is sufficient, as the remaining information is automatically retrieved and populated by ACCE.

## Project Input

The cost model supports a total of six horizontal and two vertical construction projects. Each project type requires a specific set of input variables needed to apply the CER in order to derive a cost estimate. The drop-down menu in the project input window allows the user to specify the project type of interest. Once the project type has been selected, input fields are created for entering values for all the CIVs associated with that project type's CER. Table 11 lists the possible user selections for the project input window, including the project types and the associated independent variables for each.

## Output: Cost-Estimating Report

Once the inputs have been finalized, a cost-estimating report can be generated. A sample cost-estimate report is shown in Figure 3. The tool generates cost estimates including low, most likely, and high estimates. The most likely estimate is determined by the CER and the CIV input values provided by the user. The low-high range is developed using the statistical metrics associated with the CER associated with the project type in question. CERs that feature a high quality of fit against the historical data have narrower low-high ranges than those that have a fit of lower quality.

The tool presents cost estimates both in base year (i.e., FY 2014) dollars and in nominal (i.e., then-year) dollars corresponding to anticipated construction year. The nominal dollar cost estimate is prepared using predicted GDP deflators to adjust for changes in prices. The cost-estimating report shows the percentage adjustment used to convert FY 2014 dollars to nominal dollars. For projects with a planned construction year of FY 2014, only the base year cost estimate is shown.

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**Table 11. Project input selections.**

| Project Type | Category | Input 1 | Input 2 | Input 3 | Input 4 |
|---|---|---|---|---|---|
| **ARFF Facility** | Vertical | Year | Combined floor area (sq. ft.) | | |
| **Apron** | Horizontal | Year | Pavement area (sq. ft.) | Design aircraft MTOW (lbs.) | |
| **Automated Weather Observing System** | Horizontal | Year | | | |
| **Perimeter Fencing** | Horizontal | Year | Length (ft.) | | |
| **PAPI** | Horizontal | Year | Number of systems/ runway ends | | |
| **Runway** | Horizontal | Year | Pavement area (sq. ft.) | Design aircraft MTOW (lbs.) | Landing gear configuration |
| **SRE Building** | Vertical | Year | Combined floor area (sq. ft.) | | |
| **Taxiway** | Horizontal | Year | Pavement area (sq. ft.) | Design aircraft MTOW (lbs.) | |

## Interpreting the Results

The cost-estimating report contains five distinct elements, which should all be taken into consideration when interpreting the results:

1. **Inputs:** This section summarizes the inputs that were used to generate the cost-estimating report. This includes the contact information for the preparer, the airport data, and the project-specific inputs, including the user-entered CIV values. The airport data is used to

**Airport Capital Cost Estimation Tool: Report**

| | |
|---|---|
| Report Name | ASH FY2020 CIP |
| Report Description | Extend Runway 14/32 |
| Name of Preparer | Elena Smith |
| Organization | Nashua Airport Authority |
| Phone number | (603) 123-4567, Ext. 1200 |
| Email | emith@flyash.com |
| Date Created | 1/28/14 8:48 AM |
| FAA Airport ID | ASH |
| State | NH |
| Airport Name | Boire Field |
| Project Type | Runway |
| Project Description | Extend Runway 1 /32 |
| Planned Year of Construction | 2020 |
| Pavement Area | 145,000 Sq. Ft. |
| Design Aircraft MTOW | 120,000 lbs. |
| Landing gear configuration | Dual tandem (DTW) |

**Output**

| | Cost Estimate | Low Estimate | High Estimate |
|---|---|---|---|
| FY2014$ | $2,100,000 | $1,600,000 | $2,700,000 |
| FY2020$ | $2,400,000 | $1,800,000 | $3,000,000 |

Inflation 2014 to 2020: +11.2%

**Disclaimer:** *This cost model is a proof-of-concept tool developed as a research project under the Airport Cooperative Research Program. Actual costs may differ significantly from the estimates provided here. These cost estimates are intended for initial planning purposes only and should not be used as the sole means to evaluate a proposed project.*



***Figure 3. Sample cost-estimating report.***

determine the adjustment for regional variation (based on the state the airport is located in). However, the airport location should also be considered when interpreting the resulting cost estimate. In particular, unique characteristics about the airport can affect the validity of the cost estimate. Examples include airports that are located remotely (e.g., island airports) or in environmentally sensitive surroundings (e.g., tidal marshes), which can substantially increase construction costs.

The values entered for the CIVs are critical in understanding the cost estimate, as the project cost is directly linked to these values through the CER. The project description provides context to the project. While this is an optional field that allows for free-form entry, a well-crafted project description can provide important context to allow for a critical and thorough evaluation of the resulting cost estimate.

The CERs were developed through a statistical analysis of a wide range of historical values for the CIVs. It was assumed that cost is a linear, well-behaved function within these ranges of values. While the model allows for user entry of CIV values that fall outside the range used to develop the CER for that project type, the resulting cost estimate will fall outside of the range used to validate the model. In these cases, a warning message is displayed (see Figure 4) and the resulting cost estimate should be viewed as uncertain.

2. **Most likely cost estimate:** The term "most likely cost estimate" (simply labeled "Cost Estimate" in the output table) is intended to emphasize that cost estimating is a stochastic science. In other words, every cost estimate is inherently uncertain and should be viewed as a range consisting of a random distribution of possible estimates. The most likely value in that distribution is generally accepted to be the best cost estimate. However, in interpreting the results, it is important to keep in mind that the most likely cost estimate is just one point in a range of possible values.
3. **Cost estimate range:** A range of cost estimates is formed by specifying the most likely cost estimate, as well as low and high estimates. These three values form a simplified representation of the underlying random distribution that makes up the output of the cost model. The low and high estimates are determined by adding and subtracting a percentage offset to the most likely cost estimate. The percentage value applied to create the range is computed using a rule-of-thumb that draws on the standard error resulting from the linear regression analysis used to develop the CER in question. Since the standard error measures the amount of scatter in the historical data about the best fit, the percentage range will vary by project type. Project types that have a CER where historical cost estimates closely match predicted cost estimates will tend to have a more narrow difference between the low and high estimates. Table 12 shows the resulting percentage values used to establish the low and high estimates.
4. **Inflation-adjusted cost estimate:** The base year for the cost model is FY 2014 and all cost estimates are displayed in FY 2014 dollars. However, for projects with a planned construction start beyond FY 2014, the cost estimate is also shown in inflation-adjusted dollars for the construction year in question. The base year results allow for comparing the costs of different

| | |
|---|---|
| Project Type | Runway |
| Project Description | Extend Runway 14/32 |
| Planned Year of Construction | 2020 |
| Pavement Area | **120,000 Sq. Ft. ***** |
| Design Aircraft MTOW | 120,000 lbs. |
| Landing gear configuration | Dual tandem (DTW) |
| ***** Warning: This input value falls outside the range of data used to develop the cost model. The resulting cost estimate projects into an area that has not been validated and may be inaccurate.** | |

***Figure 4. Warning message for CIV values outside range used to develop CER.***

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**Table 12. Values used to establish low and high cost estimates.**

| ro e t pe | o i an e |
|---|---|
| Construct or rehabilitate taxiway | ±2 .9% |
| Construct or rehabilitate apron | ±2 .2% |
| Construct, extend, or rehabilitate runway | ±2 .9% |
| Install perimeter fencing | ± . % |
| Install A I | ± . % |
| Install weather reporting equipment | ± 0.6% |
| Construct ARFF facility | ± .9% |
| Construct RE building | ±6. % |

projects regardless of scheduling. The nominal (i.e., then-year) results allow the airport to account for the general increase in price levels over time. Such increases can be significant: For example, price levels 10 years beyond the FY 2014 base year are projected to increase by nearly 20%.

5. **Disclaimer:** Each cost-estimating report generated by ACCE is accompanied by a disclaimer (Figure 5). The purpose of the disclaimer is to remind the user that the ACCE model was developed as a proof-of-concept tool, using a cost database limited in scope and through an applied research project within the ACRP. The cost estimates developed through ACCE are inherently uncertain, both because of the statistical method used, which is based on a sample of historical cost data with random variation, and because of limitations in both the data and the methodology. Prior to using cost estimates developed in ACCE for airport planning and development purposes, it is important that the user fully understands the limitations of the results.

To allow for a proper interpretation of the results and to understand the underlying limitations, a set of checklists follow—one each for the horizontal and vertical construction domain, respectively. The purpose of these checklists is to help identify factors that could cause the cost estimate to be either unusually high or low. They provide a mechanism for evaluating the uncertainty of the cost estimate through a self-assessment process to be conducted by the user after preparing a cost-estimating report using ACCE. If the responses to the checklists indicate the presence of several risk factors, the user should lean toward the high range of the cost estimate and/or seek an alternative estimate.

## Checklist for Horizontal Projects

### *Existing Conditions*

- Will the project be planned on a site that has evidence of previous environmental hazards such as contaminated soil, asbestos, lead paint, or the presence of threatened or endangered species, historic structures, or other unforeseen existing conditions? This may require special

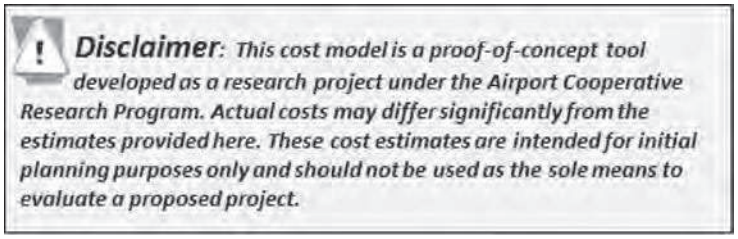


***Figure 5. Cost model disclaimer.***

environmental studies, stakeholder negotiations, and mitigation initiatives, resulting in additional on- or off-site improvements or in-lieu fee transfer of funds. If so, an allowance for the related costs must be added to the estimate provided by ACCE.
- If this is a large pavement project, is the airport located far from the nearest asphalt or concrete supply plant? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Is this project located on an island? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Will the FAA require more than 60% protection from frost for the pavement design? Generally, 60% is the standard for cold-weather regions; however, in extremely cold climates, an increase in this value to 80% is sometimes required. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Is the project located in a hot-weather region where grass is difficult to grow and maintain year round? This may require alternative site stabilization in areas between runways and taxiways, such as local stone products or hardscaping. The stone must be properly sized to prevent foreign object damage hazards, which increases cost. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Is this project located in an urban community? Projects that have sensitive socio-economic factors can add time to construction due to public outreach requirements, restricted work hour requirements, and restricted work area requirements. If so, the higher range of the estimate generated by the ACCE is likely more reflective of the final cost.
- Will there be other construction projects ongoing near the project at the same time? This may result in more favorable bids and unit prices due to economies of scale. If so, the lower range of the estimate generated by ACCE may be more reflective of the final cost.

### *Project Scope*

- Will the project be a combination of two or more separate project types? If so economies of scale may exist. If combining estimates generated by ACCE for projects occurring simultaneously, the lower range of the estimate is likely more reflective of the final costs.
- Will the project include non-standard materials such as warm-mix asphalt, underground stormwater treatment systems, or artificial turf? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Will the project require newer, environmentally friendly technologies such as light-emitting diode lighting, solar-powered lighting, pervious pavement, or low volatile organic compound paint? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Will the project provide improvements to technology infrastructure that is ancillary to the core project scope, such as airfield lighting touchscreen control panels, new access control hardware or software, new utility metering, stormwater collection, or outlet improvements? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Will the project include many different trades of work? For example, if a project includes site work, paving, metal work, concrete work, electrical work, security work, and carpentry work, there is an increased chance that there will be multiple subcontractors reporting to one prime contractor. This has the potential to increase cost due to increased management oversight, as well as multiple levels of overhead and profit. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost. Conversely, if a project scope is limited to a runway mill and overlay with minor supporting site work, the lower range of the estimate generated by ACCE is likely more reflective of the final cost.
- Will the FAA and the relevant state aviation/transportation agency support the use of polyvinyl chloride (PVC) conduit for all runway and taxiway electrical conductor circuits? In some regions, this is justified in order to protect wiring from damage by fire ants, reduce maintenance costs, or improve safety. The use of PVC conduit can add a significant amount of cost

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to runway and taxiway projects. If so, an allowance for the related costs must be added to the estimate provided by ACCE.

### *Specific Project Conditions*

- Will the project start in the fall within a cold-weather region? If a project starts late within a cold-weather region, there is potential the project mobilization cost will increase due to multiple start and stops. It is typical that an airfield pavement project will be temporarily shut down in November and restarted in May to avoid final paving, topsoil, and seeding activities in cold conditions. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Is the project being constructed at a very busy airport? Cost of construction increases for an airport with high numbers of operations, especially when commercial operations dominate. High levels of activity can require construction phasing plans, which add time and cost to construction. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Is there a risk associated with weather delays and damage due to severe weather events such as tropical storms, hurricanes, floods, or tornados? While difficult to predict, if a project is located in an area known to be subject to these weather hazards, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- For pavement projects, will the project include a simple mill and overlay of existing pavement versus a full-depth reconstruction? If so, the lower range of the estimate generated by the ACCE is likely more reflective of the final cost.
- For pavement projects, will the project include replacement of an existing airfield lighting system such as taxiway or runway lights? If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- For perimeter fence projects, will the fence serve as both a security fence and a wildlife deterrent fence? The FAA and U.S. Department of Agriculture have recently increased design requirements for wildlife deterrent fencing. Also, wildlife deterrent fencing is more likely to be located in wetlands or other environmentally sensitive areas. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.

### *Project Jurisdiction*

- Will this project involve frequent coordination with the TSA or U.S. Immigration and Customs Enforcement? If so, the price of construction may result in significant increased costs due to added facility requirements and the application of non-standard facility layout requirements. Facility foundation plans and other supporting utility items can be affected by changes in wall locations, elevator shaft locations, and baggage handling support columns. If so, an allowance for the related costs must be added to the estimate provided by ACCE.
- Will the project have sources of funding from multiple agencies such as the FAA, Economic Development Administration, TSA, or state agencies? This may create additional delineations of work and/or present a construction phasing burden to the sponsor, contractor, and inspecting team. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.
- Are there deed restrictions or existing protective land overlays on the proposed project site? For example, is there a regional or district water protection overlay within an area where stormwater improvements are proposed? This may create added requirements and/or administrative and legal costs related to mitigation initiatives. If so, an allowance for the related costs must be added to the estimate provided by ACCE.
- Will any agency or municipality require special construction considerations such as energy-efficient vehicle fleets or idling restrictions for construction equipment? This will add cost to the project related to alternative fuel equipment or work site restriction. If so, the higher range of the estimate generated by ACCE is likely more reflective of the final cost.

## Checklist for Vertical Projects

### *Existing Conditions*

- Is the proposed site for the new building cleared of obstructions and level? If not, an allowance for this work must be added to the ACCE estimated value.
- Does an existing structure need to be demolished to make way for the new building? If so, an allowance for this work must be added to the ACCE estimated value.
- Do existing underground utility lines—including steam tunnels, NAVAIDs, power, water, sewer, fuel, communications, and security—require relocation to make way for the new building? If so, an allowance for this work must be added to the ACCE estimated value.
- Where existing structures and/or utilities are required to be removed, has a hazardous materials assessment survey (asbestos, PCB, lead paint, etc.) been performed? If not, it is recommended that this be performed prior to finalizing a cost estimate for the project, as hazardous materials remediation can represent a significant additional cost as well as a potential delay to the project schedule. Such impacts may be significant enough to reconsider the location of the new building.
- Have geotechnical borings and soils analysis been performed and analyzed? If not, it is recommended that this be performed prior to finalizing a cost estimate for the project, as unsuitable (organic) soils, contaminated soils, and rock/ledge would need to be removed and replaced with structural fill, resulting in a significant additional cost as well as a potential delay to the project schedule. Such impacts may be significant enough to reconsider the location of the new building.
- Has a comprehensive site survey been performed? If not, it is recommended that this be performed prior to finalizing a cost estimate for the project, as potential cost/schedule impacts related to underground utilities/structures and property boundaries can be revealed and estimated.
- Is the project site in an area where archaeological resources may be present? If so, it is recommended that the local and/or state historic commission be consulted regarding their potential requirements for study prior to proceeding with construction, as this could impact the project schedule.

### *Project Scope*

- Is the proposed project a renovation? If so, has an existing conditions assessment been performed in relation to code deficiencies which may be required to be addressed as part of a renovation? If not, it is recommended that this be performed prior to finalizing a cost estimate for the project. Examples include structural, energy efficiency, and accessibility (ADA) upgrades which may be triggered by the local building code and increase the intended scope of the renovation. Such impacts may be significant enough to consider demolition and new construction rather than renovation.
- Is the proposed project an addition to an existing building? If so, has an existing conditions assessment been performed in relation to code deficiencies in the existing building which may be required to be addressed as part of an addition? If not, it is recommended that this be performed prior to finalizing a cost estimate for the project. A significant size addition may require code-related upgrades to the existing building even if such upgrades are not desired by the owner. Such impacts may be significant enough to consider construction of a separate new building rather than an addition.
- Does the existing and/or new building contain tenant spaces? If so, a number of considerations come into effect:
  - If the tenant will be displaced, temporary facilities to allow the tenant uninterrupted operations may be required.
  - If the tenant lease includes a clause which limits disruption from noise or vibration, certain construction activities may need to be limited to occur after hours.

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  - If the tenant requires special infrastructure (i.e., power, grease trap, ventilation, etc.), facilities (i.e., hazmat storage), or fit-out of furnishings and equipment (i.e., cooking/kitchen equipment), it is recommended the costs associated with these items be negotiated between tenant and airport prior to finalizing a cost estimate for the project.
- Are the required utility connections (power, water, gas, sewer, and telecommunications) available directly at the proposed building location? If not, extension of the primary utility lines to the building location may be required as part of the project, and consultation with the utility companies to establish additional costs is recommended prior to finalizing a cost estimate for the project.
- Are there any separate but related "enabling" projects that must occur for this project to proceed? If so, the capital plan should clarify if these enabling project costs are to be included in the cost of this project, or are to be addressed separately. Examples include relocation of a security fence, construction of new space for current occupants of a building scheduled to be demolished, construction of a new access road, etc.
- Does the new facility require purchase of any special equipment, technology, or infrastructure which is beyond that typically provided as part of this type of facility? If so, the higher range of the estimate generated by ACCE is likely more reflective of these special equipment costs.
- Will the project include all new furniture, computers, communications equipment, appliances, and the like? If so, the higher range of the estimate generated by ACCE is likely more reflective of these added costs.
- Will the airport need to engage the services of a professional moving company to relocate their furniture, materials, and operational items from an existing facility into the new facility? Will any of these items need to be placed in off-site storage during construction? If so, the higher range of the estimate generated by ACCE is likely more reflective of these moving and storage costs.

### *Specific Project Conditions*

- Is the airport located in a remote area where construction labor and materials are in limited supply, or where physical access to the airport is challenging (i.e., an island location). If so, the higher range of the estimate generated by ACCE is likely more reflective of these remoteness costs. In this instance the airport may consider setting the project schedule so that the majority of work occurs during periods of the year where access to the airport is least challenging and therefore least expensive.
- If the airport is located in a cold-weather climate, will major portions of the exterior construction be performed during winter months? If so, the higher range of the estimate generated by ACCE is likely more reflective of these winter-conditions costs. In this instance the airport may consider modifying the project schedule to avoid exterior construction work during cold-weather months.
- Will temporary facilities be needed for operational staff during construction? In cases of a major renovation, or where the demolition of an existing building is required to occur prior to the new building being ready for operations, some form of temporary facility is needed to maintain operations until the new building is complete. If so, an allowance for this work must be added to the ACCE estimated value.
- Will the project be phased in order to accommodate both construction and ongoing airport operations within the same general area? Limiting the physical areas where construction work may proceed to various time periods is very common with airport projects, but does involve cost premiums. If so, the higher range of the estimate generated by ACCE is likely more reflective of these winter-conditions costs.
- Does a critical completion date exist for the project? Furthermore, must the project be completed within an accelerated time frame? If so, the higher range of the estimate generated by ACCE is likely more reflective of this accelerated schedule.

- Does the project involve airside construction? If so, the higher range of the estimate generated by ACCE is likely more reflective of these security/operational costs, as airside projects require more extensive security and operational restrictions. In this instance the airport may consider relocating the SIDA barrier temporarily to allow for the project site to be designated as occurring landside throughout construction.

### *Project Jurisdiction*

- Are any federal or state environmental permits required? It is recommended that this be determined prior to finalizing a cost estimate for the project, as both state and federal environmental permit processes can last a year or longer and incur significant consultant fees.
- Are any special local variances, hearings, or approvals required? Local approvals which can sometimes impact a project cost and/or schedule include the following:
  - Local design review board: Many communities have regulatory design standards (sometimes related to historic districts), which are often more appropriate to residential and/or small commercial developments than to functional and secure airport facilities.
  - Conservation commission: Stormwater drainage, rare species habitats, and wetlands habitat are common considerations.
  - Zoning board: Airport buildings are often larger than typical buildings in small communities, and thus require zoning exemptions and/or special permits.
- Will any special mitigation measures be required by local authorities in order to obtain approval for the project? It is recommended that this be determined prior to finalizing a cost estimate for the project, as certain mitigation measures can significantly impact both cost and schedule. Examples include creation of a replacement habitat elsewhere on airport property, noise/visual barriers between the project location and abutters, and purchase of adjacent properties.

There are of course numerous other considerations which could affect project cost and schedule and which are unique to each airport. The preceding checklists are intended to assist the airport in anticipating and planning for potential issues in advance, thus assisting in a more predictable process of design and construction which would more closely align with the estimates developed by ACCE.

CHAPTER 6

# Lessons Learned

An accurate cost estimate is recognized by practically all stakeholders as being a significant contributor to successful airport capital improvement planning. Access to reliable cost estimates helps ensure optimal use of limited airport investment funds and reduces the risk of project cancellations or cutbacks. At the same time, there are a number of recognized risks that affect the quality of any cost estimate, no matter how sound the underlying methodology is. These include scope changes, volatility in material costs, uncertainty in mobilization costs, environmental issues, community concerns, the inherent complexity of airport systems, contractor management issues, and poor implementation of best practices.

The literature review and stakeholder survey conducted for this study describe the current practices for estimating costs for airport construction projects in both the horizontal and vertical domains. In general, existing practices utilize well-established and proven methodologies. The methodologies draw on procedures and guidance published by a number of entities that provide relevant resources, particularly professional organizations and state agencies. Cost estimating for vertical projects has an added layer of structure through the use of standard classification schemes.

The two primary methods used for estimating airport project costs are estimation through historical bid prices and cost-based estimating. All existing methods are limited in their ability to accurately account for unique project conditions. Such uncertainties can significantly affect the estimate and can result in wide variations between initial cost assumptions and the actual costs incurred on a particular project. To account for such risks, contingency analyses are often applied, but usually in a simplified manner. A typical method is the inclusion of a percentage multiplier to line item quantities and/or an overall contingency factor that is applied to the final cost estimate. There are few, if any, standards for applying such contingency factors. The stakeholder outreach effort conducted for this project indicates that the numerical values used can vary greatly. Since overall contingency factors can be applied on top of contingencies for line item quantities, the cumulative contingency can be substantial. The lack of established standards in this area results in potentially large variations.

Use of computer models for cost estimating is not currently a common practice for airport construction. It is less clear whether this is due to lack of availability of suitable models or whether the challenges in airport construction cost estimating are not easily solved through computer modeling techniques. It does, however, indicate the potential for the development of an airport-specific model, provided the challenges identified previously are carefully considered and the appropriate solutions are identified. Lessons learned through the course of this study, potential solutions to some of the challenges, and recommendations for future work are discussed in the following sections.

## Challenges to Developing an Airport Cost-Estimating Model

The literature review and industry stakeholder survey conducted as part of this study addressed existing sources of cost data. The practice of storing past bid tabulations is common and a number of agencies maintain their own cost data. Nonetheless, for the purpose of developing a comprehensive cost model, several significant challenges related to data availability exist:

- Many of the most commonly used data sources are proprietary and cannot readily be distributed as part of a publicly accessible model intended for delivery through the ACRP.
- Data maintained by public agencies are distributed across a range of state and regional agencies and stored in inconsistent formats.
- There is no standard format for data and in many cases the data is stored in formats that are notionally electronic but essentially represent digital versions of printed documents (e.g., the PDF format). This precludes automated transfer of historical cost data into a comprehensive cost database.
- Even when cost data is available, data for the key cost drivers represented by the CIVs is often not. For example, for a pavement project, the amount of asphalt or concrete required is usually included, but quantified as volumes. Key cost drivers such as the pavement surface area, design aircraft MTOW, landing gear configuration, and design freezing index are usually not included.
- Historical grant information often contains several projects that have been bundled together in such a way that prevents costs and CIV data to be separately identified and assigned to specific project types.

The main challenge in developing an effective cost model for airport projects using parametric cost-estimating methodology is in fact the availability of a sufficiently large and rich set of historical data. Assembling a cost database that is sufficiently rich in both quantity and variation across geographic locations and project types would address a number of the challenges identified previously. The potential benefits of expanding the cost database are many and include the following:

- Each project type is represented by a unique CER, requiring its own data set. Expanding the data collection would enable cost modeling support for additional project types.
- CERs incorporate independent variables that represent cost drivers and that have a causal relationship with cost. Lack of data limits the number of cost drivers that can be included, reducing the explanatory power of the CER. Variables that are not included but that affect cost result in unexplained variation and less accurate models. Expanding the number of historical observations would allow the inclusion of additional CIVs in the CER, thereby improving the model's ability to predict cost.
- Linear regression is based on statistical samples, which inherently have some random variation. This random variation introduces errors in the resulting cost model. Increasing the number of observations reduces the errors due to random variation in the sampling process.
- Similarly, in the case of a small sample, it is more likely that the results are biased because of lack of variation. For example, if the database is small and contains a disproportionate number of observations from a particular geographic region or type of airport, the likelihood is greater that the model will be biased due to lack of variation in the data. The database should be sufficiently large to ensure variation across geographic locations, urban versus rural communities, and types of airports.
- The larger the database, the less likely it is that user-entered inputs will fall outside the range of the historical observations used to develop the CER in question. As described in Chapter 5, when the CIV input values fall outside the range of historical CIV values used in the cost modeling, the cost estimate is generally more uncertain.

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## Future Work

As described previously, future work on the development of a cost model for capital planning purposes should first and foremost focus on expanding the database. This section includes specific recommendations for future data collection practices. These are based on lessons learned during the implementation of the ACCE cost model, as well as recommendations by the research team's airport construction SMEs.

Initiating an effort to expand the data collection requires addressing a number of challenges. These include establishing a framework for collecting the data, establishing support from the airport community, obtaining necessary resources, and creating standards for collection of historical cost and project data. While identifying solutions to some of these challenges is beyond the scope of this study, the key issues that need to be addressed include the following:

- **Organization:** For an expanded data collection effort to be implemented, ideally a framework should be established that can engage a large number of airport participants across the United States. This is necessary to ensure that the resulting database has sufficient number of observations, which is currently the biggest limitation in implementing the parametric cost-estimating method. It would also provide sufficient regional variation, preventing biases due to smaller and more narrowly focused samples. While there are a number of potential options to establish an organization framework, it is not possible to predict the exact makeup. Key stakeholders would likely include trade and industry organizations, state aviation agencies and their umbrella groups, and the Airports organization of the FAA.
- **Resources:** The resources required for this effort would depend on the framework and implementation of an expanded data collection program. The effort would require development of standards, a mechanism to collect data, and management and development of the database. A potential option for an initial effort would be a voluntary pilot project. However, a full implementation of an expanded data collection effort may require identifying a source of project funding.
- **Data collection:** Prior to initiating an expanded data collection effort, standards must be established for the type of data to be collected, including definitions for each field in the database. This is required in order to ensure that the right type of data is collected and that data from different airports, projects, and regions shares consistent definitions. One of the lessons learned in this project is that it can be very difficult and resource intensive to retroactively fill gaps in the database. For this reason, it is important to invest sufficient resources upfront, to ensure that effective and comprehensive data standards are established. These standards should balance the need for a rich data set to support the cost model development with ease of data collection. If the data requirements are too onerous, the data collection will suffer from an insufficient number of submitted projects. It is important to keep in mind that the parametric cost-estimating technique requires that each record is complete. In other words, records that are missing value for one or more data fields cannot be included in the statistical analysis used to develop the CERs.

The following section includes additional detail on recommended practices for establishing the data collection framework. These recommendations are based on lessons learned during the conduct of this research project, best practices identified in the literature review and stakeholder outreach effort, and SME input.

## Recommendations for Data Collection Practices

The most important step in ensuring a successful data collection effort is the establishment of data standards. These standards should include the following:

- Specifications for general data to be collected for all projects.
- Specifications for project-specific data (i.e., data that varies by project type).

These specifications should both identify the data fields to be collected for each project, as well as provide definitions that clearly identify the intent and meaning of each field. These definitions should be sufficiently detailed so as to ensure that data are collected consistently. As an example, consider the CIV "area" for vertical projects. The definition should specify that the combined floor area across all stories should be included. The definition should also determine whether the floor space should be measured to the exterior and interior walls and address the handling of unusable space. Finally, for each data field, the units of measurements should be specified (where applicable).

## General Data

The requirements for collecting general data are likely to be very similar to the data collected during the course of this project. However, some added specificity and improvements are possible. Likely data fields include the following:

- **Record identifier:** Each record in the database should be assigned a unique identifier that can be used for indexing and cross-referencing purposes.
- **Airport identifier:** A unique airport identifier is required in order to establish the location of the project. This is necessary to adjust for regional variation and can also be used to test that the database is not biased toward a specific geographic area. It also allows for follow-up queries, for example, if the data collected for the airport contains inconsistencies or missing fields. The data requirements should specify whether the FAA or International Civil Aviation Organization identifier should be used. If the identifier is linked to an airport database, no additional geographic information needs to be collected. If this is not the case, or the airport is not in the database being used, it is recommended that one or more of the following geographic identifiers be collected: zip code, county, and/or state.
- **Project type:** The project type allows the data to be mapped to a specific CER. While this requires that the project types be static (i.e., they must be established in advance), the research conducted during this project suggests that a relatively small number of project types account for the majority of construction projects. In this study, the number of supported project types was limited to eight. However, this was primarily the result of limited data availability. In an expanded data collection effort, it is recommended that a broader range of project types be supported. The projects originally identified as candidates for inclusion can serve as the starting point for identifying the project types to be supported in a future effort:
  - Airfield signage
  - Construct ARFF facility
  - Construct or rehabilitate taxiway
  - Construct parking garage
  - Construct parking lot
  - Construct SRE building
  - Construct, expand, or rehabilitate apron
  - Construct, expand, or rehabilitate terminal building
  - Construct, extend, or rehabilitate runway
  - Improve runway safety area
  - Install airport visual aid
  - Install NAVAIDs
  - Install perimeter fencing
  - Install weather reporting equipment
  - Rehabilitate runway lighting
  - Remove obstructions
  - Runway pavement marking
  - Security access systems

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- **Project description:** The project description is useful for identifying project type and, especially, for determining whether the project includes bundled construction types. It appears most practical to leave the project description as a free text field. However, guidelines should be established for the level of specificity desired in the description. For example, for pavement projects, it should be clear whether the project consists of constructing a new pavement area, expanding an existing pavement area, or rehabilitating old pavement. The type of pavement used (i.e., asphalt, PCC, or a hybrid) should be specified. The description should specify whether the project includes design only, construction only, or both. A table of relevant keywords may serve as a useful guide to craft clear and comprehensive project descriptions.
- **Year:** The year of construction is required for normalizing construction costs to take inflation into account. This is a relatively straightforward input, but the guidance should specify whether calendar or fiscal year should be used, and how to treat projects that span multiple years. Also, some thought should be given as to which is most relevant to the cost modeling—the year(s) of construction activity or the budget year(s) associated with the grant funds expended on the project.
- **Total project cost:** Project cost is the sole dependent variable in the parametric cost methodology presented here and is the most critical variable in the model. For this reason, particular care should be taken in both defining the meaning of total project cost and in ensuring that the data is collected according to the resulting definition.

  In the database created for this project, cost was unavailable for some data records and had to be estimated based on the federal share for AIP-funded projects. While the federal share is theoretically established by formula allocation, in practice, the share can vary from project to project due to items ineligible for federal funding. For this reason, estimating the total project cost based on the federal share is not ideal and is likely to introduce inaccuracies in the cost database.

  The guidance for collecting historical project cost data should clearly specify that total costs should be considered. This total includes the federal share, the state share, and the sponsor's share. Moreover, guidance should specify which stage in the project the historical cost should be based on. Options range from the cost provided during the bidding phase to that provided on the project close-out report. In general, the latest available cost data is preferred.

  Another important aspect of providing specifications for the collection of historical costs is the treatment of soft costs. Soft costs typically range from 10% to 30% of total project costs. These include design fees, permitting fees, utilities, costs associated with inspections and land acquisition, costs associated with the bidding and procurement process, and project administration and management costs. The guidance should clearly specify which costs should be included, so that the historical cost data follows a consistent pattern that allows for pooling historical observations across many projects and airports.

## Project-Specific Data

The project-specific data is the set of historical values for the CIVs that are part of the hypothesized CER for the project type under consideration. Since one of the major goals of any expanded data collection effort is to improve the performance and robustness of the cost model, the number of CIVs should be expanded significantly from the final list selected for the development of ACCE. The goal should be to identify and include all major variables that are measurable and that have the potential to affect the cost of a project significantly. At the same time, since the number of data points required increases with the number of CIVs included, the guidelines should not call for the inclusion of CIVs that only have a minor impact on cost. If the number of CIVs is excessive, the labor effort required to collect historical project data could also increase to the point that the number of records collected is substantially reduced. It is important to keep in mind that in order for a past project to be included in the model, all fields must be complete, which means a value must be collected for each CIV included in the CER.

**Table 13. Potential cost drivers for horizontal airport construction project.**

| ro e t Cate or | C | C | C | C | C |
|---|---|---|---|---|---|
| ir iel si na e | No. of intersections | Airplane design group | Control tower | | |
| Constru t or re a ilitate taxi a | Area | MTO | Landing gear configuration | avement type | Design free ing index value |
| Constru t par in lot | No. of spaces | Drainage type | | | |
| Constru t expan or re a ilitate apron | Area | MTO | Landing gear configuration | avement type | Design free ing index value |
| Constru t exten or re a ilitate run a | Area | MTO | Landing gear configuration | avement type | Design free ing index value |
| nstall airport isual ai | Type of system | No. of systems/ runway ends | | | |
| nstall s | Type of NAVAID | | | | |
| nstall peri eter en in | Length | No. of automatic gates | No. of manual gates | No. of pedestrian gates | |
| nstall or re a ilitate run a li tin | Length | Runway approach type | | | |
| nstall eat er reportin e uip ent | Type of equipment | | | | |
| e a ilitate run a li tin | Length | Runway approach type | | | |
| e o e on airport o stru tions e etation | Acres | | | | |
| un a pa e ent ar in | Length | Runway approach type | | | |
| e urit a ess s ste s | No. of pedestrian gates | No. of vehicle gates | | | |

In identifying which CIVs to include, the CERs hypothesized at the beginning of this project will serve as a useful starting point. This is because the original CERs included many more CIVs than contained in the final database, since the number of CIVs was reduced substantially to deal with the lack of available data. An expanded data collection effort should allow for a number of the rejected CIVs to be included in the model as originally intended. Table 13 displays a list of proposed CIVs for potential horizontal projects and Table 14 displays a similar list for vertical projects. These lists employ up to six CIVs per project type (compared to three for the cost model implemented in ACCE).

**Table 14. Potential cost drivers for vertical airport construction projects.**

| ro e t Cate or | C | C | C | C | C | C |
|---|---|---|---|---|---|---|
| Constru t a ilit | Area | No. of stories | No. of bays | Construction type | uilding skin type | ite conditions |
| Constru t expan or re a ilitate ter inal uil in | Area | No. of stories | No. of spaces | tructural system | Architectural treatment | Lobby area |
| Constru t par in ara e | Area | No. of stories | Construction type | uilding skin type | ite conditions | |
| Constru t E uil in | Area | Annual enplanements | No. of stories | uilding skin type | ite conditions | |

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## Conclusions

The goal of this project was to develop a model and database for estimating the cost of airport construction projects during the capital planning phase. The recommend approach—parametric cost estimating—uses historical cost data to establish mathematical relationships between construction cost and the hypothesized cost drivers for the project type in question.

The study resulted in the creation of a database that includes data on construction cost and cost drivers for eight different types of airport construction projects. The database was used to develop a statistical cost model using the parametric cost-estimating approach. Both the database and the model were implemented in Microsoft Excel. A user interface allows the user to enter airport and project-specific information and generate a cost estimate report that can then be saved, printed, or exported. The model also provides a simple what-if analysis capability that allows the user to modify the assumptions. The resulting cost estimates are adjusted for inflation and geographical variations in construction cost. The cost estimate is presented as a range of estimates, with best, low, and high values. This allows the user to take into account uncertainties and unique factors that affect cost.

The cost model was evaluated using statistical measures of quality of fit and subjective evaluations by the research team's SMEs. The model was also validated using a case study approach. The model passes the statistical tests of significance and quality of fit and, in general, generates cost estimates that match the experience of the SMEs. The research team concludes that the parametric cost-estimating methodology is a suitable approach for cost estimating for airport construction projects. This is especially true in the capital planning phase, where cost estimates need to balance accuracy with the effort required to develop the estimates. At the same time, the validation effort showed that the performance of the model is highly variable. Depending on the project type and specific circumstances, actual costs may vary significantly from those predicted by the model. This is true even when considering the range of low and high estimates provided by the model to take uncertainty into account. For this reason, the model should be treated as a proof-of-concept tool. Estimates prepared with the current model should only be used for initial planning purposes and should not be the sole means for evaluating the cost of a proposed project.

The lack of robustness and variations in performance in the model are primarily caused by the limited availability of historical cost data. Collecting data in a format that supports inclusion in a cost database was the greatest challenge identified by the research team. Data is often stored in a manner that prevents the data from being imported electronically. Also, in many cases the total project cost is available but not the values of the cost drivers that are required to perform the cost estimate. Finally, bundling of multiple projects frequently prevents historical project data from being used in the model.

Because the model suffers from a lack of robustness, the guidebook contains specific and in-depth recommendations on how to interpret the results and identify specific risks. Checklists are included for evaluating the results in order to assess the uncertainty of the cost estimate report. If the checklists identify risks that could drive the cost up or down, the airport should consider using the high or low range of the estimate. If the risk assessment reveals an unusually high level of uncertainty, an alternative cost estimate should be considered.

The guidebook includes a series of recommended best practices for any future data collection intended to update and expand the model. Increasing the number of observations and incorporating additional cost drivers are likely to substantially improve model performance. For this reason, the guidance on expanded data collection is the focus of the discussion on recommended future research.

Any expanded data collection would require a framework for collecting the data in a centralized manner. Standards need to be established to ensure data consistency and that the format supports transfer into a spreadsheet or database. Consideration should also be given to collecting site plans. These drawings provide important information on project dimensions, such as the size of pavement surface areas. Analyzing such information would require analysis by an architect or engineer to interpret the drawings, however.

A key finding of the data collection effort is that there is no single entity that can provide the data required to expand and improve the model. Consequently, the research team suggests that a cooperative approach to data collection be considered that involves state aviation agencies, transportation departments, industry organizations, and the FAA Airports organization, especially at the regional level. The research team believes that a broad-based, collaborative approach to the collection of airport project and cost data has the greatest potential for achieving the best outcome. The resulting improvements could provide substantial benefits to the airport community by enabling standardized and more accurate cost estimates to be available in the capital planning phase.

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APPENDIX A

# Cost-Estimating Relationships

Table A.1 shows the coefficients that define the cost-estimating relationships (CERs) in the final cost model. The CERs used here take the general linear form:

$$C = \beta_0 + \beta_1 CIV_1 + \beta_2 CIV_2$$

where $C$ is the total construction cost (normalized to FY 2014 Kansas dollars), $\beta_0$ is the intercept, $\beta_1$ is the coefficient multiplying the value of the first candidate independent variable ($CIV_1$), and $\beta_2$ is the coefficient multiplying the value of the second candidate independent variable ($CIV_2$). Note that in the final version of the cost model, for all but one CER, the intercept is zero. Also, only the pavement-related CERs have two independent variables (i.e., the runway, apron, and taxiway project types). "Adjusted" maximum takeoff weight (MTOW) indicates that the MTOW has been converted to a single-wheel-equivalent MTOW, as described in Chapter 4.

Table A.2 displays measures of statistical fit for each CER in the final cost model. The measures shown are adjusted $R^2$ and the P-values associated with the t-statistics for the coefficients for the independent variables. As described in Chapter 3, adjusted $R^2$ value is a measure of the overall correlation between construction cost and the cost drivers (i.e., CIVs) selected for inclusion in the CERs. Values close to one indicate a good statistical fit. Unlike adjusted $R^2$, P-values are computed separately for each coefficient (i.e., $\beta_1$ and $\beta_2$). They represent measures of the statistical significance of the corresponding independent variable as a predictor of cost. Low P-values (i.e., close to zero) indicate high levels of statistical significance.

The P-value for a statistical test associated with the F-statistic is also shown. This test indicates whether a significant linear relationship exists between cost and the CIVs (as opposed to a constant value). For this project, a statistical significance of 95% was adopted as the standard, which corresponds to a target P-value of 5% or less.

Note that the CERs for installing PAPIs and weather reporting equipment consist of a simple arithmetic mean of the historical cost of each installation in the database. For this reason, statistical measures of quality of fit are not available. Since the construction of PAPIs can involve installations at multiple runway ends, the CER consists of the mean cost per system multiplied by the number of systems to be installed.

The remaining sections of this appendix contain graphs that plot the predicted cost for each data point, as estimated using the CER derived for the project type in question, against the observed actual cost. Note that both predicted and actual cost values have been normalized to thousands of FY 2014 Kansas state dollars. For a CER that predicts costs perfectly, the plot of predicted versus actual costs would fall on a line through the origin with slope one. This line is

**Table A.1. Final cost-estimating relationships.**

| Project Type | Intercept (FY 2014 KS $) | Coefficient 1 | | Coefficient 2 | |
|---|---|---|---|---|---|
| *Horizontal Projects* | | | | | |
| Construct or rehabilitate taxiway | | 11.9 | Pavement area (sq. ft.) | 6.1 | MTOW (lbs.) |
| Construct, expand, or rehabilitate apron | | 1.2 | Pavement area (sq. ft.) | 12.2 | MTOW (lbs.) |
| Construct, extend, or rehabilitate runway | | 2.9 | Pavement area (sq. ft.) | 35.4 | Adj. MTOW (lbs.) |
| Install perimeter fencing | | 32.2 | Fencing (linear ft.) | | |
| Install PAPI | | 83.1 | No. of systems | | |
| Install weather reporting equipment | 171,700 | | | | |
| *Vertical Projects* | | | | | |
| Construct ARFF facility | | 374.5 | Floor area (sq. ft.) | | |
| Construct SRE building | 111,500 | 116.5 | Floor area (sq. ft.) | | |

**Table A.2. Statistical tests.**

| Project Type | Adj. R2 | P-value $\beta_1$ | P-value $\beta_2$ | P-value F-statistic |
|---|---|---|---|---|
| *Horizontal Projects* | | | | |
| Construct or rehabilitate taxiway | 82.5% | 0.0% | 0.4% | 0.0% |
| Construct, expand, or rehabilitate apron | 87.4% | 1.6% | 0.0% | 0.0% |
| Construct, extend, or rehabilitate runway | 83.7% | 0.1% | 0.1% | 0.0% |
| Install perimeter fencing | 83.5% | 0.0% | | 0.0% |
| Install PAPI | N/A | N/A | N/A | N/A |
| Install weather reporting equipment | N/A | N/A | N/A | N/A |
| *Vertical Projects* | | | | |
| Construct ARFF facility | 88.2% | 0.0% | | 0.0% |
| Construct SRE building | 88.3% | 0.0% | | 0.0% |

shown as a reference: The amount of scatter about the reference line serves as a visual indicator of the predictive ability of each CER. One graph is shown for each project type in the final cost model (except for "install PAPI" and "install weather reporting equipment," which use simplified CERs, as described previously).

## Horizontal Projects

Figures A.1 through A.4 plot the predicted cost for each data point against the observed actual cost for four of the horizontal project types in the final cost model.

## Vertical Projects

Figures A.5 and A.6 plot the predicted cost for each data point against the observed actual cost for the vertical project types in the final cost model.

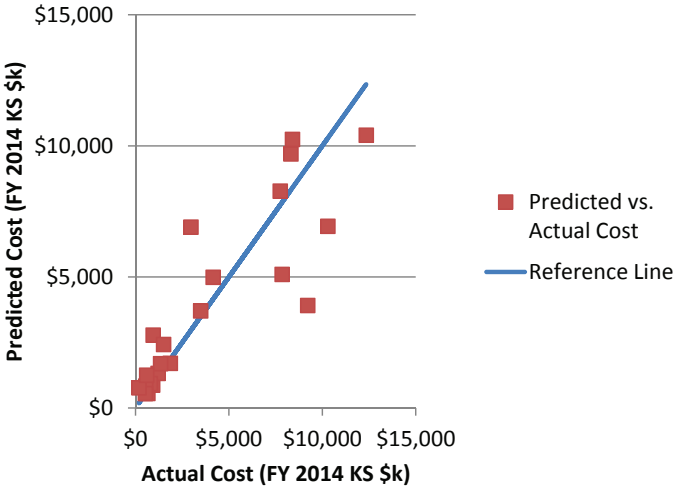


***Figure A.1. Predicted vs. actual cost—construct or rehabilitate taxiway.***

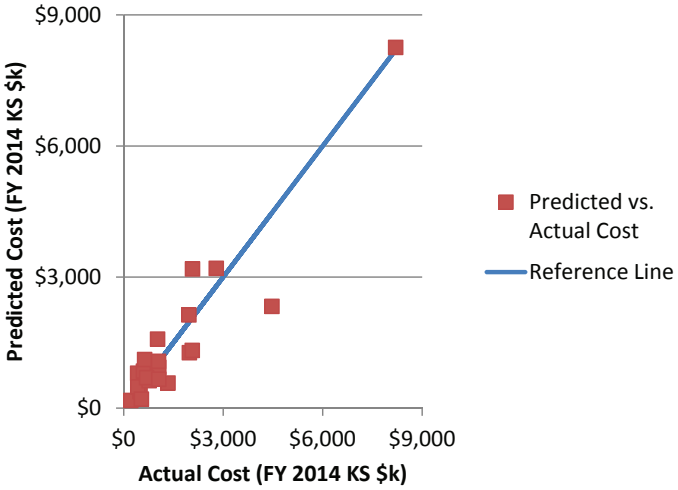


***Figure A.2. Predicted vs. actual cost—construct, expand, or rehabilitate apron.***

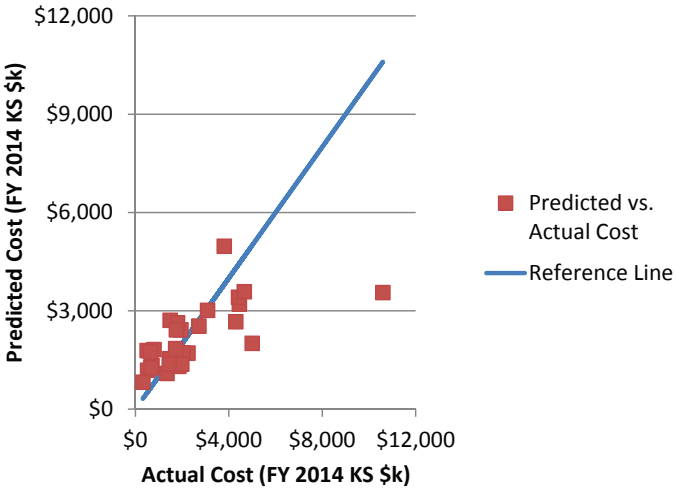


***Figure A.3. Predicted vs. actual cost—construct, extend or rehabilitate runway.***

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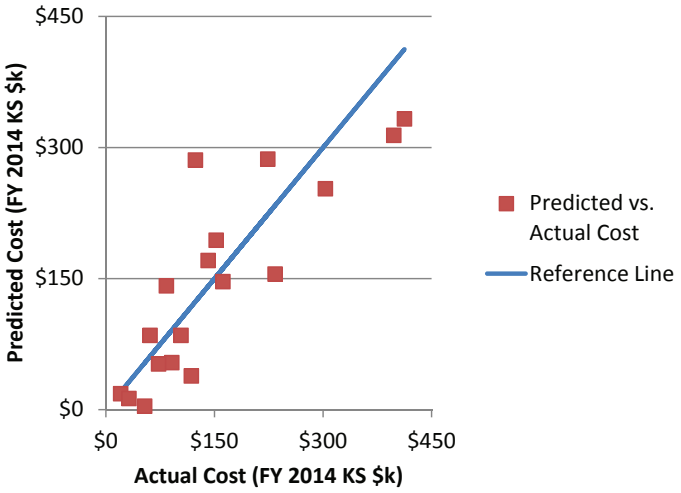



***Figure A.4. Predicted vs. actual cost—install perimeter fencing.***

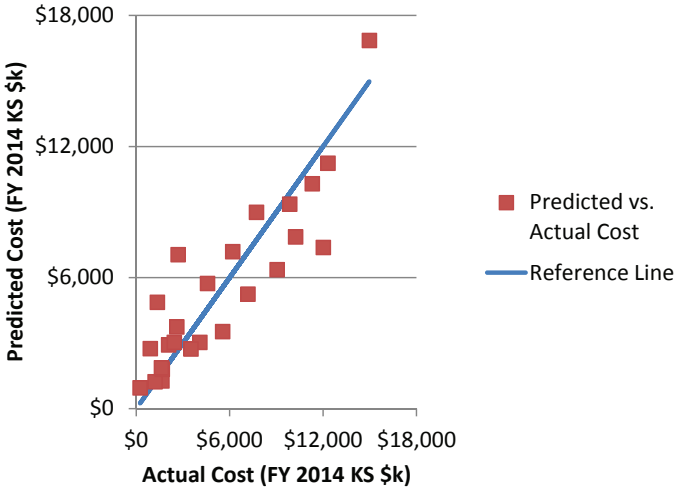



***Figure A.5. Predicted vs. actual cost—construct ARFF facility.***

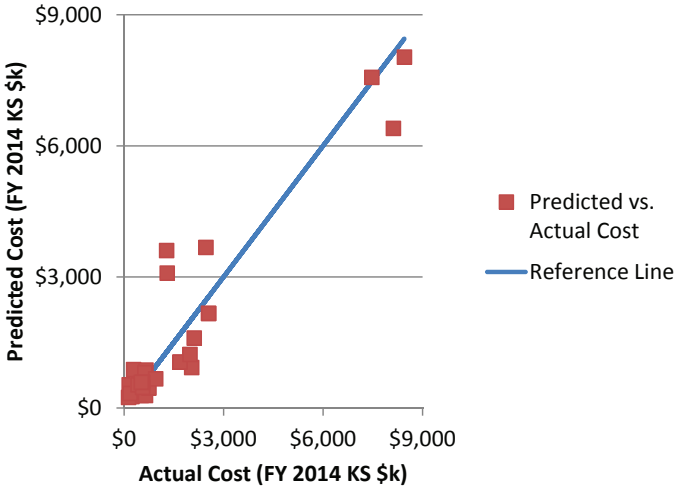


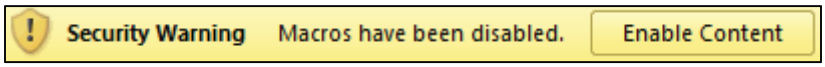

***Figure A.6. Predicted vs. actual cost—construct SRE building.***

APPENDIX B

# ACCE Quick Reference Guide

## Running ACCE

✓ ACCE requires 32-bit Microsoft® Excel (version 2007 or later) and a display resolution of 1024x768 pixels or greater.
✓ To start ACCE, click on the button **ACCE** on the accompanying CD or right click on the file **ACCE.xlsm** and select "Open" (or double click on the file name to begin the program).
✓ ACCE requires an Excel function known as "macros" in order to function properly. If a pop-up message with an "Enable Macros" or "Enable Content" button appears, that content should be enabled:




If no warning appears, macros have already been enabled and ACCE is ready to be used.

## Before Starting

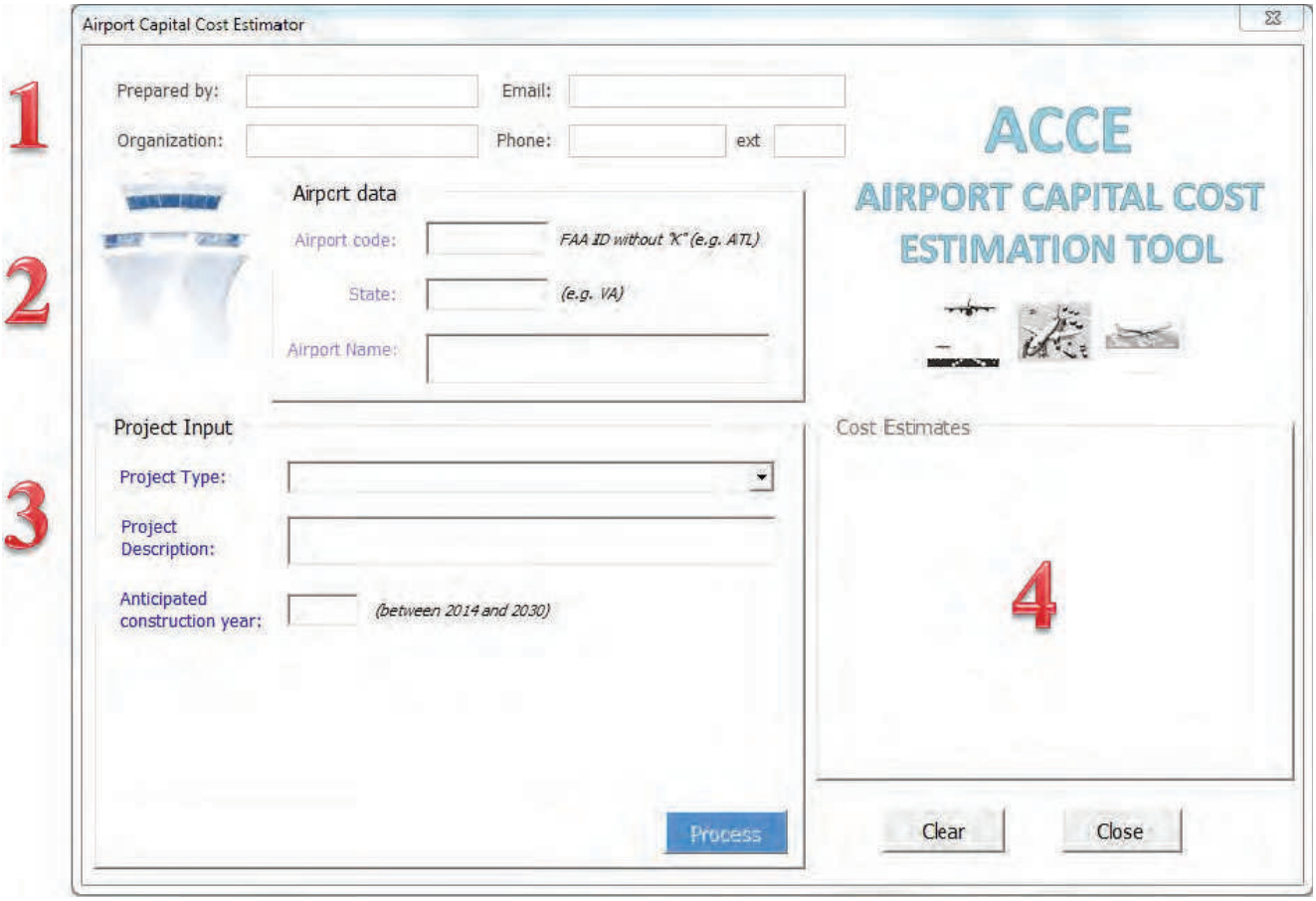
Before starting, have the following information ready:

- Description of proposed construction project.
- Planned year of construction.
- Values for key cost drivers:
  - Pavement projects: Pavement area (square ft.), design aircraft MTOW (lbs.), and, for runway construction projects, design aircraft landing gear configuration (SW/DW/DTW/DDTW)
  - Security fence projects: Length (ft.)
  - SRE building and ARFF facility projects: Combined floor area (square ft.)

## Input Window

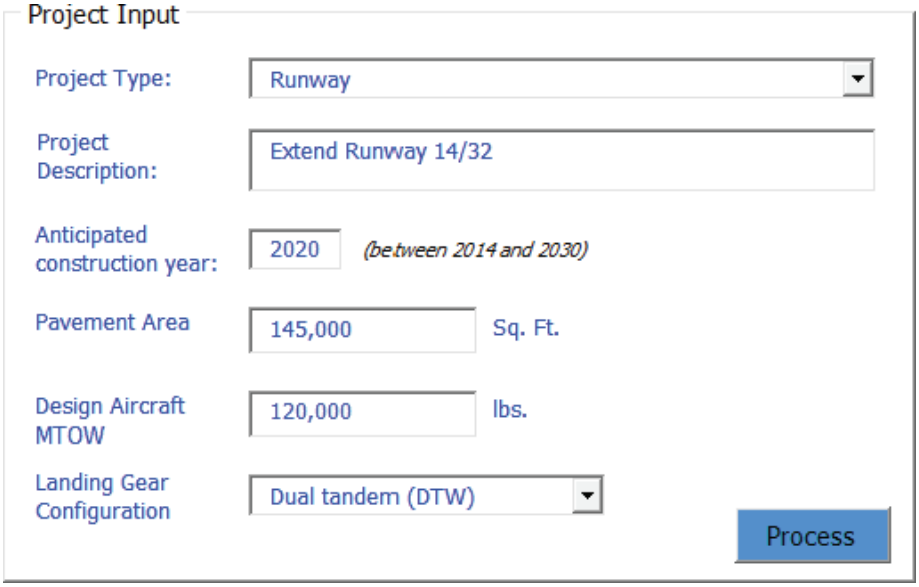
✓ The ACCE input window is displayed automatically when opening the tool. It consists of four sections:

1. Contact information: To be used for entering the name and contact information of the preparer of the cost estimate. This information is optional.
2. Airport data: Includes the three-letter FAA identifier, state abbreviation, and name. For NPIAS airports, only the identifier has to be entered: The remaining information is retrieved automatically. This information is required.



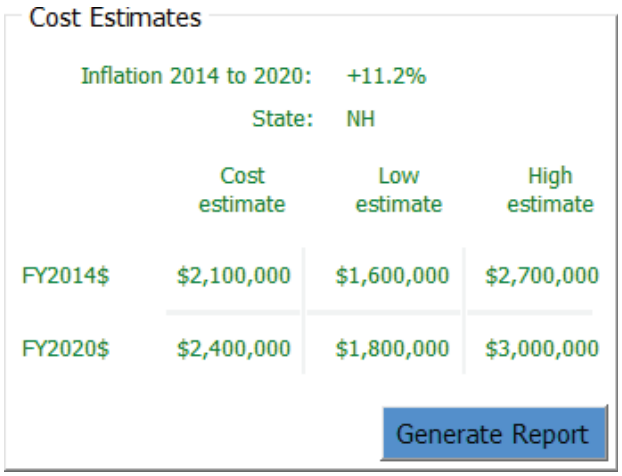

3. Project input: This includes a drop-down menu for selecting the project type, a text field for free-form entry of a project description, and a field for the construction year. Once the project type has been selected, additional input fields are shown for entering the input values for the key cost drivers. This information is required.

   Example:



4. Cost estimate: Once the project input data has been entered, the "Process" button can be used. This causes a cost estimate to be instantaneously calculated and shown to the right of the project input section. This estimate can be updated by changing the project input values and pressing "Process" again. Selecting "Generate Report" will produce the final output—the cost estimate report.

   Example:




Other features:

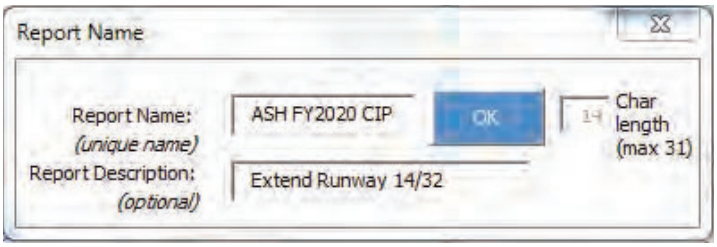
✓ The "Clear" button can be used to clear the input values, in order to generate a brand new cost estimate.
✓ The "Close" button closes the ACCE tool and returns the user to Microsoft Excel.

## Project Types

✓ The project type is selected using a drop-down menu in the project input section.
✓ The following project types are supported:
- Aircraft Rescue and Fire Fighting (ARFF) Facility
- Apron
- Automated Weather Observing System
- Perimeter Fencing
- Precision Approach Path Indicator (PAPI)
- Runway
- Snow Removal Equipment (SRE) Building
- Taxiway

## Cost Estimate Report

✓ Provide a name and an optional description to identify the cost estimate. **Note: The report name can be a maximum of 31 characters and must conform to Excel naming conventions.**
✓ Press OK to generate the cost estimate report.
✓ The cost estimate report displays the contact and airport information, the date and time the report was generated, the project input data, and the cost estimate.




✓ The cost estimate includes a low estimate and high estimate that create a range of possible costs. The low and high estimates are based on the level of statistical uncertainty in the cost model for the project type in question.
✓ Cost estimates are provided both in fiscal year (FY) 2014 dollars and in inflation-adjusted dollars for the proposed year of construction. The inflation adjustment is based on predicted increases in general price levels (i.e., not increases in construction-specific costs).

**Airport Capital Cost Estimation Tool: Report**

| | |
|---|---|
| Report Name | ASH FY2020 CIP |
| Report Description | Extend Runway 14/32 |
| Name of Preparer | Elena Smith |
| Organization | Nashua Airport Authority |
| Phone number | (603) 123-4567, Ext. 1200 |
| Email | emith@flyash.com |
| Date Created | 1/28/14 8:48 AM |
| | |
| FAA Airport ID | ASH |
| State | NH |
| Airport Name | Boire Field |
| | |
| Project Type | Runway |
| Project Description | Extend Runway 14/32 |
| Planned Year of Construction | 2020 |
| Pavement Area | 145,000 Sq. Ft. |
| Design Aircraft MTOW | 120,000 lbs. |
| Landing gear configuration | Dual tandem (DTW) |

**Output**

| | Cost Estimate | Low Estimate | High Estimate |
|---|---|---|---|
| **FY2014$** | $2,100,000 | $1,600,000 | $2,700,000 |
| **FY2020$** | $2,400,000 | $1,800,000 | $3,000,000 |

Inflation 2014 to 2020: +11.2%

***Disclaimer:*** *This cost model is a proof-of-concept tool developed as a research project under the Airport Cooperative Research Program. Actual costs may differ significantly from the estimates provided here. These cost estimates are intended for initial planning purposes only and should not be used as the sole means to evaluate a proposed project.*

✓ A disclaimer is shown explaining that ACCE is a proof-of-concept tool and that actual costs may differ significantly from the cost estimates produced by the tool.
✓ A toolbar is available below the report:

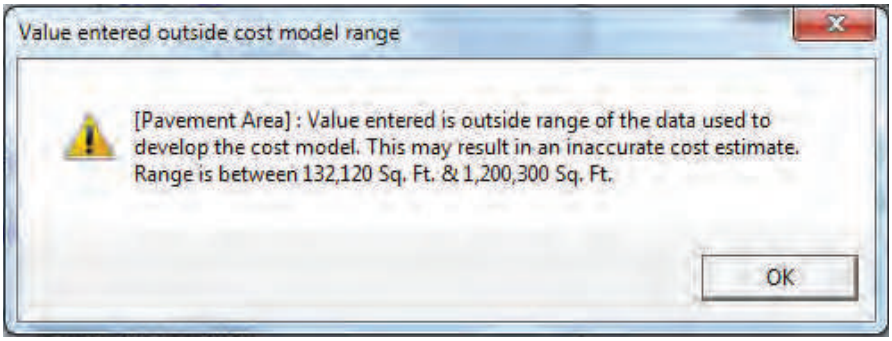

This toolbar supports the following functions:

- Print: Sends the report to a printer attached to the computer or on the network.
- Save as PDF: Saves the report as a PDF file.
- Export: Prompts the user to select a folder and then saves a copy of the report as a Microsoft Excel file with the specified name. Note that only the output is saved (i.e., the cost estimate report). The macros that make up the ACCE tool are not exported.
- Return: Returns to the input window—this allows the user to enter new inputs and generate a different cost estimate (i.e., to create a what-if analysis).

## Notes

✓ If the planned year of construction is FY 2014, then inflation-adjusted results are not shown, since these would be identical to the cost estimate expressed in FY 2014 dollars.

✓ If an input value for a key cost driver falls outside the range of values used to develop the cost model for the project type in question, a warning message is displayed indicating that this may result in higher than usual levels of uncertainty:



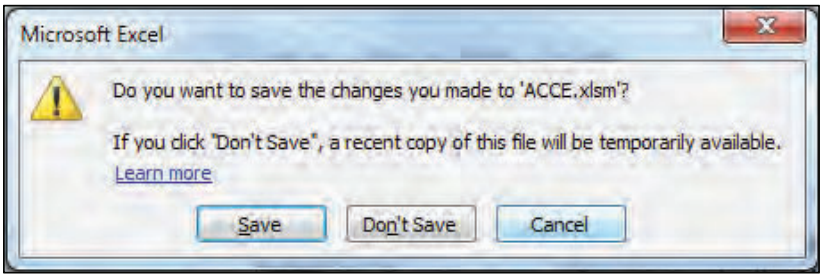

This warning does not, however, preclude use of the entered value—it is only a cautionary note explaining that the value may result in a greater than usual level of uncertainty.

If the user proceeds with the entered value, a similar warning is also displayed in the cost estimate report:

| | |
|---|---|
| Project Type | Runway |
| Project Description | Extend Runway 14/32 |
| Planned Year of Construction | 2020 |
| Pavement Area | **120,000 Sq. Ft. ***** |
| Design Aircraft MTOW | 120,000 lbs. |
| Landing gear configuration | Dual tandem (DTW) |

***** Warning: This input value falls outside the range of data used to develop the cost model. The resulting cost estimate projects into an area that has not been validated and may be inaccurate.**

✓ When exiting Microsoft Excel, the following message may appear:




Generally, "Don't Save" should be selected, to avoid overwriting the ACCE tool with entered data. To save results from a cost estimate, use the "Export" button in the cost estimate report.

*Abbreviations and acronyms used without definitions in TRB publications:*

| | |
|---|---|
| A4A | Airlines for America |
| AAAE | American Association of Airport Executives |
| AASHO | American Association of State Highway Officials |
| AASHTO | American Association of State Highway and Transportation Officials |
| ACI–NA | Airports Council International–North America |
| ACRP | Airport Cooperative Research Program |
| ADA | Americans with Disabilities Act |
| APTA | American Public Transportation Association |
| ASCE | American Society of Civil Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| ATA | American Trucking Associations |
| CTAA | Community Transportation Association of America |
| CTBSSP | Commercial Truck and Bus Safety Synthesis Program |
| DHS | Department of Homeland Security |
| DOE | Department of Energy |
| EPA | Environmental Protection Agency |
| FAA | Federal Aviation Administration |
| FHWA | Federal Highway Administration |
| FMCSA | Federal Motor Carrier Safety Administration |
| FRA | Federal Railroad Administration |
| FTA | Federal Transit Administration |
| HMCRP | Hazardous Materials Cooperative Research Program |
| IEEE | Institute of Electrical and Electronics Engineers |
| ISTEA | Intermodal Surface Transportation Efficiency Act of 1991 |
| ITE | Institute of Transportation Engineers |
| MAP-21 | Moving Ahead for Progress in the 21st Century Act (2012) |
| NASA | National Aeronautics and Space Administration |
| NASAO | National Association of State Aviation Officials |
| NCFRP | National Cooperative Freight Research Program |
| NCHRP | National Cooperative Highway Research Program |
| NHTSA | National Highway Traffic Safety Administration |
| NTSB | National Transportation Safety Board |
| PHMSA | Pipeline and Hazardous Materials Safety Administration |
| RITA | Research and Innovative Technology Administration |
| SAE | Society of Automotive Engineers |
| SAFETEA-LU | Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005) |
| TCRP | Transit Cooperative Research Program |
| TEA-21 | Transportation Equity Act for the 21st Century (1998) |
| TRB | Transportation Research Board |
| TSA | Transportation Security Administration |
| U.S.DOT | United States Department of Transportation |

Annxure 3

Press release

6 Mar 2024 | Mumbai, IN

# EY predicts 9.6% average salary increase for India Inc in 2024; attrition decline nears pre-pandemic levels

Press contact

EY India

- **The top three sectors in terms of projected salary increase are ecommerce, professional services and financial services**
- **Overall attrition dropped to 18.3% in 2023, from 21.2% in 2022**
- **Super niche skills like Artificial Intelligence, Machine Learning command a premium of 30-50% in 2024**

**Mumbai, 06 March, 2024:** According to the second edition of **EY 'Future of Pay 2024' report,** India Inc. is set for an average salary increase of 9.6% in 2024, similar to the actual increase in 2023. Overall attrition dropped to 18.3% in 2023 (from 21.2% in 2022) and is set to gradually decline over the next few years as companies prioritize cost management and employee wellbeing, stabilizing the workforce amidst high talent demand.

In light of India's position as a global hub for technology and outsourcing services, the EY report highlights that e-commerce is expected to have the **highest salary** growth in 2024, at 10.9%, followed by financial services with a projected growth of 10.1%. Professional services' salary is projected to grow by 10% in 2024, suggesting a rebound as companies invest in strategy alignment to navigate global business complexities. The impact of real estate and infrastructure emerging as a growth sector is also visible, as increments continue to be stable at 10%.

As per the EY report, 35%- 40% of the **technology workforce** is made up of digital talent, a figure that is expected to become more crucial in the future. Amongst digital skills, super niche skills like Artificial Intelligence (AI), Machine Learning (ML) and Blockchain skills are highly sought-after, commanding a **premium** in the range of 30%-50%.

Reflecting on the key findings, **Abhishek Sen, Partner and Leader, Total Rewards, HR Technology and Learning, People Advisory Services, EY India** said, *"As we unveil our second edition of the 'Future of Pay' report, we provide industry stakeholders with a compass to navigate the ever-shifting landscape of Total Rewards. While overall average salary increase in India Inc. holds steady compared to last year, certain sectors such as ecommerce, financial services and professional services firms are poised for significant*

*pay raise in 2024. There is also a discernible trend towards embracing a more comprehensive Rewards Value Proposition (RVP) to drive better ROI across all industries. Going forward, organizations will harness the transformative power of AI to craft bespoke benefits packages, optimize reward procedures, and elevate overall employee satisfaction at workplace."*

**Attrition across sectors**

As per the report, attrition rates in India have been fluctuating, influenced by macroeconomic factors and internal corporate strategies. Overall attrition dropped to 18.3% in 2023, from 21.2% in 2022. The highest levels of attrition in 2023 prevailed across financial services (24.8%), professional services (24.2%) and information technology (23.3%).

This year, voluntary attrition decreased slightly, while involuntary attrition rose, particularly among global companies, indicating layoffs in the IT and startup sectors due to global economic changes. Indian companies, however, showed resilience and performed better, experiencing less impact from economic shifts. Looking forward, attrition is expected to gradually decline over the next few years as companies focus on cost management and increased employee wellbeing amid high talent demand, thereby stabilizing the workforce.

**Trends in Total Rewards**

80% of the organizations emphasized the importance of "pay and benefits" and a need to move away from traditional employee benefits in the modern workforce. Top three areas of focus for employers are benefits cost planning (43%), employee wellness (29%), evaluating and aligning with industry standards (20%).

At 43%, variable pay plan (non-sales) are the most common type of incentives plans offered in the organization, followed by discretionary incentives (32%) and sales incentive plan (21%).

The report reveals that in terms of job levels, Executives (CXOs) typically get the most variable pay, but their projected salary increases for 2024 are lower than those in 2023. Most employee levels are experiencing decreased variable pay percentages for 2024, except for the lowest-paid tiers, which might see a slight uptick. On an average, organizations distributed variable bonuses equivalent to 15.05% of employees' annual fixed cash in 2023.

**LTIPs are becoming increasingly diverse, flexible, and strategic**

The report highlights that organizations have been creatively revamping their long-term incentive plans (LTIPs) in recent years. Shifting from cash rewards to stock incentives, around 26% of companies focussed on LTIPs for performance rewards in FY23. There is also a marked increase in penetration of this rewards component across non CXO cadres fuelled largely by the booming new age digital enterprise growth in India.

**Top talent trends as we head into 2024**

Hybrid work cultures is gaining importance as it helps enhance work-life balance, productivity, and satisfaction. Unique hiring trends are observed in various sectors, like formation of ESG teams in financial services sector. There is an increasing trend towards ESG reporting among Indian companies with 60% firms already utilizing or on their way to utilize ESG policies.

Diversity, equity, and inclusion (DE&I) initiatives have become a pivotal part of corporate strategy. The top 3 DE&I initiatives are gender pay parity, defined DE&I

policies and a diversifying talent pool.

AI and automated reward systems are personalizing rewards and streamlining the rewarding process, reducing manual work. Going forward, companies are poised to utilize AI algorithms to customize benefits and improve employee satisfaction.

- Ends -

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# Future of pay

**March 2024**

EY
Building a better working world

# Agenda

# Foreword

Amid global economic and geopolitical shifts shaping the workplace of the future, India stands resilient, bolstered by strong fundamental metrics. With robust domestic demand and a promising digital economy, India continues to assert its presence on the global stage. While attrition rates are easing slightly, talent market continues to face significant skill gaps with only a fraction of new entrants possessing the requisite skills for employment. This underscores the urgency for rapid upskilling and reskilling initiatives to bridge the talent divide. Despite these challenges, there's cautious optimism in the business community fueled by projections of stable compensation hikes and government initiatives aimed at fostering economic growth.

While average pay hike percentages for India Inc remain flat vis-à-vis last year, there is a notable shift towards embracing a more comprehensive Rewards Value Proposition (RVP) to drive better ROI across all industries. Additionally, a culture of recognition is gaining momentum, cultivating an atmosphere of mutual respect and appreciation for collective contributions. Furthermore, organizations are increasingly prioritizing employee wellness, offering initiatives for physical and mental well-being along with new-age benefits.

As India's digital Human Resource journey picks up speed this year, digital adoption in Rewards is seeing an upswing to drive experience and efficiency. As large and mid-tier organizations increase adoption of such platforms, the Total Rewards function continues to evolve into a strategic design and decision support function as opposed to a transactional function.

At People Consulting, EY, we are committed to staying abreast of these developments and navigating the evolving landscape of Total Rewards, recognizing the need for comprehensive Rewards Value Propositions (RVP) to complement Employee Value Propositions (EVP) in attracting and retaining top talent within a fiercely competitive market. Our analysis reveals emerging trends in this domain, marking the onset of a transformative journey in Total Rewards practices nationwide.

As we unveil our "Future of pay" report for this year, we extend our appreciation to industry stakeholders and colleagues for their contributions. We eagerly anticipate engaging with industry experts and clients to discuss these insights and chart a path forward in the ever-evolving realm of talent management and compensation practices.

**Abhishek Sen**
Partner & Practice Leader
Total Rewards, HR Technology and Learning
Email: abhishek.sen@in.ey.com

01

# Key themes

# Unlocking the world of total rewards

This report delves into the complexities of Total Rewards, encompassing compensation, incentive frameworks, and the influence of modern benefits on employee well-being. Our objective is to provide organizations with the necessary insights to gain a competitive advantage in the talent market. The report will explore various themes, such as:

**Economic Outlook**

Navigating India's growth amid global uncertainties

**Talent Trends**

Uncovering latest talent trends in India reflecting a significant shift towards accommodating evolving employee expectations

**Attrition vs. Retention**

Provides key insights into attrition and retention; helps organizations craft strategies to lower attrition and increase workforce engagement

**Compensation Trends**

Intricate aspects of movement in compensation salary increments across different sectors and pay for performance

**Incentive Innovations**

Explores the market trends in both short-term and long-term incentive programs

**Executive Compensation**

Insights on market trends in executive and board compensation

**Emerging Trends**

Navigating the evolving landscape of Gig Workers, Innovative Wage Codes, and DE&I Initiatives

**Key Focus Areas**

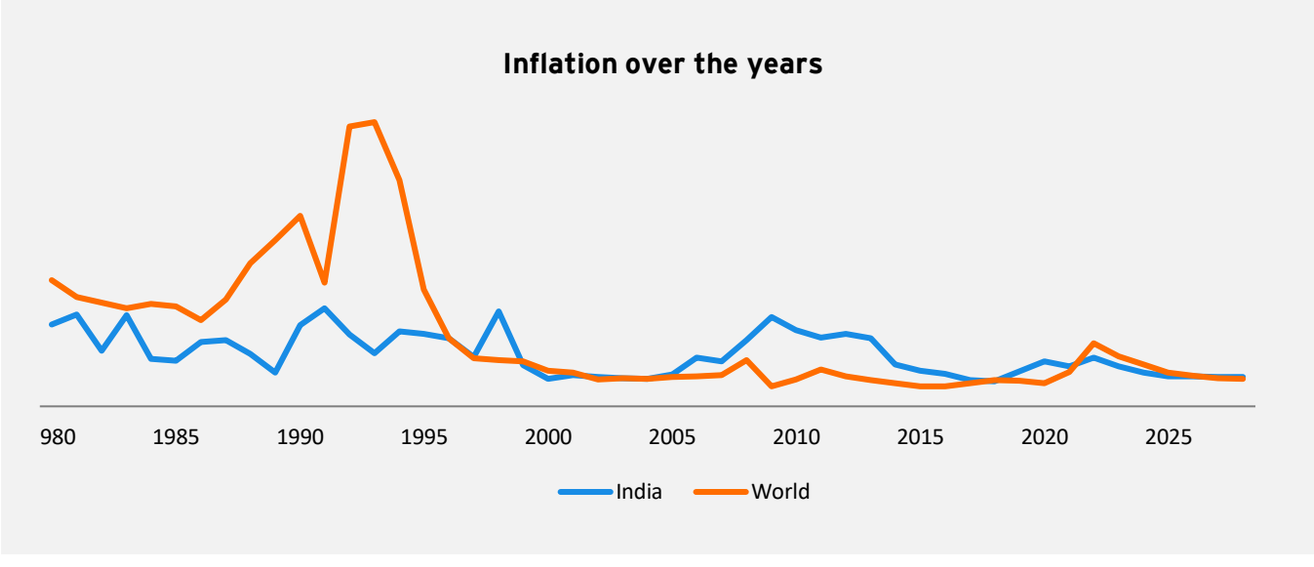
Examines the evolving landscape of employee benefits amid a competitive job market

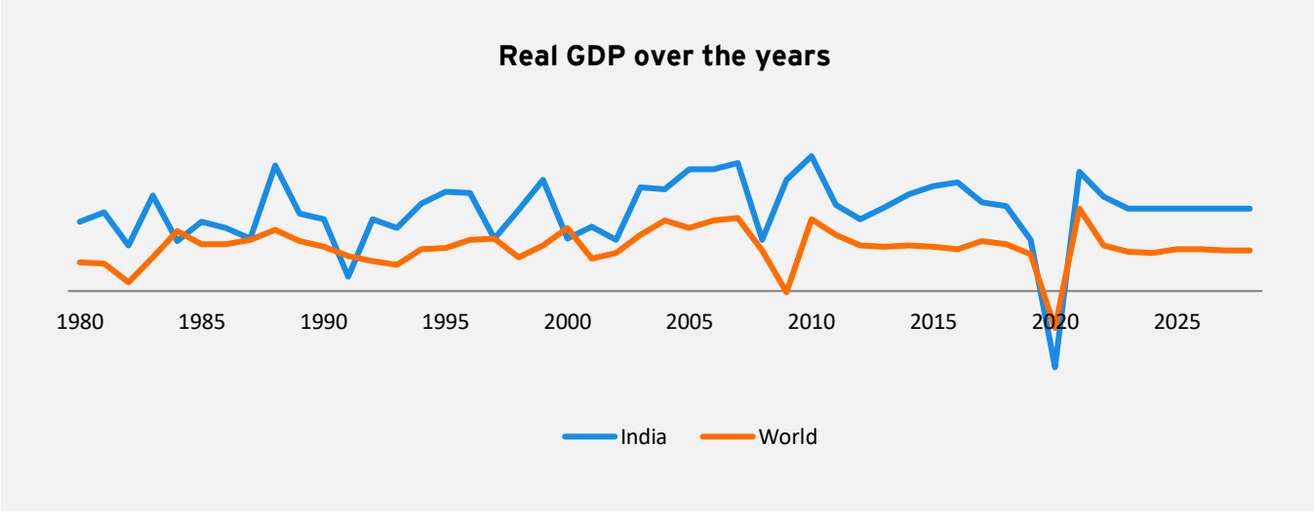
02

# Economic outlook: global and India

# Continuing the global drag

- The ongoing global situation remains worrisome. According to the Organization for Economic Co-operation and Development (OECD) in its November 2023 report, global growth is expected to decrease from 3.3% in 2022 to 2.9% in 2023, further dropping to 2.7% in 2024. This projected rate is the lowest since the global financial crisis, excluding the initial year of the pandemic
- The optimism for the future is cautious, it is tempered by the emergence of new and the continuation of existing geopolitical conflicts, notably the ongoing Russia-Ukraine situation and crises in the Middle East
- Climatic conditions also pose a threat to the global economy. The drought in the Panama Canal will disrupt global trade to a larger extent. The imperative to address climate change is spurring investment in renewable energy and sustainable infrastructure, offering both economic and environmental benefits.
- Earlier, the IMF had projected a medium-term global growth in the range of 2.9% to 3.2% during 2023 to 2028. We expect some of the ongoing global conflicts to ease even if final resolutions may not be achieved. This would improve the supply side situation, including that of global crude.
- Moreover, international collaboration and cooperation are playing a crucial role in navigating global challenges, fostering a climate of inclusive and resilient growth across nations




Source: IMF Data Mapper, EY Economy Watch Dec 2023

# Indian economy shows resilience

- India shines as a leading global growth engine in 2023, achieving a remarkable GDP growth of 7.6% in 2QFY24 and 7.7% in 1HFY24
- India ranks second among G20 nations with a 7.2% growth rate in FY2022-23, fueled by solid investment, domestic demand, and service exports
- Amid global economic challenges, India's unique inflation saw CPI rise to 5.6% in November 2023 from 4.9% in October, mainly driven by soaring vegetable prices
- India's 2023 G20 presidency highlighted its major role in global policy and growth, contributing 16% to worldwide expansion and reinforcing its international influence
- In November 2023, the OECD forecasted India's growth for FY24 at 6.3%, underscoring its strong economy in a tough global environment
- India's financial sector showed resilience against early 2023's global uncertainties, with employment surpassing pre-pandemic levels and progress in formalizing the dominant informal sector

# Exploring sectoral opportunities as India emerges as the premier investment hub

India positions itself as a compelling foreign investment hub, poised to surpass China's growth forecast of less than 5% in 2024. By 2027, India will surpass Japan and Germany to become the world's third-largest economy with a GDP of over US$5 trillion, according to IMF. Shedding some light on the growing sectors in India.

### Renewable Energy

- India is aggressively pursuing renewable energy initiatives, aiming for 450 GW of renewable capacity by 2030
- The green industry in India is expected to add 3.7 million jobs by FY, particularly in renewable energy, environmental health and safety, solar energy, corporate social responsibility, and sustainability

### Automobile Sector (EVs)

- The Electric Vehicle (EV) market in India is forecasted to grow at a Compound Annual Growth Rate (CAGR) of 49% between 2022 and 2030, with expected annual sales of 10 million units by 2030
- The automobile sector contributes 6% to India's GDP and 35% to the manufacturing GDP

### Capital Goods Sector

- This sector includes sub-sectors such as electrical equipment, plant equipment, and earthmoving/mining machinery
- It is poised to benefit from the Indian government's focus on infrastructure development and initiatives like the Production-Linked Incentive (PLI) scheme

### Infrastructure

- Infrastructure sector is expected to reach $1.4 trillion by 2025
- The Urban Infrastructure Development Fund will allocate an annual budget of INR 10,000 crore to bolster urban infrastructure in Tier 2 and Tier 3 cities in India

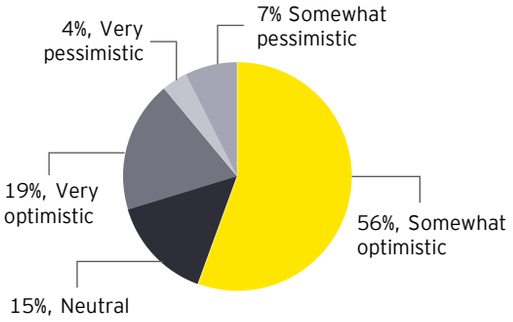
### Healthcare and Pharmaceuticals

- The hospital sector in India was valued at INR ~7,941 Bn in FY21 in terms of revenue & is expected to reach $221.49b by FY 2027, growing at a CAGR of 18.24%
- The Indian MedTech Industry has grown substantially and is expected to reach $50b by 2025

Source: Invest India

# Additionally, Technology and Innovation are defining business expectations

**Business Outlook for 2024**




**Top 3** factors driving the business outlook

1. Digitization and automation
2. Market/Product expansion
3. Supply and demand of labor/employees

There are several new and emerging sectors in India that are gaining momentum and are not part of the traditional economic landscape. These sectors are often driven by technological advancements, changing consumer behaviors, and evolving business models.

### Global Capacity Centres (GCCs)

- In the coming three to four years, India's GCC count is expected to hit 2,000, leveraging its rich talent in AI, analytics, and digital tech
- GCCs are also branching into Tier-2 and Tier-3 cities, boosting economic growth.

### Financial Technology (FinTech)

- India has the highest FinTech adoption rate globally of 87% which is significantly higher than the Global average rate of 64%
- This sector is set to undergo major tech shifts, with DeFi emergence, AI-driven personalized finance and expanded blockchain

### AgriTech and Food Processing

- The Indian food processing industry accounts for 32% of the country's total food market
- It is expected to attract $33 billion investment and generate employment for 9 million people by 2024
- The AgriTech sector in India is projected to reach $24.1 billion by 2025

### Education Technology (EdTech)

- India's EdTech market is forecasted to reach $10 billion by 2025, growing at an exponential rate by adoption of online learning, with a significant increase in users from both metropolitan and non-metropolitan cities

03

# Talent outlook

# Evolving talent trends are redefining India's work environment

In 2023, the talent trends in India reflected a significant shift towards accommodating evolving employee expectations and navigating the complexities of the post-pandemic workplace. These trends are likely to influence the job market and organizational strategies in 2024 as well.

Here are the top talent trends in India as we head into 2024:

**Workplace Flexibility**

- Flexibility remains a significant priority, with employees desiring more control over where and when they work
- Hybrid work cultures is gaining importance as it helps enhance work-life balance, productivity, and satisfaction as a new-age benefit

**Digitization**

- India's technology industry, with a workforce of 5 million, has digital talent forming up to ~35-40%
- AI, Big Data Analytics, cloud computing and IoT rank as the leading tech skills facing a demand-supply mismatch exceeding 50%

**Learning and Development**

- At present growth rates, freshers will fulfill just ~20-25% of the digital talent needs by 2028, emphasizing the importance of reskilling and upskilling to bridge the digital talent demand-supply gap
- Over 80% of learning and development (L&D) professionals concur that reskilling current employees is more cost-effective than hiring new ones, highlighting the growing strategic role of L&D

**High demand in specific sectors**

- Unique hiring trends in various sectors, like formation of ESG teams in Banking and Financial sector
- The AI and NLP talent pool has grown almost double since 2020, but demand continues to outpace supply, especially after the advent of generative AI in 2022
- Demand for cloud computing skills, including hybrid/multi-cloud, infrastructure as Code, and containerization, is skyrocketing due to evolving organizational needs

**Changing expectations among millennials**

- Millennials and Gen Z account for nearly ~70-80% of India's technology workforce, emphasizing flexible work, autonomy, and socially impactful roles
- Both groups seek continuous learning, mentorship, and technology that fosters growth and aligns with their career aspirations

04

# Attrition and retention trends

# The talent environment is disrupted by a variety of forces, and employers and employees view the world through different lenses

**Employer sentiment more influenced by cyclical factors**

- Economic slowdown and inflation
- Geopolitical uncertainty, natural disasters and pandemic
- Fewer new job vacancies
- Underutilized office space
- Cybersecurity and emerging technologies

**Cyclical forces**

**Structural forces created a new reality for employees**

- Demographic shifts are reducing labor supply and changing preferences
- Cost of living
- Globalized labor markets and persistent skills change
- Flexible and remote work
- Generative AI

**Structural forces**

- EY Work Reimagined survey indicates that both employees and employers recognize the impact of economic slowdown on the likelihood of employees leaving their jobs. However, employers seem to overestimate this impact compared to employees' own perspectives.
- Interestingly, data shows a decrease in employee inclination to leave their jobs compared to last year, suggesting a drop from 43% to 34%. Despite this decrease, the current attrition rate remains higher than historical norms.
- Given this context and considering employees still hold a significant balance of power in the workplace, it is crucial for employers to have a pulse on employee sentiment. Focusing on wellbeing, reward preferences, and engagement is essential for retaining key talent and reducing unwanted attrition.

# Attrition trends in India reflect the dynamic nature of the job market and the evolving preferences of its workforce

## Attrition %



| 2022 Actual | 2023 Actual | 2023 Voluntary | 2023 Involuntary |
|---|---|---|---|
| 21.2% | 18.3% | 15.2% | 4.2% |

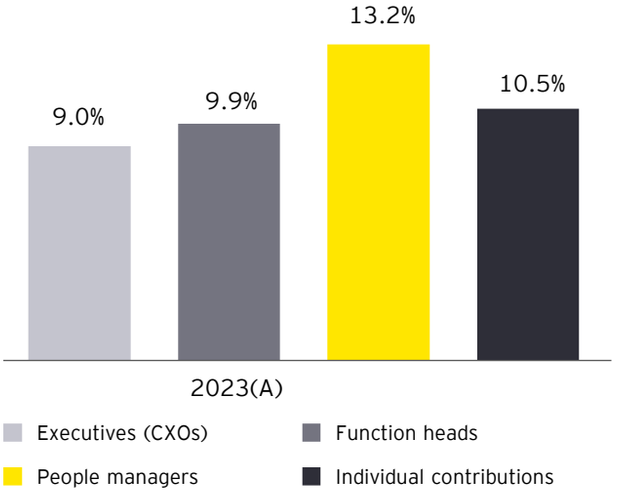
| Sector | 2022 (A) | 2023 (A) | 2023 (A) | |
|---|---|---|---|---|
| | | | Voluntary | Involuntary |
| E-commerce | 27.7 | 22.4 | 18.9 | 4.6 |
| Professional services | 22.0 | 24.2 | 21.9 | 3.0 |
| Information technology | 22.1 | 23.3 | 18.3 | 6.3 |
| Financial services* | 28.3 | 24.8 | 21.4 | 6.0 |
| Automotive | 10.5 | 11.1 | 9.2 | 2.5 |
| Media & entertainment | 21.2 | 19.5 | 15.5 | 5.2 |
| ITeS | 23.5 | 21.8 | 18.5 | 4.3 |
| Telecommunications | 24.5 | 18.4 | 15.0 | 4.4 |
| Chemicals | 17.0 | 11.1 | 9.1 | 2.7 |
| FMCG/FMCD | 16.0 | 18.0 | 16.1 | 2.5 |
| Lifesciences / Pharmaceuticals | 19.6 | 15.2 | 12.2 | 3.9 |
| Metals & mining | 8.2 | 22.3 | 19.8 | 3.3 |
| Engineering | 9.8 | 17.0 | 13.2 | 4.9 |
| Real estate/Infrastructure | 10.0 | 20.9 | 15.9 | 6.6 |
| Oil & gas | 8.9 | 15.6 | 13.7 | 2.6 |

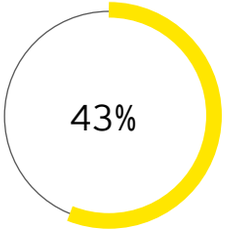
### Key insights

- Attrition rates in India across sectors have been fluctuating, influenced by a combination of macroeconomic factors, global economic conditions, and internal corporate strategies
- A cautious sentiment has emerged, characterized by a moderated pace of hiring and a reduction in salary increments by 1-2%. Attrition rates exhibited indications of slowing down, bolstered by an improved availability of talent
- Strategic recruitment adjustments are anticipated to result in fewer job opportunities and a potential increase in involuntary attrition due to rightsizing efforts
- In the Technology sector, there are positive indicators of attrition rates improving. Some major players have reported a decrease in attrition rates during the second quarter of FY24 compared to previous quarters, signaling a concerted effort towards enhancing employee retention. One of the key reasons for the dip in attrition is the muted hiring observed in these sectors due to global economic slowdown.
- Global Capability Centers (GCCs) have higher attrition than product-based companies, but lower than services sector, highlighting the need for unique GCC retention strategies

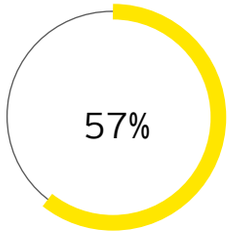
# Addressing attrition requires a multifaceted approach that encompasses various aspects of the employee experience

**Attrition across levels**




Organizations are facing challenges in attracting talent




Organizations believes that flexible work options play a role in shaping your talent acquisition strategies

**Top reasons for voluntary attrition**


# Organizations are evolving their talent retention strategies to ensure employees feel valued, engaged, and motivated

## Retention strategies

### Financial well-being support

- Financial education and planning services: Providing access to financial planning services, including retirement planning, investment advice, and budgeting workshops

### Personalized employee experience

- Customizable benefits packages: Allowing employees to choose from a diverse offering of benefit options that best meet their personal and family needs
- Individual career trajectory: Offering personalized career development plans that align with each employee's aspirations, skills and interests

### Enhanced use of technology for engagement

- AI-driven HR platforms: Provide personalized learning and development recommendations, career coaching, and wellness advice
- Employee engagement apps: Implementing mobile applications that facilitate instant recognition, feedback, and social connection among team members

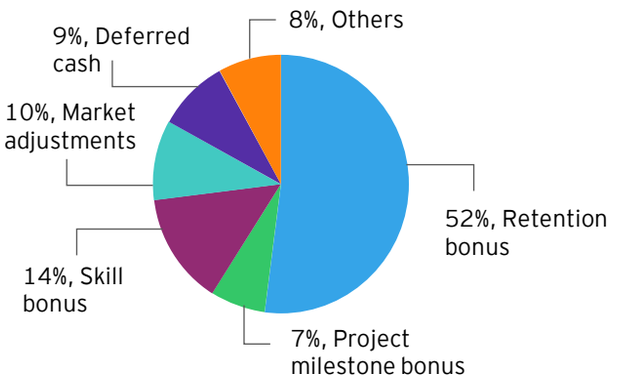
### Remote and hybrid work options

- Hybrid work models: A blend of in-office and remote work for flexibility
- Remote work infrastructure support

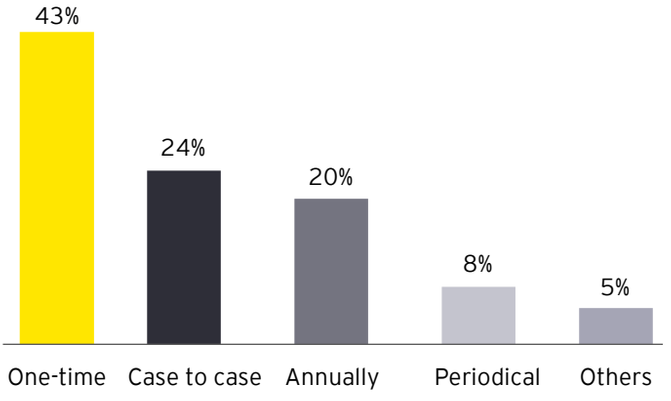
### Recognition and reward systems

- Instant recognition platforms: Immediate recognition and rewards for achievements
- Peer-to-peer recognition programs: Encouraging employees to recognize their colleagues' efforts and contributions, building a supportive work environment

**Retention tools used by organizations**




**Frequency of retention bonus**




### Skill premium

- Companies use skill premiums, higher salaries for employees with unique, high-demand digital talents, as a key retention tool
- The average skill premium across organizations hovers around 18-20%
- Top digital skills: 1. AI/ML/NLP 2. Blockchain 3. Cloud computing 4. Cyber security 5. Data Science and BI

05

# Total rewards: increments, incentives and executive compensation

# Salary growth trends and movements across different sectors

## Salary Increment %



| Sector | 2022 Actual | 2023 Actual | 2024 Projected |
|---|---|---|---|
| | 10.4% | 9.6% | 9.6%% |
| | 2022 (A) | 2023 (A) | 2024 (P) |
| E-commerce | 14.2 | 10.5 | 10.9 |
| Professional services | 13.0 | 9.7 | 10.0 |
| Information technology | 11.6 | 10.3 | 9.8 |
| Financial services | 10.9 | 10.4 | 10.1 |
| Automotive/Vehicle manufacturing | 10.3 | 10.4 | 9.7 |
| Media & entertainment | 10.3 | 9.6 | 9.0 |
| ITeS | 10.3 | 9.5 | 9.2 |
| Telecommunications | 10.3 | 8.9 | 9.3 |
| Chemicals | 9.9 | 9.4 | 9.7 |
| FMCG/FMCD | 9.8 | 9.2 | 9.5 |
| Lifesciences / Pharmaceuticals | 9.6 | 9.3 | 9.6 |
| Metals & mining | 9.6 | 9.0 | 9.2 |
| Engineering | 9.5 | 10.1 | 9.9 |
| Real estate/Infrastructure | 9.3 | 10.0 | 10.0 |
| Oil & gas | 9.0 | 9.1 | 9.5 |

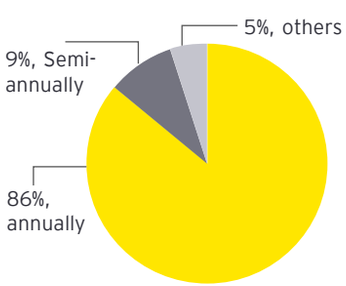
### Key insights

- In 2022, certain technology sub-sectors, like cloud platforms and consumer technology, experienced notable growth. However, there is a projected decrease across all technology sub-sectors by 2024, potentially due to market saturation following rapid digital transformation in previous years
- E-Commerce, after a peak increase of 14.2% in 2022, is expected to drop to 10.9% in 2024, possibly due to pandemic-driven shifts in consumer behavior or intensified online competition
- A rise from 9.7% in 2023 to 10% in 2024 in professional services suggests a rebound as companies invest in post-pandemic strategy alignment or navigate global business complexities
- The financial sector shows a slight decline in projected growth from 2023 to 2024, indicating potential headwinds or consolidation after previous growth phases
- Media and entertainment sector witnessed a decrease from 9.6% in 2023 to 9.0% in 2024, possibly due to the shift towards digital streaming platforms or increased demand for personalized content, impacting traditional revenue channels

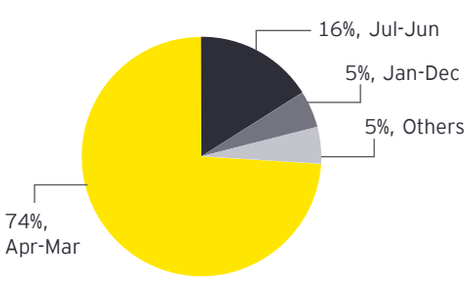
Note: Financial services sector is inclusive of Fintech companies

# Adapting performance management to navigate the evolving talent landscape..

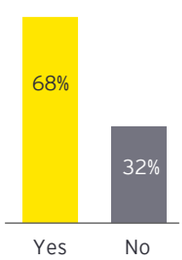
### Pay cycle frequency




### Pay increment cycle




### Mid-cycle promotion




### Top five considerations when recommending a salary increase budget

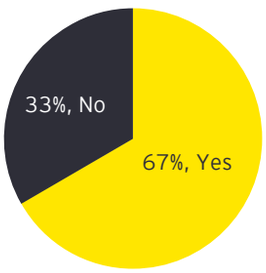
1. Current salary increase budget
2. External market positioning
3. Economic conditions like change in cost of living, inflation rate, etc.
4. Current financial outlook of the organization
5. Pay philosophy

### Key insights

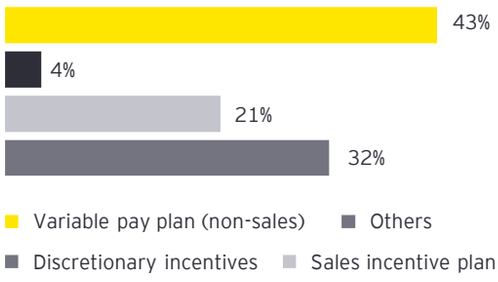
- April sees the highest number of salary increments coming into effect, coinciding with the commencement of the new financial year
- Most organizations finalize their decisions on salary budgets between October and February for the upcoming year
- Although companies are more frequently facilitating internal job postings to meet employees' career goals, these lateral moves often do not result in a salary increments in most cases
- Even in cases where a lateral movement accrues an increment, it does not surpass the promotional increment
- To handle fluctuating talent landscape, many organizations opt for salary adjustments apart from merit or promotional increments

# As businesses adapt to dynamic market conditions, short-term incentives emerge as a pivotal strategy, driving employee motivation and fostering performance excellence

**Eligibility of Incentive plan**




**Types of incentives plans offered in the organization**




## Key insights

- Executives (CXOs) typically get the most variable pay, but their projected salary increases for 2024 are lower than those in 2023
- Most employee levels are experiencing decreased variable pay percentages for 2024, except for the lowest-paid tiers, which might see a slight uptick

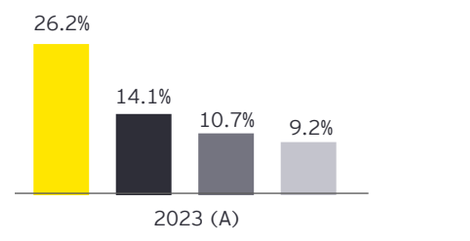
| Variable Pay % | 2023 (A) |
|---|---|

**Variable pay highlights**

Average variable pay-out as a percentage of total fixed pay

**15.05%**

**Variable pay across levels**

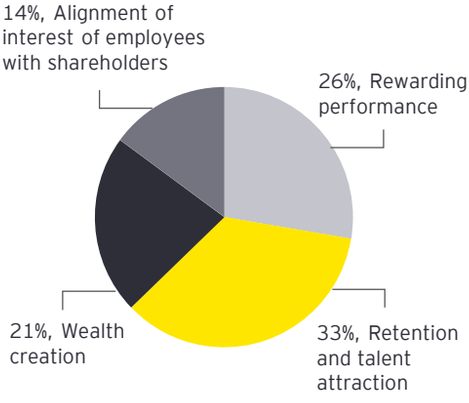



**Variable pay pay-out multiplier by performance**

| | |
|---|---|
| **1.3X** | Outstanding performer |
| **1.1X** | Exceeds expectations |
| **1X** | Meets expectations |
| **0.3X** | Does not meet expectation |

# LTIPs are becoming increasingly diverse, flexible, and strategic in their design and implementation..

**Objective of LTIP**




## Key insights

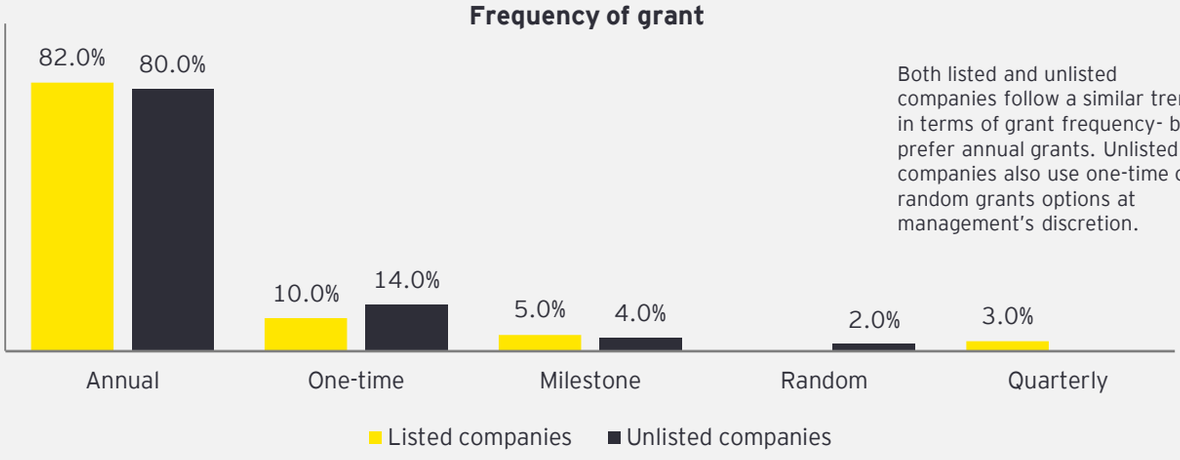
- Organizations have been creatively revamping their long-term incentive plans (LTIPs) in recent years, making compelling adjustments to better suit their workforce and align with strategic goals
- It indicates a readiness among companies to tailor LTIP components creatively, ensuring these incentive schemes not only meet the unique preferences of their workforce but also align seamlessly with the company's strategic goals
- Among LTIP, the top trends are as follows:
  - Expanding LTIPs beyond senior management to include a broader base of employees, particularly for equity-based schemes
  - LTIPs are not only rewards for high performance but also used for talent attraction and wealth creation
  - The proliferation of LTIPs, especially in digital enterprises and startups, with increased frequency, incentivization, and coverage
- While retention remains important, there's a greater emphasis on rewarding the performance and wealth creation
- Shift from cash rewards to stock incentives, with around 26% of companies focusing on LTIPs for performance rewards in FY23, as per the EY LTIP report
- Organizations are updating their LTIPs to include performance and milestone-based vesting to align employees' interests with organizational goals

# Varying LTI practices in listed and unlisted companies

**Types of share-based incentive plan for employees:**

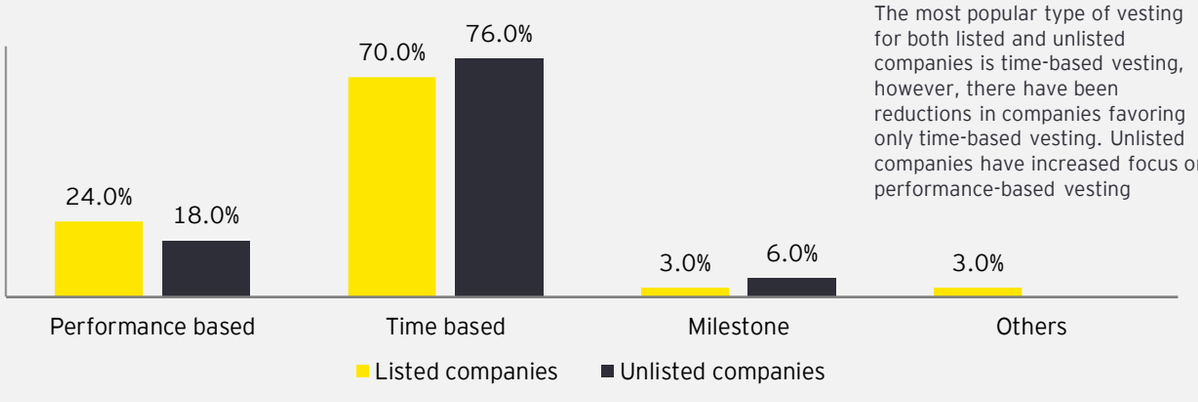
- The employee stock option plan (ESOP) remains the top choice for stock incentives among companies. Following closely are Restricted Stock Units (RSUs), which have gained popularity as discounted ESOPs, while Stock Appreciation Rights (SARs) have seen a decline due to pandemic-related cash constraints and market slowdown
- Approximately 71% of companies offer ESOPs, whereas only about 9% have adopted SARs. This could be attributed to SARs being favored by financially robust companies aiming to provide equity value to employees without dilution

**Frequency of grant**



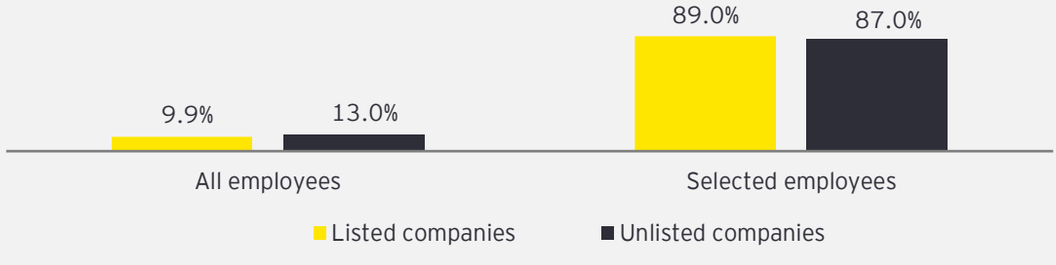

Both listed and unlisted companies follow a similar trend in terms of grant frequency- both prefer annual grants. Unlisted companies also use one-time or random grants options at management's discretion.

**Types of vesting**




The most popular type of vesting for both listed and unlisted companies is time-based vesting, however, there have been reductions in companies favoring only time-based vesting. Unlisted companies have increased focus on performance-based vesting

**Eligibility of employees**



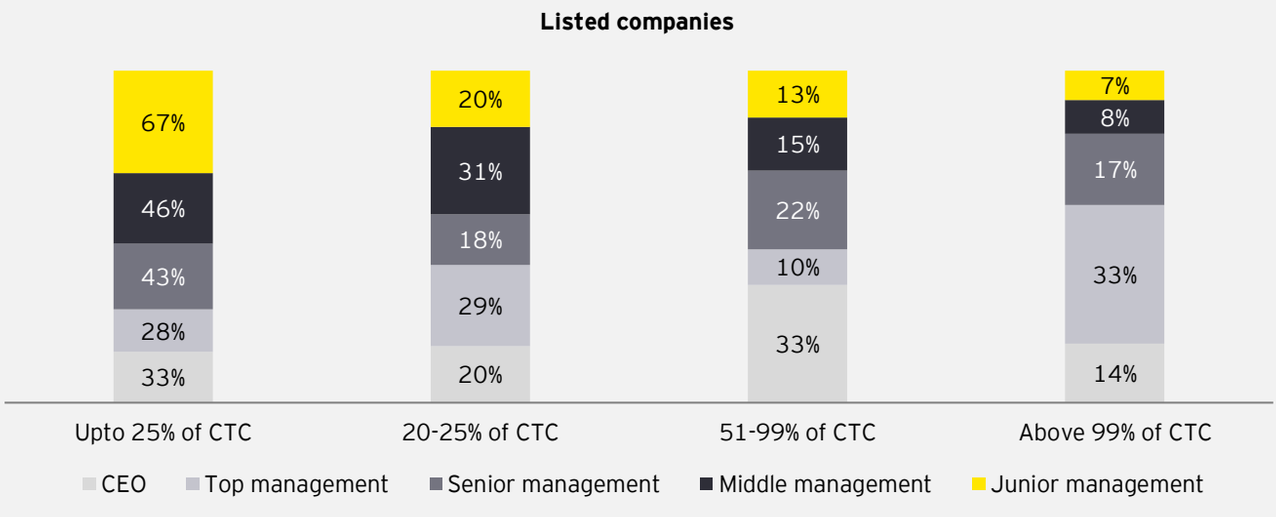

Marginal increase in coverage of all employees in both listed and unlisted companies

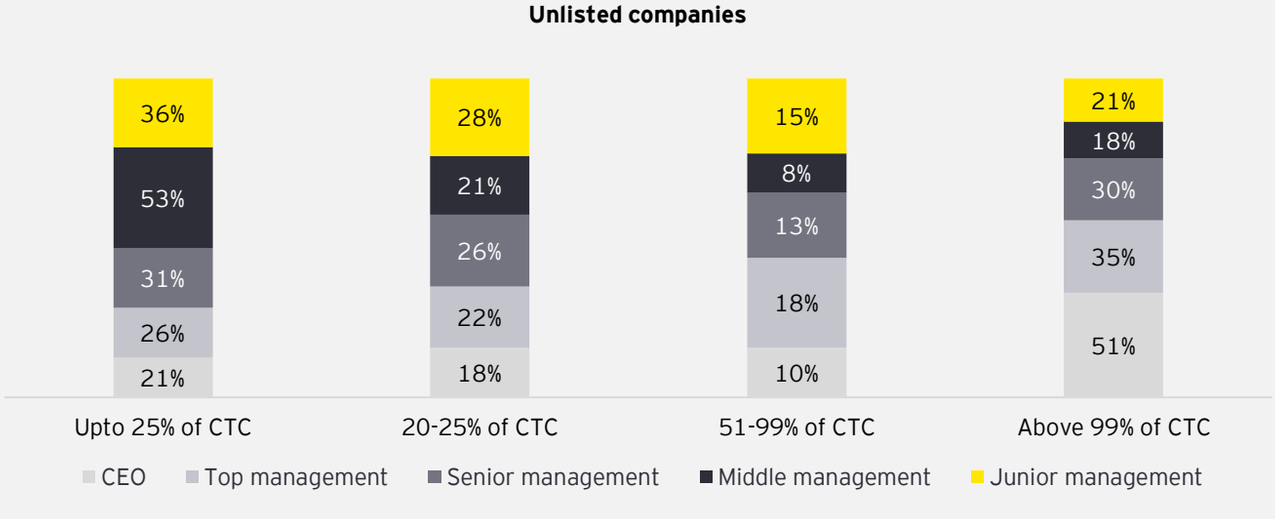
# Executive compensation trends: Analyzing the balanced pay structure for CEOs

## Key trends in executive compensation

- On an average, approximately 70% of CEO compensation is tied to performance
- LTIs become a more significant part of total rewards as one moves up the hierarchy, signaling that companies are focusing on retaining top-level talent by aligning their interests with the long-term success of the company
- Over the last 2-3 years, pay mix has been consistent, with fixed pay comprising 25-30% of the total compensation, short-term incentives accounting for 30-35%, and the remainder being attributed to long-term incentives (LTI)
- As companies acknowledge the significance of sustainability and ethical corporate conduct, they are progressively incorporating ESG (environmental, social, and governance) criteria into executive compensation frameworks
- There has been a noted increase in emphasis on establishing the appropriate board composition and enhancing compensation for Independent Directors. Overall, board composition plays a critical role in driving effective governance, risk management, and long-term value creation
- There's a stronger push to empower boards and nomination and remuneration committees (NRCs)

## LTI quantum as per management levels




Source: EY LTI Report 2024


06

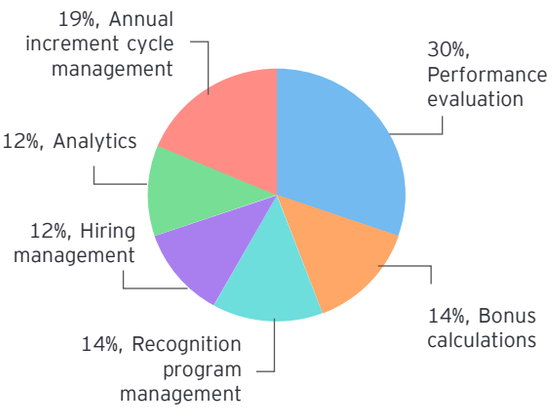
# Emerging trends

# Redefining employee value: Emerging trends in total rewards

## AI and automation

- **Automated reward systems and integration into HRMS systems**: customized rewards tailored to each recipient's preferences and automate the entire rewarding process, reducing manual effort
- **Benefits personalization**: By using AI algorithms, companies can tailor benefits packages to individual employee needs and preferences, increasing satisfaction and perceived value
- **Data-driven decisions**: Advanced compensation management software, AI, and machine learning algorithms are being utilized for tasks such as salary benchmarking, performance evaluations and incentive calculations

**Rewards activities using AI**




## Gig economy

- **Economic impact**: The gig economy in India was projected to contribute significantly to the GDP, with estimates suggesting a potential contribution of about 1.25% by 2025
- **Workforce and sector focus**: A large portion of India's gig workforce was engaged in sectors like transportation, delivery services, maintenance, content creation, and IT, with 70% of organizations reporting that gig workers constituted less than 10% of their total workforce, a figure expected to grow
- **Future outlook and government response**: Apprentices Act, 1961, and NAPS, is set to enhance the skilled workforce through quality training and vocational skills development. This initiative supports the promising future of India's gig economy, backed by a young workforce and growing internet access

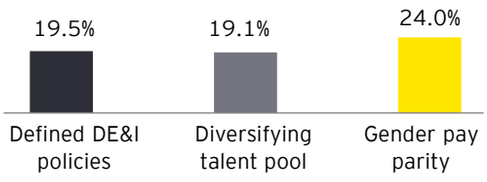
> India's gig workers are expected to grow from 7.7 million to 23.5 million by 2029-30 – Niti Ayog
>
> The four largest industry sectors–construction, manufacturing, retail, and transportation and logistics could alone account for over 70 million of the potentially 'gigable' jobs– unlocking the Potential of the Gig Economy in India Report

# Redefining employee value: Emerging trends in total rewards (cont'd.)

## Diversity, inclusion and equity

- DE&I initiatives have become a pivotal part of corporate strategy, with organizations increasingly recognizing their impact on employee well-being and corporate success
  - The initiatives focus on:
    - Gender diversity
    - Age inclusion
    - Differently abled inclusion

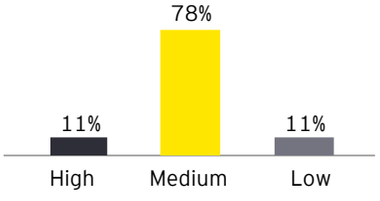
**Top 3 DE&I initiatives**




## Environmental, social and governance

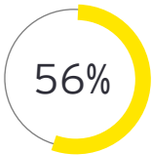
- There was an increasing trend towards ESG reporting among Indian companies. The number of companies publishing sustainability reports had been growing, with many adopting international frameworks like the GRI
- 60% organizations are already utilizing or on their way to utilize ESG policies
- The market for sustainable investing is expanding, with more mutual funds and institutional investors integrating ESG factors into their investment decisions

**Prioritization of ESG considerations**

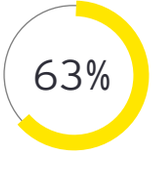



## New labor codes

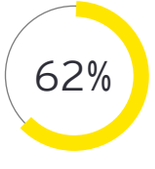
- The recent labor codes may influence compensation and benefits, workforce management, employee engagement, retention, in addition to compliance and risk management
- Employers must adjust their total rewards strategies to align with the updated regulations governing their workforce




Understand the key provision of the new labor codes




Yet to conduct an external review of its compensation practices for the new wage code regulations




Yet to take an action in restructuring their compensation practices

07

# Key focus areas: compensation and new-age benefits

# Revamping total rewards: key focus areas in compensation

Companies today face a variety of challenges and must prioritize when it comes to total rewards, which encompass all aspects of compensation, benefits, and non-monetary rewards offered to employees. These challenges and focus areas can vary depending on industry, location, and organizational objectives. Here are some major focus areas in compensation to manage total rewards in a more strategic manner:

### Total rewards philosophy

- Develop a total rewards philosophy that embodies a comprehensive, employee-centered approach while maintaining competitiveness and cost-effectiveness
- Consider factors such as demographic differences, generational preferences, and individual motivations to tailor pay packages to the diverse workforce

### Performance based pay

- Integrate pay with performance management to ensure that pay outcomes are directly tied to individual and organizational performance
- Include opportunities for skill-building and career advancement in performance management system, and align performance evaluations with employees' long-term career aspirations

### Objectivity and fairness in pay

- Regular reviews of compensation practices and making adjustments as needed to address any inequities or disparities
- Implement transparent compensation practices, such as clearly defined salary ranges and promotion criteria, helps ensure fairness in pay decisions
- Despite a push for equal pay, the gender pay gap remains evident. Women still earn 17% less than men on average

### Globalization

- Account for regional variations in cost of living and economic conditions by offering geo-differential pay to ensure competitiveness across global markets
- Customize compensation packages to align with local regulations, cultural norms, and workforce dynamics, while ensuring consistency with overall compensation philosophies and business objectives

### Skill-based pay

- Establish skill-based pay bands or tiers that correspond to different levels of proficiency in specific skills or competencies
- Premiums observed in the market for different categories of skills in comparison to generic/ vanilla skills
  - Niche: 15% - 30%
  - Super niche: 30% - 50%

# Revamping total rewards: key focus areas in benefits and wellness

Companies are increasingly giving importance to benefits and wellness of employees to meet the expectations of the today's modern employee. Employers are aware of the impact these new-age benefits can have on employee recruitment, retention, and overall organizational success

### Benefits

- Offer more flexibility and choice in benefits packages to accommodate diverse employee needs and preferences
- Leverage technology such as benefits management platforms, mobile apps, or self-service portals for easier access and management of benefits
- Monitor on how benefits are being utilized and identify gaps in service provision, enabling continuous improvement

### Work flexibility

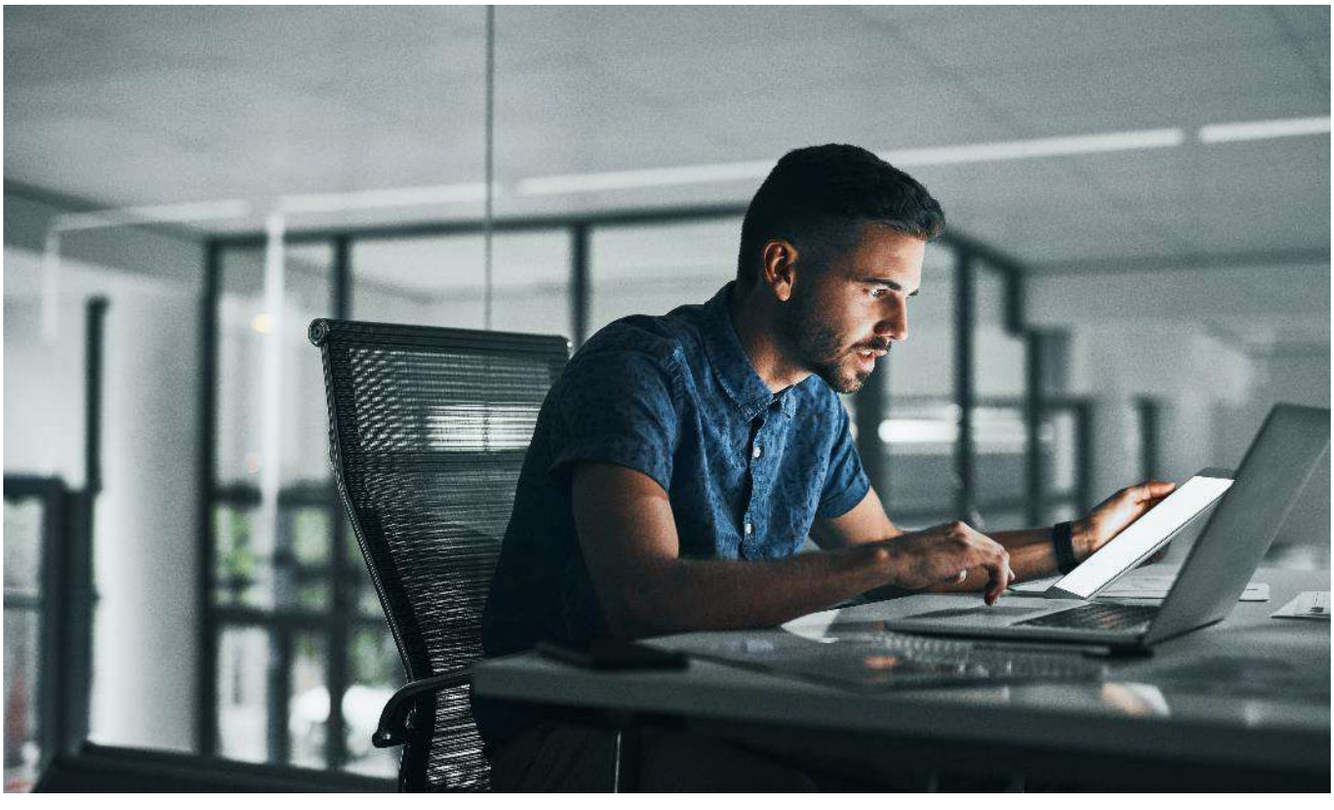
- Ensure that remote and hybrid work arrangements are executed in a manner that fulfil both business requirements and employee needs
- Evaluate relocation assistance and geographic-based benefits to better support remote employees
- Enhance leave benefits including parental leave and childcare support allowing employees to better balance their work and caregiving responsibilities

### Employee wellbeing

- Implement a multifaceted approach, acknowledging that wellness encompasses physical, mental, and financial health
- Cultivate a culture where promoting employee wellbeing is seen as a core leadership competency
- Identify a hybrid employee assistance program (EAP) model that combines internal services with external resources to offer a wide range of assistance options tailored to individual need

### Dynamic workforce

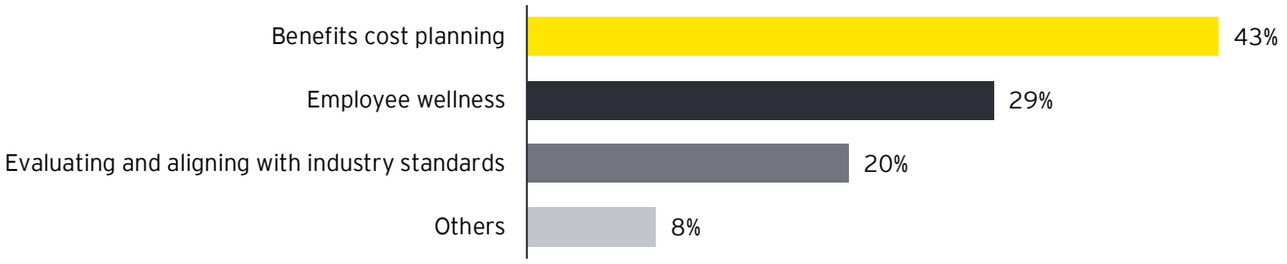
- Review benefits practices through a lens of diversity and inclusion to ensure that benefits offerings are equitable and accessible to all employees
- Conduct diversity audits of benefits packages and offering resources and support for underrepresented groups



# Revamping total rewards: key focus areas in new-age benefits

80% of the organizations emphasized the importance of "pay and benefits" and a need to move away from traditional employee benefits to cater to the changing expectations of the modern workforce

**Top three areas of focus for employers on the benefits strategy**




### Physical well-being

- Fitness classes: offering yoga, pilates, or other exercise classes
- Gym memberships: providing access to on-site or off-site gym facilities
- Health screenings: organizing regular health check-ups and screenings
- Tele-medicine: fitness apps with discounted options for accessing online consultations
- Enhanced parental and family support, including leaves and insurance benefits
- Ergonomic workspaces: investing in ergonomic office equipment and offering assessments to ensure a comfortable working environment
- Health challenges: initiating fitness or weight loss challenges with incentives

### Emotional well-being

- Stress management workshops: conducting stress reduction workshops and mindfulness training or meditation sessions
- Employee assistance programs (EAPs): Offering confidential support and access to counselors or therapists
- Flexible schedules: allowing flexibility to manage personal and emotional needs
- Peer support groups: creating groups for employees to connect and share experiences
- Introduction of "Bring your pet to work" days and providing pet insurance benefits
- Offering company-wide early time off on a designated day of the month/ quarter

### Social well-being

- Employee resource groups (ERGs): encouraging formation of diverse employee groups
- Social club: creating clubs for common interests like book clubs or hiking clubs
- Community involvement: engaging in volunteer and community service activities
- Recognition programs: recognizing and rewarding employee achievements.
- Networking events: arranging events for employees to network
- Mentorship programs: establishing mentorship programs for skill development
- Use chatbots or interactive AI to connect at various milestones to gauge engagement

### Financial well-being

- Financial counseling: providing financial planning and counseling services
- Retirement planning: offering resources for retirement savings
- Debt management: assisting with debt reduction strategies
- Budgeting workshops: conducting workshops on financial planning
- Tuition reimbursement: supporting education and skill development
- Loan assistance: assisting with student loan repayment
- New baby fund: employees to receive a certain amount to cover expenses of a newborn

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