

Ref No: JIAL/CO/AERA-MYTP/2024/02

10th April 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. 26/2023-24 dated 11th March 2024 in The Matter of Determination of Aeronautical Tariff for Jaipur International Airport, Jaipur (JAI) for the Third Control Period (01.04.2022 - 31.03.2027)

Dear Sir,

This is in respect to the Consultation Paper No. 26/2023-24 dated 11th March 2024 in The Matter of Determination of Aeronautical Tariff for Jaipur International Airport, Jaipur (JAI) 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 Jaipur International Airport Limited,



Manoj Chanduka
Authorized Signatory

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Comments on the Consultation Paper No. 26/2023-24 dated 11th March 2024 in The Matter of Determination of Aeronautical Tariff for Jaipur International Airport, Jaipur (JAI) for the Third Control Period (01.04.2022 - 31.03.2027)

Disclaimer

This document has been prepared by Jaipur International Airport Limited (JIAL) in response to AERA's Consultation Paper No. 26/2023-24 dated 11th March 2024 in The Matter of Determination of Aeronautical Tariff for Jaipur International Airport, Jaipur (JAI) 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 JIAL. This document includes statements, which reflect various assumptions and assessments by JIAL 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 JIAL to consider particular needs of each party who reads or uses this document.

Whilst every effort has been made to ensure the accuracy of the information provided herein, JIAL cannot be held responsible for any errors or omissions. JIAL shall have no liability to any person under any law for any loss, damages, cost, or expense on account of anything contained in this document.

The response set out below to the CP shall not be construed as an acceptance by JIAL 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 JIAL'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 JIAL as on 19 th January 2021
CAPM	Capital Asset Pricing Model
COD	Commercial Operation Date
CoD	Cost of Debt
CoE	Cost of Equity
CP	Consultation Paper No. 26/2023-24 dated 11 th March 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
JIAL or JAI	Jaipur International Airport Limited
LOA	Letter of Award
LOI	Letter of Intent
LPM	Liters per Minute

Abbreviation	Expansion
MCLR	Marginal Cost of Funds based Lending Rate
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 T3	New Terminal T3
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 Jaipur Airport
T2	Terminal 2 of Jaipur Airport
TCP	Third Control Period
TDSAT or the Appellate Authority	Telecom Disputes Settlement and Appellate Tribunal
UDF	User Development Fees
VDGS	Visual Docking Guidance System
WACC	Weighted Average Cost of Capital

Airport Operator or AO or JIAL 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, 4.8.3 and 5.4.5 of CP and 4.5.1 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.*

4.5.1 of Appendix I – Study on Allocation of Assets

It was observed that as per AAI's True up submission for the period up to October 10, 2021 had an average terminal building ratio of 92.47:7.53 based on actual utilization. The Authority in its order 10/2017-18 for JIA had decided to adopt 90% as aeronautical area based on terminal area ratio calculations submitted by AAI for FY 2015-16.

This is also consistent with the IMG norms, which has recommended the Non-Aeronautical area within the terminal building for airports having passenger traffic less than 10 MPPA to be in the range of 8% to 12% of the total terminal area and for airports having passenger traffic greater than 10 MPPA to be up to 20%. The Authority in case of other similar airports, has considered 90:10 terminal building ratio to encourage Airport Operators to achieve full potential in non-aeronautical revenue. With an actual passenger traffic of ~5.5 MPPA in FY 2019-20 (pre-Covid year), JIA falls into the similar basket case.

The Study thus proposes to consider the Terminal Building ratio of 90:10 as approved by the Authority in the Tariff Order for the Second Control Period.

4.8.3

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 JIA, 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 25: Determination of Deemed Initial RAB by the Authority

(Rs. in crores)

Particulars	Aeronautical assets (A)	Non-aeronautical assets (B)	ANS assets (C)	Total D = (A + B + C)
Total assets of AAI as on COD (Net block) as per submission (a)	516.92 [#]	0.31	30.99	548.22
Reclassification of RAB (b)	(10.75)	10.74	0.01	
Total assets of AAI as on COD (Net block), after reclassification and other adjustments (c = a+b)	506.17	11.05	31.00	548.22

<i>Less Assets retained by AAI (d)</i>	(1.56)	(0.25)	(26.65)	(28.46)
Net assets transferred by AAI to JIAL as on COD (e=c+d)*	504.61	10.80	4.35	519.76
Deemed Initial RAB as on COD for JIAL (includes value of Aero and ANS assets at 'e' above) (f)	508.96			

5.4.5

The asset allocation study reviewed the various asset categories and developed a basis for segregation of various assets into Aeronautical, Non-aeronautical and Common assets. Authority noted that JIAL also procured employee related asset which needs to be allocated as per Employee Ratio. The Authority considers the employee ratio derived as part of the Study on Efficient Operation and Maintenance Expenses for Jaipur International Airport. As per para 5.3.3. of the said study the Employee Head Count Ratio for JIAL is 90.91:9.09 (Aeronautical: Non-aeronautical).

Various references that Assets have been allocated based on Terminal Building Ratio and Employee Head Count Ratio.

Comments by JIAL:-

1.1.1 The comments on similar matters are provided at 1.3.2 and 3.12 below. The same may be referred hereto.

1.2 AERA proposal as per 5.8.4 page 81 onwards of CP relating to Pre-COD expenses

The Authority notes that JIAL has submitted pre-COD expenses amounting to ₹ 7.16 Crores for true-up of the post-COD period. This expense included ₹ 0.68 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 JIA is transferred to JIAL. 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 11th April 2021 to 10th October 2021, for the purpose of tariff determination.

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

- 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 JIAL prior to COD.*
- The Authority proposes that the bid expenses incurred prior to the date of Letter of Award of JIAL, and expenses incurred between the date of Concession Agreement and COD (other than as specifically considered above), as submitted by JIAL are not considered for 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 JIA is as follows:

Table 55: Pre-COD expenses proposed by the Authority for the Third Control Period (₹ Crores)

Particular	Nature of expense	Total	% Allowable	Proposed Pre-COD Expense
Expense till Letter of Award- setting up Airport business	Corporate Cost Allocation	1.72	NIL	-
Project Cost for setup for Airport Business - Allocation by parent companies	Corporate Cost Allocation	2.38	NIL	-
Other Preliminary expense prior to COD	Incurred by JIAL	2.38	NIL	-
Pre-COD Payroll Cost	On roll employee cost	0.68	100%	0.68
Total		7.16		0.68

Comments by JIAL: -

1.2.1. It is to be noted that the overall claim of the JIAL 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 Jaipur 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: - Operational like CTO, Fire NOCs, Clearance of BoD Financial – GST / PAN / TAN Engineering & Maintenance – Travelators, Weights & Measures, Single Line, HR Compliances – Shops & Establishment / ESI / PSF / CLRA Security – Clearance of Aviation Security Program 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. 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 & Comments
Category 1: Expenses till letter of award	1.72	
Project cost for Setup for Airport Business (Expenses upto Sep'20) - Allocation by parent companies	1.72	
Category 2: Expenses from letter of award to COD	5.44	
Project cost for setup for Airport Business (Munich Airport Service) - Allocation by parent companies	1.88	This was consultancy provided for organization set up, master plan review, Staff Capacity Building & Training Need Analysis, Transition Management.
Consultancy for Traffic Study	1.34	The report was used to make master plan which is mandatory requirement under CA
Pre-COD Payroll Cost (salary cost incurred by JIAL)	0.68	Allowed by the Authority
Project cost for Setup for Airport Business - Allocation by parent companies	0.50	Allocation by parent companies for providing group resources. The similar cost was approved in Ahmedabad, Lucknow and Mangaluru Airport
IT Assessment & Transition - M/s Wipro	0.30	The consultant was engaged to assess the AAI existing IT infrastructure and what are the gaps.
Bank Charges for PBG	0.21	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 verification of CWIP from AAI - M/s Ernst & Young	0.11	The report is used to verify the CWIP works transferred by AAI to JIAL as mandated under clause 4.6.5 of the CA.

Particulars	Amt (Rs. Cr)	Remarks & Comments
Franking Charges, ROC Filing and Others	0.08	Various charges paid on execution of concession agreement, financing documents etc.
Cargo Terminal Design Brief - M/s Realog	0.05	The study conducted to understand the most optimum cargo design for the airport.
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.
Misc Exp (incl. beautification of terminals, one-time expenses for handover, Printing-Stationery, Vehicle Hiring etc)	0.25	Miscellaneous Expenses incurred as a run-up to achieve COD.
Total Pre-COD Exp	7.16	

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 Yes 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. 5.44 crores against Rs. 7.16 crores claimed.

1.3 AERA proposal as per 5.8.5 page 83 onwards of CP relating to Rationalization of O&M Expenses

5.8.5

Corporate Allocation Cost

Observation: It is observed that the Aeronautical Corporate Allocation Cost of ₹ 5.18 Crores has been incurred by JIAL towards Corporate Support Services received from the Holding Companies, namely, Adani Enterprises Limited (AEL) and Adani Airports Holding Limited (AAHL) for the period from Post-COD till March 31, 2022. This cost includes ₹ 3.06 Crores from AAHL and ₹ 2.12 Crore from AEL.

However, as the services provided by AAHL & AEL are mainly in the nature of provided specialised resources and knowledge and also it benefits whole airport ecosystem, the cost needs to be allocated in the same ratio as the employee cost of JIAL manpower cost has been allocated. The impact of such difference is a decrease of ₹ 0.05 Crores

Further, it is noted that the Corporate Allocation Cost claimed by JIAL includes an amount of ₹ 0.05 Crores allocated towards In-house Legal department, which is in addition to the cost of one (01) employee of Legal department, already considered under the manpower expenses of JIAL and is not justified. Hence, the Study proposes to exclude ₹ 0.47 Crores from the Corporate Allocation cost submitted by JIAL.

The impact on the Aeronautical O&M expenses of JIAL on account of the proposed reallocation of expenses is as follows:

Various references that O&M Expenses have been allocated into various allocation ratios (EHCR, Gross Fixed Asset Ratio, Terminal Building Ratio) which has an overall impact of reduction of Rs. 1.89 Cr in O&M Expenses as indicated in Table 56.

Comments by JIAL: -

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 80 Cost 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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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 JIAL'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 5.8.3 page 81 of CP relating to Working Capital Interest

It is observed that JIAL has included Working Capital Loan Interest amount of ₹ 0.35 Crores for ARR computation as Aeronautical. Authority sought clarification from JIAL for providing basis and terms of the working capital loan. As per JIAL, the working capital interest has been calculated on best estimation basis since the ICD loan is a mix of working capital and other debt. Since, there is no exclusive working capital facility availed by JIAL and the terms of working capital loan is not clear, Authority is unable to relate with working capital loan vis a vis actual requirement. Accordingly, the Authority proposes that cost towards that cannot be considered as pass through in tariff.

Comments by JIAL: -

1.4.1 JIAL 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 JIAL 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 JIAL has actually incurred costs.**

1.5 AERA proposal as per 5.9.2 and 5.10.3 page 87 of CP relating to True up Of Non-Aeronautical Revenue

The Authority, on verification of the NAR of JIAL, notes that ₹ 0.28 crores relate to space rentals from airlines. The Authority is of the view that space rentals from agencies providing aeronautical services should be treated as aeronautical revenue. The authority, therefore, proposes to exclude Space Rentals from airlines providing aeronautical services from the NAR for the post-COD period.

The Authority has reduced the Non-Aero revenue and considered the same in Aero Revenue.

Comments by JIAL: -

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 6.2.3 to 6.2.4 on page 92 of CP relating to Exempted Traffic

6.2.3 The Authority notes that JIAL has considered only billable ATM, after excluding ATM traffic that are 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 Central Government, State Government and the Airport Operators. As this scheme is promoted to encourage small aircrafts, therefore the flights operating under this scheme are not eligible to be claimed as a passthrough/ exemption. The Authority notes that, as per JIAL's submission, currently there is only one RCS flight which runs thrice a week. This translates to less to ~0.5% of overall traffic volume. Based on the above fact, the Authority has estimated traffic projections after excluding ATMs that pertain to less than 80-seater capacity flights which fall under non-RCS category and being exempted from landing charges. The Authority further notes JIAL's submission that, Jaipur being the capital city airport, acts as a hub to destinations like Varanasi, Agra, Dehradun, Jodhpur, Jaisalmer, Udaipur, Pantnagar etc. in the regional connectivity model where, some of these destinations have restrictions for larger aircraft to operate. Limited seat loads on these routes do not permit airlines to operate larger aircraft as demand from smaller cities are generally inadequate. In addition, Jaipur besides being a tourist hotspot, is also a destination for weddings, MICE, corporate business travel (gems/ handicraft/ textile etc.), and part of high-end golden triangle circuit. These events lead to substantial movement through corporate jets/ general aviation.

6.2.4 The Authority, after rationalization has derived the exempted traffic as 19% for each tariff year and has considered the same for determining the billable domestic ATM. Based on the above factors, the exempt traffic considered by the Authority (after excluding ATMs that pertain to less than 80-seater capacity flights which fall under non-RCS category) for determining billable domestic ATM for the Third Control Period for JIA is as follows:

Particulars	FY'23	FY'24	FY'25	FY'26	FY'27
Exempt Domestic ATM considered by the Authority	19%	19%	19%	19%	19%

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. JIAL cannot claim any passthrough regarding UDF on such categories and this is followed by AERA across at all Major Airports.

Comments by JIAL: -

- 2.1.1 With respect to RCS flights, we would like to submit that there is only one RCS flight currently operating from JAI. In case any more RCS flights get scheduled at JAI in TCP, we request the Authority to consider those flights as exempt as these flights will not be charged any landing charges by JIAL 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 Recent ATM data indicate that approx. 28% of Domestic Flights are operated through less than 80 seater aircraft which is exempt from landing charges. Refer the data provided below:

Month & Year	ATM Upto 80-seater aircraft	Total ATM	Exempt ATM %
1. April 22	978	3135	
2. May 22	990	3202	
3. Jun 22	846	2917	
4. Jul 22	780	2818	
5. Aug 22	882	2841	
6. Sep 22	766	2690	
7. Oct 22	794	3131	
8. Nov 22	770	3265	

Month & Year	ATM Upto 80-seater aircraft	Total ATM	Exempt ATM %
9. Dec 22	858	3705	
10. Jan 23	806	3691	
11. Feb 23	672	3292	
12. Mar 23	808	3524	
2022-23 Total	9950	38211	26%
1. Apr 23	982	3237	
2. May 23	1020	3378	
3. Jun 23	1028	3285	
4. Jul 23	914	3198	
5. Aug 23	878	3258	
6. Sep 23	874	3218	
7. Oct 23	944	3344	
8. Nov 23	1214	4063	
9. Dec 23	1306	3852	
2023-24 Total (Upto Dec 23)	9160	30833	30%
Grand Total	19110	69044	28%

2.1.8 Similarly, the recent data for Pax indicate that approx. 8% of Domestic Pax and 1% of International Pax pertains to exempt category (transfer, transit and infants), not liable for UDF charges. Refer the data provided below:

Month & Year	Transit	Infant	Transfer	Other Pax	Total Pax	Exempt Pax%
1. Apr 23	3,532	2,090	14,961	172,178	192,761	11%
2. May 23	4,953	2,673	29,481	178,300	215,407	17%
3. Jun 23	3,393	2,532	20,965	173,829	200,719	13%
4. Jul 23	1,551	1,960	12,309	172,541	188,361	8%
5. Aug 23	918	2,007	8,362	179,089	190,376	6%
6. Sep 23	3,374	2,284	8,865	177,322	191,845	8%
7. Oct 23	2,505	1,998	7,649	173,907	186,059	7%
8. Nov 23	3,599	2,617	11,286	200,342	217,844	8%
9. Dec 23	7,994	2,806	10,449	235,784	257,033	8%
10. Jan 24	5,773	2,265	8,703	219,496	236,237	7%
Domestic Total	37,592	23,232	133,030	1,882,788	2,076,642	9%
1. Apr 23	-	146	-	19,020	19,166	1%
2. May 23	-	141	1	23,659	23,801	1%
3. Jun 23	166	120	-	18,155	18,441	2%
4. Jul 23	-	145	-	19,217	19,362	1%
5. Aug 23	170	164	3	21,351	21,688	2%
6. Sep 23	-	140	-	20,818	20,958	1%
7. Oct 23	6	116	-	15,837	15,959	1%
8. Nov 23	-	121	-	14,970	15,091	1%
9. Dec 23	-	141	-	19,529	19,670	1%
10. Jan 24	12	150	7	19,480	19,649	1%
International Total	354	1,384	11	192,036	193,785	1%

2.1.9 We, therefore, request the Authority to consider deduction of exempted Passenger traffic of 8% for Domestic Passenger and 1% for International Passenger and 28% of Domestic Flights as exempted ATM, as per latest trends, while determining billable traffic for projection of aeronautical revenues. Accordingly, JIAL 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 7.1.9 of CP relating to optimal planning and execution of capex projects

7.1.9 The Authority's Independent Consultant, interacted with the technical team of JIAL on the aspects of airport planning, traffic estimation and its short, mid and long term impact on Airport Economics as provided in the Concession Agreement.

*Based on the response provided by JIAL, the Authority observed that *prima facie*, JIAL has not demonstrated desired understanding of optimal planning and execution of capex projects related to airport. This is evident from the fact that the proposed CAPEX has not been linked with expected outturn of traffic and is multifold as compared to other airports which handle similar traffic levels. JIAL has projected a capex to the tune of ₹ 5998.15 Crores for handling traffic of 9.7 Mn in FY'27, which has no rational justification. This approach of the Airport Operator is not in the overall interest of the stakeholders of the airport. It appears that the CAPEX has been projected by JIAL without linking it with the mandate provided under Schedule B of the Concession Agreement.*

In view of these facts, the Authority notes that the Capital Expenditure estimates submitted by JIAL are not reasonable / their need is not justifiable. Therefore, the Authority has considered various applicable factors such as current capacity, traffic estimates, normative cost benchmarks, need assessment etc. together with the need for modular development of facilities as mandated by the Concession Agreement and has rationalized the Capital Expenditure proposed as detailed below.

Comments by JIAL: -

3.1.1 **With respect to the Authority's comment on JIAL not demonstrating understanding of optimal planning and execution of capex projects, we would like to submit as below:**

3.1.1.1 Reference from JAI SCP Order issued by the Authority.

Terminal building capacity was already saturated when SCP Tariff Order was issued. Terminal expansion by 145,000 sqm (incl. 20,000 sqm basement area) was proposed by AAI.

Relevant extract from SCP Tariff Order is appended below:

to the year of 2025-26. The terminal building is planned to be completed within the area of 1,25,000 Sq.m. (excluding the existing terminal building area of 18,000 Sq.m.). In addition to this, 20,000 Sq.m. of basement area has been planned for services.

Further, there was no comment from the Authority with respect to planning and execution of the then Airport Operator being sub-optimal. The Authority had even allowed the project on incurrence basis alongwith an additional comment that "In case the expenditure is incurred during the 2nd control period and AAI feels that this will lead to significant increase in tariff, it may propose revision of tariffs after capitalization of the Terminal Building".

Further, as per AAI, the expansion of terminal building as referred above, was supposed to be completed by FY 20-21 by which the passenger traffic was supposed to reach 5.93 Mn (as per traffic forecast approved by the Authority in the second control period).

To summarize, the terminal planning and related parameters considered by JIAL for JAI airport is compared with the parameters prior to COD and indicated below:

Terminal	Planning As per AAI (during SCP)	As per JIAL (as indicated in MYTP)
T1 Area	13,739 sqm	13,739 sqm
T2 Area	32,647 sqm	37,917 sqm
New Terminal	145,000 sqm (includes 20,000 sqm basement area for services) proposed for completion in FY 20-21 when projected traffic was expected as 5.93 Mn	150,000 sqm (includes 35,000 sqm basement area for services) proposed for completion in FY 26-27 when projected traffic is expected as 9.75 Mn

We would also like to submit that JIAL has carried out the best possible due diligence for utilizing the existing terminal and other infrastructure which is evident from the fact that

- Terminal 1, which was refurbished but not operational before COD, is planned for operationalization soon which will enable sweating of already available infrastructure to bridge the gap between requirement and available capacity.
- Further, Terminal 2, which is the only operational terminal (and which was supposed to be augmented with additional expansion of 145,000 sqm by AAI by FY 20-21), is being sweated by JIAL by adding 2 PBBs which will make better use of already available infrastructure without much changes till the time new terminal is constructed.
- Terminal 3 (or may be called as expansion of terminal building as was considered in SCP Order) along with existing terminal area was supposed to be ready in FY20-21 when the traffic was approved as 5.9 million. Whereas, JIAL has planned the almost the similar size expansion in FY26-27 when the traffic will be more than 9 million.
- It is also worth noting that in other airports like Lucknow and Guwahati, having similar traffic size, construction for new terminal capacity of similar size was already started by AAI prior to COD and are likely to be commissioned in FY23-24 and FY 24-25 respectively. Thus, the terminal infrastructure at JAI lags behind by almost 2 years.

3.1.1.2 Reference from JAI Concession Agreement

The Concession Agreement signed with AAI provided the list of capital expenditure to be undertaken by AO which included Construction of Integrated Terminal Building.

Relevant extract from Concession Agreement is appended below:

Sr. No.	Name of work	Cost of work (lakhs)	Likely date of start	Likely date of completion	Remarks
1	Civil C/o Isolation bay at CA Jaipur	1493	31.10.2019	31.12.2020	PAR estimated submitted to CHQ. State government/JDA is being persuade for clearance of Land issue. Detailed Estimate under preparation.
2	Construction of hangers and VIP complex for State Government at Jaipur Airport.	4500.00	31.08.2019	31.02.2021	Location is to be finalised by planning directorate.
3	Construction of Parallel Taxi Track (Phase III) from PTT-Pb-II to 27 Runway at Jaipur International Airport, Jaipur.	400.00	31.10.2020	31.10.2021	Planning Stage
4	Construction of frengible hut in Operational area at Jaipur Airport	25.00	01.08.2019	31.12.2019	Planning Stage
5	Construction of MSSR Building at Jaipur Airport.	500.00	30.08.2019	30.06.2020	Planning Stage
6	Construction of Office for BCAS office at Jaipur Airport.	100.00	31.05.2019	31.01.2020	Planning Stage
7	Construction of Boundary wall, perimeter road, watch tower etc. at Jaipur Airport.	400.00	01.08.2019	31.03.2020	Planning Stage
8	Construction of administrative block at CA Jaipur	4757.53	30.04.19	30.10.20	AA & ES received from CHQ. TS Estimate under preparation.
9	Construction of Integrated terminal building phase-II	144100	30.04.19	31.10.21	work is at concept stage.
10	Construction of residential quarters at Jaipur Airport.	7000	30.04.2019	31.10.21	AA & ES received from CHQ. TS Estimate under preparation.
Electrical Works					

3.1.2 Further, with respect to the Authority's comment about capex not linked with requirements mandated under Schedule B to the Concession Agreement (CA), we would like to submit that JIAL has gone through detailed process of master planning with consideration to various requirements mandated under CA including Schedule B. The same is detailed in following paragraphs.

3.1.3 The Concession Agreements (CA), signed with Airport Authority of India (AAI) for Jaipur Airport in 2021 is the base documents on which planning, and operations of the airport 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 April 2023.

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

3.1.4 It is interesting to note that the capacity enhancement plan proposed by JIAL is more efficient than what AAI has proposed pre-privatization. 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.

3.1.5 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 7.3.4 and 7.3.6 of CP relating to Inflation-adjusted normative cost of terminal and apron works.

The Authority has derived the inflation adjusted normative rates for the proposed capex in 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 April 18'2022, 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 – 0.20% in FY 2023-24 and 3.80% thereafter (considered as per 86th 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 i.e. 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 Authority, in this regard notes that the proposed normative cost of ₹ 1,00,000 per sqm is inclusive of GST. Accordingly, the Authority first arrived normative cost excluding of GST and then applied 18% GST which comes to ₹ 1,05,357 per sqm, the amount so arrived is indexed with inflation to arrive normative rates for following years.

The inflation adjusted normative costs, thus derived is presented in the below table:
Table 80: Inflation Adjusted normative rates for the Terminal Building

Financial Year	Inflation rate	Inflation adjusted normative rates (in ₹ per sqm)	Inflation adjusted normative cost @18% GST (in ₹ per sqm)
FY'21	-	100000	1,05,357
FY'22	7.14%	107140	1,12,880
FY'23	9.42%	117233	1,23,513
FY'24	0.20%	117467	1,23,760
FY'25	3.80%	121931	1,28,463
FY'26	3.80%	126565	1,33,444
FY'27	3.80%	131374	1,38,411

**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% (C=B*18%) = Rs. 16,071 per sqm*

Normative cost including GST (D = B+C) = Rs. 1,05,357 per sqm

The Authority has considered normative cost for the terminal expansion projects considered in this control period. In view of the above, the Authority has considered the applicable normative cost as per the project schedule submitted by JIAL. Further, the Normative Order also provide normative cost for pavement related works for Apron, taxiway, runway. The normative cost for the Runway/taxiway/Apron (excluding

earthwork up to sub grade level) was ₹ 4700/- per sqm based on the project executed in FY 2015-16. The Authority has adjusted the normative cost on account of additional tax impact of 6% on account of GST in line with the adjustment made in arriving normative cost for terminal cost across all Airports uniformly. The inflation adjusted normative rate for Runway/taxiway/Apron excluding earthwork up to sub grade level proposed to be as follows:

Table 81: Inflation adjusted Normative Cost considered by the Authority

Financial Year	Inflation rate	Inflation adjusted normative rates (in ₹ per sqm)	Inflation adjusted normative cost @18% GST (in ₹ per sqm)
FY'16-Base Year		4700	4952
FY'17	1.73%	4781	5038
FY'18	2.96%	4923	5187
FY'19	4.26%	5133	5408
FY'20	1.67%	5218	5498
FY'21	1.31%	5287	5570
FY'22	7.14%	5664	5968
FY'23	9.42%	6198	6530
FY'24	0.20%	6210	6543
FY'25	3.80%	6453	6799
FY'26	3.80%	6718	7077
FY'27	3.80%	6993	7368

*Note

Inflation adjusted base amount (inclusive of 12% GST) (A) = Rs. 4700 per sqm

Inflation adjusted base amount (exclusive of 12% GST) (B=A*100/112) = Rs. 4196 per sqm

Add GST @ 18% (C=B*18%) = Rs. 756 per sqm

Normative cost including GST (D = B+C) = Rs. 4952 per sqm

7.3.6

A.8 Terminal-II upgradation and associated works (₹ 278.98 Crores)

vii. In case of area expansion, Authority has noted that JIAL has considered Rs 146000 per sqm rate to estimate cost. The normative cost for the Terminal expansion works for the financial year 2023 ₹ 123513 inclusive of GST as explained at 7.3.4 above. Authority proposes to consider the same for the expansion of additional area at Terminal-II instead of ₹146000 per sqm proposed by JIAL.

B.2 Apron and Taxiways related works (₹ 179.23 Crores)

The Authority considered normative rates to assess Apron and Taxiways related works as provided under order no. 07/2016-17 dated 13.06.2016 (Normative Order), the normative cost related to Runway/taxiway/Apron provided under the Normative Order excludes cost towards site development activities. Accordingly, Authority compared the proposed construction cost excluding site development works with normative rates and observed that the proposed cost by JIAL is within range.

Comments by JIAL: -

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 0.2% for FY24) similar averaged out inflation for FY24 to be considered. Hence, the inflation factor for FY24 would come to 4.81% (i.e. Average of 9.42% (FY23) and 0.2% (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	4.81%	122,872	130,653
FY25	3.80%	127,541	135,618
FY26	3.80%	132,388	140,772
FY27	3.80%	137,418	146,121

Thus, Inflation-adjusted normative cost for FY23 is Rs. 1,24,657 per sqm. To this, an additional 5% towards allowance for extra cost over applicable rates for working in operational area as detailed in para B.2.v is proposed to be added making the total cost estimate to be Rs. 1,30,890, rounded to Rs. 1.31 lakhs per sqm. Accordingly, the cost of terminal 2 expansion works out to Rs. 69.04 crores (Rs. 1.31 lakhs per sqm * 5,270 sqm).

3.2.5 Similarly, the inflation-adjusted normative cost for apron works out as indicated in below table:

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
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

Year	WPI Index *	Inflation (%)	Inflation adjusted normative rates (Rs.)	Inflation adjusted normative cost @18% GST*
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 at Clause C.1 page 122 onwards of CP relating to Capex cost for Airport Boundary Wall

- i. *As part of MYTP, JIAL has submitted that in line with the proposed airside developments and terminal expansion, the existing airside boundary wall needs to be re-constructed. Similarly, some of the existing airport site area which were not utilized earlier but now needs to be included within airside area. Thus, new airside boundary wall needs to be built at these locations. A total of 2,393 m of airside boundary wall is proposed by JIAL.*
- ii. *JIAL has proposed for ₹ 4.40 Crores as base cost for this project.*
- iii. *The Authority compared the rates from CPWD PAR 21 and found that the rate considered by JIAL are not aligned. CPWD PAR 21 envisaged boundary wall cost at ₹ 11,662/Sqm for FY 23 against which JIAL has considered ₹ 18,400/Sqm.*

Comments by JIAL:

3.3.1 In case of capex cost for boundary wall, please note that the overall cost estimate of Rs. 18,400 per sqm shared by JIAL(which is based on CPWD DSR rates) includes the cost for excavation, backfilling, structural works of PCC, RCC and requisite reinforcements for columns, footings, Wires (Concentrina and Barbed), MS Angle, Paint etc. Whereas, the CPWD PAR 2021 rates of Rs. 11,662 per sqm considered by the Authority pertains to boundary wall only. As the scope of works for the rates considered by JIAL is wider and appropriate for the planned works, it is requested that the same may kindly be considered by the Authority. JIAL had already furnished the breakup of the CPWD DSR based rates to the consultants. The same is appended herewith as Annexure 2 for reference.

3.3.2 **In view of the above, we request that the capex cost as submitted by JIAL for boundary wall may be allowed.**

3.4 AERA proposal at Clause C.3 on page 123-124 of CP relating to Capex cost for Perimeter Intrusion Detection System (PIDS)

- i. The Jaipur airport presently does not have Perimeter Intrusion Detection System (PIDS) at its airside boundary wall. Due to security considerations, the airport requires PIDS as part of its airport security infrastructure. Therefore, installation of PIDS is proposed for approximately 14,430 m on the boundary wall.
- ii. The Authority further notes that as per BCAS the Jaipur Airport has been categorized as Hypersensitive Airport. Accordingly, considering security requirement Authority proposes to consider this project.
- iii. In terms of the project cost, Authority compared the rates submitted by JIAL with the quotations received for PIDS at Lucknow and Ahmedabad Airport. JIAL proposed ₹ 10,700 per running meter which is higher than the rates considered at abovementioned airports Authority has corrected the unit cost considered by JIAL in line with these airports. The base cost of the project is accordingly revised to ₹ 15.44 Crores vis a vis ₹ 31.60 Crores proposed by JIAL.

Comments by JIAL:

3.4.1 With respect to the PIDS rate of Rs. 10,700 considered by the Authority based on Ahmedabad and Lucknow, we would like to submit that the rates considered in Ahmedabad & Lucknow airport were based on estimates only.

3.4.2 We would like to submit that the estimated rates at JAI are in line with the per sqm rate at which the contract is awarded at Cochin Airport which was duly considered in the tariff order for Cochin TCP.
 PIDS cost approved in case of Cochin Airport was Rs. 22.35 Cr for an approx. length of 12 km which translates to Rs. 18,625 per RMT in FY 2021-22. Adjusting the same with inflation adjustment upto Year FY 2025-26, the cost comes to Rs. 23,276 per RMT; Whereas JIAL has considered only Rs. 21,900 per RMT.
 Please refer below the relevant extract from Cochin MYTP & Order and Calculation of per RMT rate:

Extract from MYTP submitted by Cochin Airport (Page 78)

based CCTV Surveillance System for day and night surveillance.

5.45 The approximate length of the perimeter area where PIDS is proposed to be implemented is 12 km. Out of the above non-lethal power fence is proposed for a length of 9 km, Fibre Optic Mesh Technology is proposed for a length of 3 km. Fibre Optic vibration sensor will be installed on the perimeter wall for a length of 13 km.

5.46 The capital expenditure proposed for Perimeter Intrusion Detection System is as follows:

Table 73: Capital Expenditure related to Perimeter Intrusion Detection System

Particulars* (in INR cr.)	Prior period WIP	2022	2023	2024	2025	2026
Perimeter Intrusion Detection System	7.0	15.3	0.0	0.0	0.0	0.0
Total	7.0	15.3	0.0	0.0	0.0	0.0
Grand Total		22.3				

*difference is due to rounding off

Extract from AERA Order for CIAL TCP (Page 134)

6.5.10. Based on the above, the revised capital expenditure for the Third Control Period as considered by the Authority is given below.

Table 134: Capital Expenditure for the Third Control Period considered by the Authority

Reference	Particulars (INR Cr)	As per CIAL		As per Authority	
		Total Capex	Total	Aero	Non-Aero
A	A.1 Construction of import warehouse	52.70	52.70	52.70	0.00
	A.2 Modification of existing warehouse	35.94	35.94	35.94	0.00
	A.3 Mechanisation of export warehouse after modification	10.35	10.35	10.35	0.00
Cargo facilities (sub-total)		98.99	98.99	98.99	0.00
B	B.1 Construction of parking bays phase 2	145.62	156.22	156.22	0.00
	B.2 Development of northern side of T3 pier	189.86	178.79	166.45	12.34
Pier expansion and parking bays phase 2 (sub-total)		335.38	335.01	322.67	12.34
C	Flood control measures in airport area	93.07	93.07	93.07	0.00
D	CISF Quarters	74.01	0.00	0.00	0.00
IT Systems:					
E	E.1 CCTV Surveillance system	43.81	43.81	43.81	0.00
	E.2 CT based Hand baggage X-BIS T3	29.98	29.98	29.98	0.00
	E.3 CT based Hand baggage X-BIS T1	25.12	25.12	25.12	0.00
	E.4 SOC & NOC for IT	15.92	15.92	15.92	0.00
	E.5 Digi yatra – IT systems	30.69	0.00	0.00*	0.00
	E.6 Perimeter intrusion detection systems	22.35	22.35	22.35	0.00
	E.7 Smart Lane – T1	19.88	19.88	19.88	0.00
	E.8 Smart Lane – T3	22.48	22.48	22.48	0.00
	E.9 Passenger processing IT systems	31.40	31.40	31.40	0.00
IT Systems (sub-total)		241.62	210.93	210.93	0.00

3.4.3 **As the actual awarded cost would serve as a better rate reference (as referenced from Cochin Airport) as compared to block cost estimate (of Ahmedabad or Lucknow Airport), we request that PIDS cost as submitted by JIAL may be allowed.**

3.5 AERA proposal at clause E.2 page 126 onwards of CP relating to Capex cost for Integrated Cargo Terminal

Authority has reviewed the cost proposed by JIAL and have following observations:

- i. *In case of new pavement works, JIAL plans to construct 6825 sqm of landside road, for this purpose JIAL has assumed a rate of ₹ 6900 per sqm. Authority has verified these rates with CPWD. As per para 5.2.2. of CPWD PAR 2021 the construction cost for landside road is ₹ 1850 per sqm. Authority has updated this rate in the BoQ proposed by JIAL and revised the proposed project cost. This has resulted into reduction of new pavement cost to ₹ 1.26 Crores against ₹ 4.71 Crores estimated by JIAL.*
- ii. *The structure cost submitted by JIAL comprises of site circulation of ₹ 1.76 Crores, Cargo complex ₹ 38.52 Crores, Annex building ₹ 8.34 Crores and streetlight ₹ 0.32 Crores. Authority has sought detailed BoQ of the cost proposed. As per JIAL submission the Cargo complex structure cost has been arrived considering ₹ 85600 per sqm rate for the structural work on the basis of Ahmedabad ICT complex.*
- iii. *Authority has reviewed the structure cost and observed that the proposed structure cost is very high compared to the cost already approved by the Authority in case of similar Airports. Authority in its previous order for third control period of Lucknow Airport allowed ₹ 60,300/- per Sqm cost for cargo terminal and ₹ 8,300 per Sqm cost for parking and trucking area. A total cost of ₹ 68,600 per Sqm was estimated in 2021 which can be indexed to arrive cost for 2023. The inflation adjusted cost comes to ₹ 73,402 per Sqm. Authority proposes to consider the same to arrive the base cost for cargo structural works. The revised based cost considered for cargo structure is ₹ 43.44 Crores against JIAL submission of ₹ 48.93 Crores.*

Comments by JIAL:

3.5.1 **In case of landside road** proposed as part of Cargo Terminal cost, please note that the cost estimate of Rs. 6,900 per sqm shared by JIAL(which is based on CPWD DSR rates) includes the Carriageway area including shoulders, Footpath, Median with landscaping, Miscellaneous Items (like streetlight, CCTV, kerbstone etc.). Whereas, the CPWD PAR 2021 rates of Rs. 1,850 per sqm considered by the Authority pertains to roads only. As the scope of works for the rates considered by JIAL is wider and appropriate for the planned works, it is requested that the same may kindly be considered by the Authority. JIAL had already furnished the breakup of the CPWD DSR based rates to the consultants. The same is appended herewith as Annexure 3 for reference.

Also, the Authority had approved the rate of Rs. 6,100 per sqm in Lucknow TCP Order (Refer Page 190 of Lucknow TCP Order). Accordingly, we request to consider the cost details submitted by JIAL.

3.5.2 **With respect to the Cargo terminal rate** of Rs. 73,402 considered by the Authority based on Lucknow, we would like to submit that the rates considered in Lucknow airport were based on estimates only (refer the relevant extract of Lucknow TCP order as appended below)

B3: Other Services (Cargo facility and Fuel farm) – The work towards Other Services relating to Cargo facility and Fuel farm and the status of its completion was as follows:

a. **New Integrated Cargo facility** – The Authority noted that this project was mandated under Clause 19.4 of the Concession Agreement and that the AO had planned for construction of New Integrated Cargo Terminal with total area of 5,826 Sq.m of office, warehouse space and 3,915 Sq.m of parking and trucking area. The AO had further projected to have an annual Cargo handling capacity of approximately 30,000 tonnes per annum as against the much lower current capacity of Interim Cargo Terminal i.e., total. 5,000 tonnes per annum.

The Authority, through its Independent Consultant, examined the details of the cost estimate along with other supporting documents provided by the AO and noted that the estimate had been prepared based on CPWD plinth area rates and market rates. It included the cost of Civil work, MEP, Fire Fighting System, Security Equipment and Airport Systems. The unit rate for Cargo terminal of ₹ 60,300/- per Sq.m and for parking and trucking area of ₹ 8,300 per Sq.m are reasonable. Based on the above factors, the Authority found the estimated cost of ₹ 38.38 Crores to be reasonable and proposed to consider the same in FY 2023-24.

We had also submitted to the consultant that the estimated rates at JAI 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 JAI location would approximate to Rs. 85,600 per sq mtr).

Refer point 7.3.148 from Ahmedabad Tariff order as appended below:

7.3.147. The Authority noted that AIAL had estimated the cost of Cargo Complex based on CPWD DSR rates. Subsequently, AIAL also submitted the LoA for a portion of the project for which the contract had been awarded. It was observed that out of the components listed in the table above, all major items except the Perishable Cargo Facility, have already been awarded.

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 I 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

Considering the cost escalation for 1.5 years from the LOA issued in Jul'22 for Ahmedabad and differential cost factor for JAI, this rate translates to Rs. 86,251 per sqm in FY 2023 which is less than JIAL's submission of Rs. 85,600 per sqm.

Notwithstanding the above, even the rates of Lucknow airport with escalation for 2 years comes to Rs. 80,422 per sqm.

As the actual awarded cost (referenced from Ahmedabad Airport) would serve as a better rate reference as compared to block cost estimate (of Lucknow Airport), we request that Cargo Terminal Complex cost as submitted by JIAL may be allowed.

3.5.3 **In view of the detailed explanations provided above, we request the Authority to consider the cost of roads and Cargo terminal as submitted by JIAL.**

3.6 AERA proposal at Clause F.1 on page 128 onwards of CP relating to Capex cost for Fuel Farm Facility

Further, with respect to cost of the fuel farm, JIAL vide email dated 9th Aug'23 has submitted detailed bill of quantities with CPWD rates with respect to fuel facility. Authority has verified the rates with relevant standards and observed that in case of fuel tank facility JIAL has considered ₹ 180000 per KL rate on the basis of cost related to underground RCC, steel frame structure, fuel resistance coating etc. Authority noted that in case of prefabricated steel tanks JIAL has considered ₹ 134.34 per Kg rate based on CPWD DSR 2021, whereas as per the standard the rate should be ₹ 78.20 per KG. Authority has updated the rates and the revised effective rate comes to ₹ 161,900 per KL instead of ₹ 180,000 proposed by JIAL. Authority has considered the same for the purpose of cost estimation and revised the cost of fuel tanks.

Comments by JIAL:

3.6.1 With respect to the cost of prefabricated steel tanks considered by the Authority, we would like to submit that the cost of Rs. 78.20 per KG has been updated by CPWD based on update in December 2021. The revised rate as per Dec'21 update of CPWD DSR 2021 shows Rs. 111.95 per KG.

The same may be referred by the Authority as per link given below:

https://cpwd.gov.in/Publication/DAR_Vol1_UPDATE_DEC_2021.pdf

Relevant extract from the same is appended for quick reference:

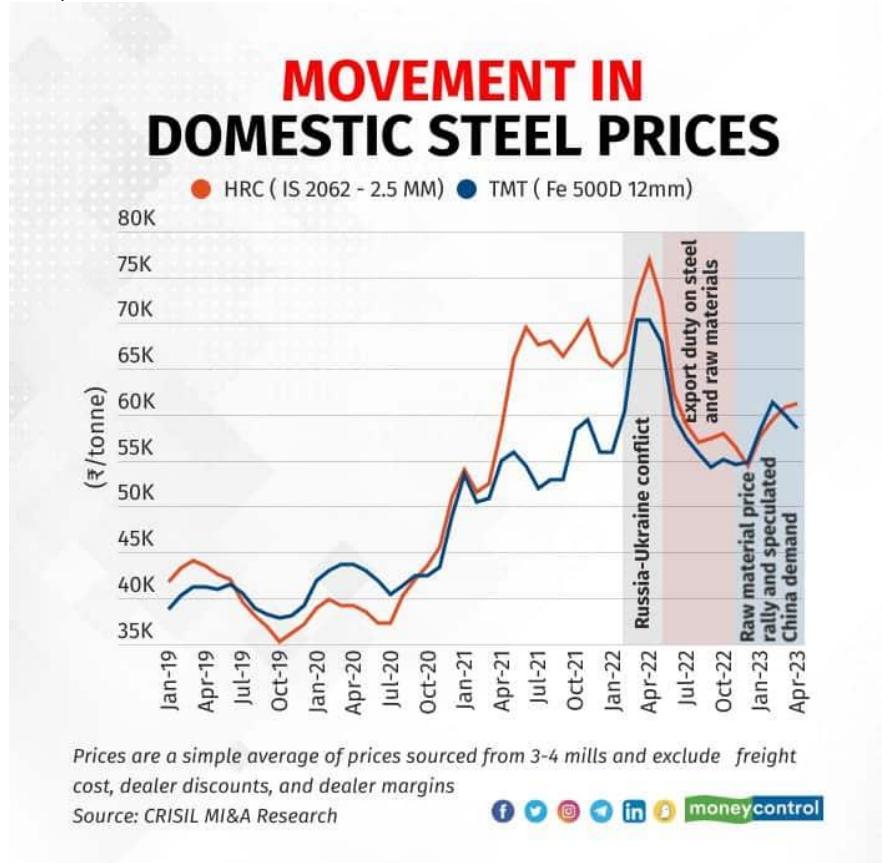
10.2 Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.

Code	Description	Unit	Quantity	Rate ₹	Amount ₹
1007	Details of cost for a truss 7.6m clear span (weight = 3.95 quintal) MATERIAL (i) Principal rafter (T-iron) 100x100x10mm @15kg/m = 142.50Kg+ Struts (angles)40x40x6mm 2x1.35=2.70m @ 3.5kg/m = 9.45kg Total =151.95kg+ Add wastage @ 5% = 7.60kg Total = 159.55kg. = 1.60q Structurals such as tees,angles channels and R.S. joists	quintal	1.60	4950.00	7920.00

Code	Description	Unit	Quantity	Rate ₹	Amount ₹
1009	(ii) Ties (flats) 50x12mm $2x2.7 = 5.4m @4.7kg/m = 25.38kg$ + Ties central (flats) 50x10mm $1x2.28 = 2.8m @3.90kg/m = 10.92kg$ + Braces (flats) 40x10mm $2x1.84 = 3.68m @3.9kg/m = 14.35kg$. Total = 50.65kg + Add wastage @ 5% = 2.53kg. Total = 53.18kg. = 0.53q Flats exceeding 10 mm in thickness (iii) Gusset plates 10mm thick $1x0.74x0.35m = 0.259sqm$.+ shoe $4x0.46x0.46 = 0.845sqm$. Total = 1.104 sqm. $1.104sqm @ 78.4kg/m = 86.55kg$. 12mm plates at the point of principal rafter and strut- $2x0.3x0.2 = 0.12sqm$.+ Tie beam, brace and strut- $2x0.5x0.3 = 0.30sqm$.+ Sole plates- $2x0.46x0.46 = 0.42sqm$.+ Anchor plate- $2x0.46x0.1 = 0.09sqm$. Total = 0.93 sqm. Say 1.00 sqm. $1.0sqm @ 94.4kg/m = 94.40kg$. Total = 180.95kg. Add wastage @ 5% = 9.05kg. Total = 190.00kg or 1.90q	quintal	0.53	4950.00	2623.50
1010	Mild steel plates	quintal	1.9000	5400.00	10260.00
1020	(iv) 16mm dia. 50mm long rivets = 56 nos @ 0.10753 kg/each = 6.02168 kgs or 0.0602 quintal	quintal	0.0602	5100.00	307.02
1221 2205	Mild steel rivets (v) 20mm dia. (460mm long) holding down bolts with nut and washers, 4 Nos. @ 1.2125 kg/each = 4.85 kgs or 0.0485 quintal 20 mm dia holding down bolts Carriage of Steel (0.160+0.053+0.190 +0.006+ +0.005) =0.414 tonne LABOUR	quintal tonne	0.0485 0.414	6100.00 145.72	295.85 60.33
0116 0103 0139 0114 0100	Fitter (grade 1) Blacksmith 2nd class Skilled Beldar (for floor rubbing etc.) Beldar Bandhani Applying priming coat- T.Iron 9.5x0.4 = 3.80sqm.+ Struts $2.70x0.16 = 0.43sqm$.+ Ties $5.4x0.124 = 0.67sqm$.+ Braces $2x1.84x0.12 = 0.44 sqm$.+ Ties $2.8x0.12 = 0.34 sqm$. Total = 5.68 sqm.	day	2.70	784.00	2116.80
		day	3.60	714.00	2570.40
		day	5.40	714.00	3855.60
		day	3.60	645.00	2322.00
		day	0.44	714.00	314.16

Code	Description	Unit	Quantity	Rate ₹	Amount ₹
13.50.3 9999	Rate as per item no 13.50.3 of SH : Finishing Sundries TOTAL Add 1 % Water charges on "W-A" TOTAL Add GST on "X-A" (multiplying factor 0.1405) TOTAL Add 15% CPOH on "Y-A" TOTAL Add Cess @ 1% on "Z-A" Cost for 3.95 quintal Cost of per kg. Say	sqm L.S.	5.68 80.73	55.50 2.12	315.24 A 171.15 33132.05 W 328.17 33460.21 X 4656.87 38117.08 Y 5670.28 43787.36 Z 434.72 44222.08 111.95 111.95

Additionally, JIAL had considered 20% additional cost due to surge in steel prices over the period from 2021 to 2023 as indicated below:



Also, the recent CPWD DSR 2023 indicates the rate for the said item as Rs. 133.7 per KG. Please see the below extract of the same:

10.0 STEEL WORK			
Code No	Description	Unit	Rate
10.1	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	kg	117.35
10.2	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	kg	133.70
10.3	Providing and fixing in position collapsible steel shutters with vertical channels 20x10x2 mm and braced with flat iron diagonals 20x5 mm size, with top and bottom rail of T-iron 40x40x6 mm, with 40 mm dia steel pulleys, complete with bolts, nuts, locking arrangement, stoppers,		

Accordingly, JIAL had considered Rs. 134.34 per KG for prefabricated steel tanks.

3.6.2 **In view of the above explanations, we request the Authority to consider the cost of prefabricated steel tanks as submitted by JIAL and accordingly, the capex cost for Fuel Farm Facility may be revised accordingly.**

3.7 AERA proposal at Clause G on page 131 of CP relating to Capex cost for Crash Fire Tenders (as part of Vehicles)

In case of Crash Fire Tenders (CFT), JIAL estimated a cost of ₹ 61.36 Crores for four CFTs. Authority has reviewed the cost submitted by JIAL along with similar Airports. Authority noted that in case of Lucknow Airport the Airport Operator has received quotation of ₹ 9.00 Crores per CFT. As part of clarification, JIAL has provided Trivandrum PO which doesn't seem to be a formal proposal/document. Accordingly, the quotation received in case of Lucknow airport has been considered for JIAL.

Comments by JIAL:

3.7.1 In recent consultation paper issued by the Authority for Thiruvananthapuram Airport, the Authority has considered the cost of Rs. 12 Crores per Crash Fire Tender (CFT) as reasonable based on review of quotation. Please refer the below extract of consultation paper for Thiruvananthapuram Airport for TCP:

L.3 Fire Fighting Equipment and facilities – TKIAL has projected a total of Rs. 42.71 crores as estimated capital cost under this head. This includes:

- Replacement of 3 Nos. ACFTs (Rs. 36 crores) – ACFTs need to be replaced in a phased manner due to ageing. TKIAL has submitted that the existing ACFTs were handed over from AAI and bought in 2009-10.
- Driving and Fire Fighting simulator – Rs. 4.20 crores
- Triage and rescue tools for ARFF – Rs. 2.50 crores
- Other miscellaneous items such as Video Recorder, Fire Fighter turnout gear locker, extendable hose, radiation detector etc

The Authority notes that these items are required for ensuring safety and for emergency response. The Authority has reviewed the quotation for ACFTs and finds the estimate to be reasonable. However, the

3.7.2 **In view of the above, we request that the capex cost of at least Rs. 12 Cr per CFT may be allowed.**

3.8 AERA proposal as per 7.3.11 on page 152-153 of CP relating to Soft Cost – Technical Consultancies, Contingencies, Pre-Operative cost, design cost, PMC, Preliminary expenses

The Authority upon review of JIAL's explanation and relevant documents has the following views with respect to soft cost:

- a. *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 JIAL is on the higher side, as compared to other PPP Airports and hence not justified.*
- b. *Many of the capex allowed to JIAL are bought out items, wherein orders are placed on Supply, installation, Testing & Commissioning (SITC) basis, Hence, soft cost such as Project Management Consultancy (PMC), Design etc. need not be incurred on such items.*
- c. *New Capital Expenditure allowed to JIAL 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.*
- d. *Soft cost claimed by the JIAL 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.*
- e. *JIAL has considered 18% soft cost unilaterally over all capex items including bought out items. These include items such as procurement of vehicles, plant & machinery items, security equipment etc.*

Accordingly, the Authority proposes to consider the aforementioned costs to the extent of 8% of the Aero CAPEX of the projects 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 ₹ 93.98 Crores against ₹ 714.83 Crores proposed by JIAL.

Comments by JIAL: -

3.8.1 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)

3.8.2 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 3.8.1 and 3.8.2 above is minimum 18-20%.

3.8.3 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 4** - ACRP Report - Airport Capex

3.8.4 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 JAI, then the like-to-like soft cost will be approx. 16%.

3.8.5 **Based on information from reputed agencies from India and Overseas and recent tariff orders, it is evident that soft costs requested by JIAL 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 1/2 % for repetition
- (iii) Structural designs and drawings 1% for original work 1/2 % 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	1/2%	1/4%	1/4%	1/4%	
2. Preparation of detailed working drawings	1%	3/4%	1/2%	1/4%	
3. Preparation of preliminary estimates	1/2%	1/4%	1/4%	1/4%	
4. Preparation of detailed estimates	1/2%	3/4%	1/2%	1/4%	
5. Preparation of structural designs	1%	1%	3/4%	3/4%	
6. Execution	19-1/4%	7-3/4%	4-3/4%	4-1/4%	
Total Establishment charges	22-1/2%	10-3/4%	7%	6%	
(B) T&P (Machinery Equipment)	3/4%	3/4%	1/2%	1/2%	
(C) Audit & Account	1/4%	1/4%	1/4%	1/4%	
(D) Pensionary	1/4%	1/4%	1/4%	1/4%	
	23-3/4%	12%	8%	7%	

PART 3

SOP No. 3/4: 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 INCLUDED 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)

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~2.25%

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

<p style="text-align: center;">In case there is a delay in completion of the project beyond the timeline proposed, due to any reason beyond 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.</p> <p>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:</p> <p>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:</p> <p>Table 83: Capital Expenditure additions for the Third Control Period considered by the Authority</p>						
Reference	Project	No.	Particulars	Submitted by AAI	Proposed by the Authority	Difference
I	Capital additions deferred from the Second Control Period to the Third Control Period	I.A	New Integrated Terminal Building			
		I.B	PMC-Expansion of Terminal Building- (Tensile canopy)	44,621.19	43,694.92	-926.27
		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 (N/E)	52,141.71	47,839.95	-4,301.77

~3.5%

PART 7

Form P11 (b): Payroll Related Expenditure and Provisions (ref. Section A5.5.5)

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

3.9 AERA proposal as per 7.3.12 on page 153 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 1% of the uncapitalised project cost from the ARR / target revenue as re-adjustment in case any particular capital project is not completed/ capitalized as per the approved capitalisation 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 JIAL 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 JIAL and is also encouragement for JIAL to commission/ capitalize the proposed assets as per the approved CAPEX plan/schedule.

Comments by JIAL:-

3.9.1 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 JIAL 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 JIAL 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.

3.9.2 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.

3.9.3 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."

3.9.4 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.

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

3.10 AERA proposal as per 7.3.13 on page 153-154 of CP relating to Financing Allowance

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

- i. *The Authority considered 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.*
- ii. *Further, provision of Financing Allowance will disincentivize the Airport Operators 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 in case debt is used for funding of projects.*
- iii. *Furthermore, the future returns from the project should generate adequate returns to cover the cost of equity during the construction stage. JIAL 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.*
- iv. *Developments at greenfield airports inherently take longer durations to commission and operationalize. Thus, airport operators would have to wait for a considerable duration before getting returns on large capital projects. Keeping this in view, the Authority had earlier provisioned for financing allowance in 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 the 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 on the debt portion of the proposed capital expenditure.*
- v. *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 can't 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 JIAL brings in additional investments, the airport facilities are mobilized and enabled to other functional parts of the airport, which remains functional and JIAL keeps on enjoying the charges from the users. In the case of JIA, since new projects have included mobilization of existing operations, the said Airport is 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.*
- vi. *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 the Airport Operator 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 execution of a project.

vii. *AERA Guidelines, 2011 does not specifically state that Financing Allowance is to be provided on equity portion of the capital expenditure. The proviso to Section 13 (1) (a) of the AERA Act 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)".*

Comments by JIAL: -

3.10.1 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.

3.10.2 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:

AERA

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

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

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.

3.10.3 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.



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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 = Ra 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.

3.10.4 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.

3.10.5 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.

3.10.6 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 Jaipur 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.*

3.10.7 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.

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

3.11 AERA proposal as per 7.3.13 on page 154 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 para 8.2.4 onwards) for the Third Control Period for calculating the value of IDC. Based on the same, the Authority has derived an amount of ₹ 28.17 Crores and proposes to allow the same as against ₹ 815.63 Crores (as Financing Allowance and IDC) claimed by JIAL for the Third Control Period.

Comments by JIAL: -

- 3.11.1 To avoid repetition of comments on Cost of Debt, please refer comments provided in point 4.2.
- 3.11.2 Further it is to be noted that IDC is calculated considering certain projected cash outflows. Whereas in actual, the cash outflows could be different.
- 3.11.3 **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.**

3.12 AERA proposal at clause 7.3.15 of CP relating to Allocation Ratios including Terminal Building Ratio

Authority has examined JIAL submission and have following observations:

- i. As per tariff guidelines 2011 for Airport Operators the tariff for an Airport needs to be calculated as per single till methodology. According to which all building block of ARR considered 100% as aeronautical.
- ii. Authority in order to adopts uniform tariff policy across all major airports had amended its tariff guideline to the extent of adoption of Hybrid Till instead of Single Till prescribed in the guidelines vide order 14/2016-17. The Hybrid Till in principle considers only aeronautical portion of OPEX and CAPEX as pass through in tariff with 30% cross subsidy from Gross Non-Aero Revenue.
- iii. The revenue, cost and asset are interlinked and should be aligned in accordance with the till methodology adopted for tariff determination. Thus, as part of asset allocation exercise, we would require identification and allocation of Assets and OPEX into Aero and Non-Aero
- iv. Authority has adopted following basis for allocation of RAB addition during third control period:

Terminal Building Ratio - It was observed that JIAL has classified the entire area of the terminal building as aeronautical. Upon enquiry, JIAL stated that this was done in accordance with the AERA Act.

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 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 Non-Aeronautical activities are over 10% of terminal building area at other similar size PPP airports. Prescriptions of IMA norms also provide for non-aeronautical area to be between 8% and 12%, with the range being higher for larger airports. Considering the above, the Authority proposes to consider the ratio of 90:10 towards Aeronautical and Non-Aeronautical in line with its decision in Order No. 03 /2017-18 dated 2nd June 2017 for JIAL for the Third Control Period.

Employee Ratio- JIAL has submitted expected deployment of employees during third control period. Basis on employment schedule and rationalization, the employee ratio has been calculated at operating expense chapter, please refer Table 138 of O&M chapter of this consultation paper for detailed calculation. The effective employee ratio for third control period comes to 96.82%.

Gross Block Asset Ratio – As per the asset allocation study the gross block asset ratio is 97.88% as on 31st Mar'2022, same has been considered for third control period for the purpose of asset allocation.

- v. It is to be further noted that Authority has considered above ratios to allocate assets planned to be procured as part of third control period, the allocation ratio will be revised as per asset allocation exercise undertaken by the Authority in the next control period.

Accordingly, the Authority has applied various allocation ratios for individual capex and assets.

Comments by JIAL: -

AERA Act or AERA Guidelines do not provide allocation

3.12.1 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.*"

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

3.12.2.1 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."

3.12.3 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

3.12.4 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."

3.12.5 No norms with respect to unit area and costs were mentioned in the bidding documents and Concession Agreement of Jaipur 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 Jaipur Airport.

3.12.6 **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.**

3.12.7 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. JIAL 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.

3.12.8 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.

3.12.9 **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.**

3.13 AERA proposal as per 7.5.7 to 7.5.9 on page 163-164 of CP relating to Depreciation

7.5.7 The Authority has observed the recommendations given in the study report for adopting shorter useful life and noted the following:

- The Independent Expert appointed by JIAL has considered the various components of the Terminal Building such as False Ceiling, Sanitation works, Glass façade, Flooring works etc. for assessing the useful life of the Terminal Building. The Expert has calculated the contribution of each of the components to the overall structure of the Terminal Building along with the estimated useful life of such components wherein shorter useful lives have been adopted for False Ceiling, Sanitation works, Glass façade and Flooring works due to frequent renovation works in the building, weather conditions, wear and tear, etc., and arrived at the weighted average useful life of the entire structure of Terminal Building as approximately 25 years. Further, the Authority notes that JIAL has adopted the same shorter useful life of 25 years for the projected capital expenditure on construction of new Cargo Terminal Building.
- Similarly, the Independent Expert has recommended shorter useful life for Runways, Taxiways and Apron based on the useful life followed by various international regulators and associations.
- Further, in respect of Plant and machinery items, as per the technical report, these items are broadly used at Jaipur International Airport for 24 hours per day as the Airport is working all three shifts and hence, as prescribed under the Companies Act 2013, Schedule II for assets used during the year for double shift or triple shift, the Expert has recommended to adopt useful life of 7.5 years instead of 15 years. The Authority also notes that JIAL has adopted the same shorter useful life of 7.5 years for Cargo and Security Equipment.
- JIAL has adopted shorter useful life of 3 years for Flight Information Display System (FIDS) and AOCC Equipment (included under the category of 'Information and Technology equipment') in its MYTP submission.

7.5.8 Apart from the above, the Authority notes that in respect of Fuel Farm facility, JIAL has adopted 'weighted average' useful life of 7.5 years. Since the major portion of the assets are in the nature of Plant and Machinery, JIAL has estimated the useful life of the Fuel facility as 7.5 years and adopted higher depreciation of 13.33% for the entire capital expenditure projected for this facility.

7.5.9 The Authority on perusal of all the above, has summarized its view as under:

Asset class - Building: The Expert has recommended shorter life for False Ceiling, Sanitation works, Glass façade and Flooring works which appear to be integral part of the Airport Terminal Building. Authority's Order No.35 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 JIAL has determined the shorter life to be adopted, it has not provided sufficient rationale for adopting such 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 JIAL to maintain the assets in good working condition during its entire life. The Authority has issued Order No.35 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 JIAL 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 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 provides for specific determination of life through technical evaluation for specific assets other than those listed in the Order based on specific requirement of the Airport. The Authority finds that none of the asset 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 asset for tariff purposes.

Fuel farm facility – The Authority examined the list of items forming part of Fuel facility including assets planned to be purchased 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 JIAL. Instead, the Authority proposes to adopt the specific depreciation rate prescribed as per Order No.35 for such asset category in line with depreciation rates adopted for similar facility at other airports.

Comments by JIAL:-

- 3.13.1 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."
- 3.13.2 JIAL 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. JIAL 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.
- 3.13.3 **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 8.2.3 on page 169 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 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 Jaipur International Airport for the Third Control Period.

8.2.2 The independent study reports have drawn from the international experience of airports and their conclusions have been evaluated to the extent comparable with Jaipur Airport in terms of hybrid till, ownership structure, size, scale of operations and regulatory framework. The median and average Cost of equity arrived at by the independent study reports are 15.16% and 15.18%, respectively, as shown in the table below:

Table 120: Computation of Cost of equity as per IIM Bangalore independent study reports

Particulars	CIAL	MIAL	BIAL	DIAL	GHIAL	Average
Risk-free rate (A)	7.56%	7.56%	7.56%	7.56%	7.56%	7.56%
Equity beta (B)	0.9427	0.9391	0.9732	0.9296	0.9442	0.94576
Equity risk premium (C)	8.06%	8.06%	8.06%	8.06%	8.06%	8.06%
Cost of equity $A + (B * C)$	15.16%	15.13%	15.40%	15.05%	15.17%	15.18%
Average Cost of equity						15.18%

8.2.3 Based on the above reports, the Authority proposes the Cost of equity of 15.18% for Jaipur International Airport for the Third Control Period. This is also in line with the considerations of the Authority for other similar airports including Lucknow.

Comments by JIAL: -

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 JIAL. Rather it has taken reference from Cost of Equity calculated for other PPP Airports and applied it to JIAL. 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 JIAL 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 JIAL) 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 unlevered 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 markets 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

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

4.1.15 **We hereby request AERA to accept the CoE as submitted by JIAL 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 8.2.4 to 8.2.12 on page 169-170 of CP relating to Cost of Debt

8.2.4 JIAL has considered Cost of Debt for the Third Control Period at 12% 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%.

8.2.5 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 JIA.

8.2.6 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. JIAL 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.

8.2.7 Further, it may also be noted that as the traffic growth and associated revenue from Aeronautical & Non- Aeronautical services improve; and the timely execution of capital projects, approved by the Authority, are completed and start to yield benefits. It is expected that the debt profile of Jaipur International Airport is bound to improve and its inherent financial risk, as reflected in the cost of debt will reduce to the levels of other PPP airports.

8.2.8 The Authority expects JIAL to exercise its best endeavor to undertake the financing towards capital expenditure at competitive rates as in other PPP airports and take all steps as detailed above, with support from its Parent company to optimize the cost of debt and follow all requisite procedures of financing including following all Government guidelines, obtaining efficient credit rating etc. in order to ensure that debt is contracted at optimum rates to ensure that the users of the airport are not burdened.

8.2.9 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%.

8.2.10 Accordingly, the Authority has considered the Cost of Debt of 9% for the computation of Fair Rate of Return. The Authority also directs JIAL 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.

8.2.12 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. The Authority would like to mention that FRR is computed on the basis of Cost of Equity and Cost of Debt. It has determined the CoE based on the IIM Bangalore independent study reports for the other PPP Airports whereas, the Cost of Debt shall be computed as per the Cost of Debt of other five PPP airports viz., DIAL, MIAL, GHIAL, BIAL and CIAL. Since the debt equity mix has been proposed 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 JIAL:-

4.2.1 JIAL 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.

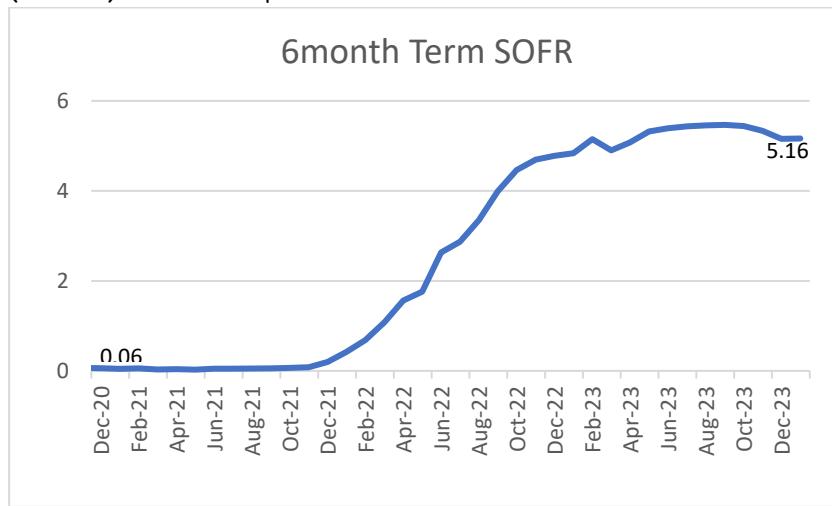
4.2.3 It is to be noted that TCP tariff orders of above-mentioned PPP airports were issued during the period from December 2020 to August 2021. The interest rates have increased significantly in India and globally after the same which are explained in detail in subsequent paragraphs. Hence, comparing the same with current JIAL'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:

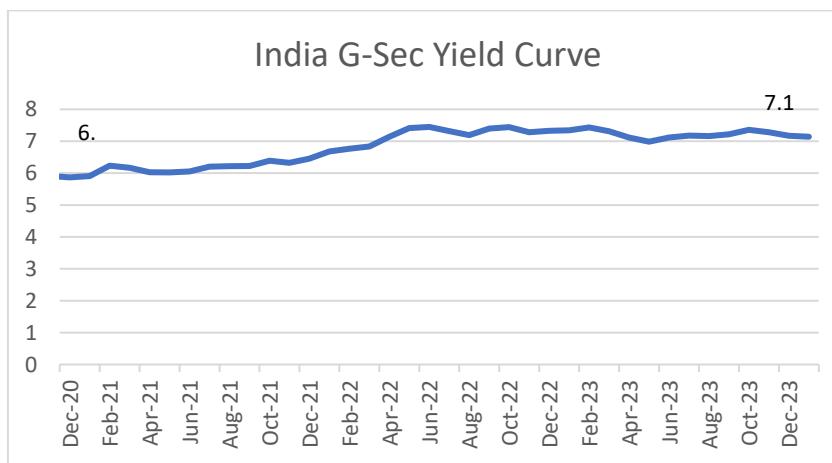


4.2.3.2 **Secured Overnight Financing Rate (SOFR)**, has also increased materially (~5.10%) in the said period:

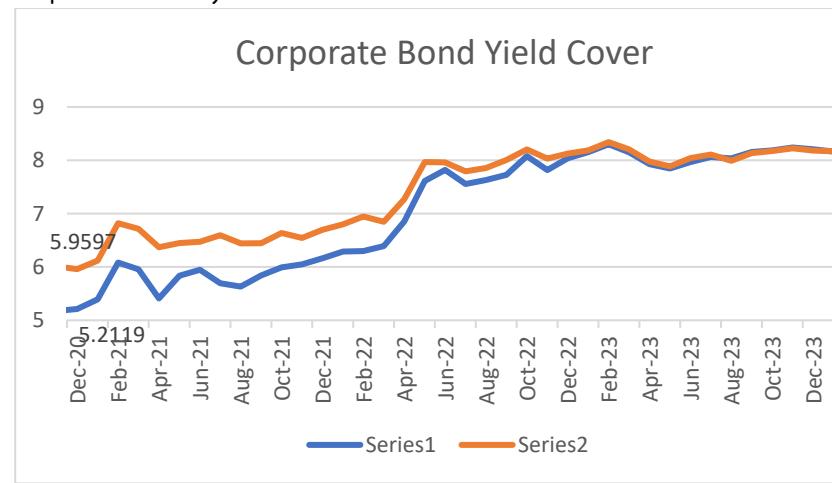


4.2.3.3 **Increase in Domestic Interest Rates in India:**

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 increased 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 JAI:

- 4.2.4.1 Considering the current profile of operation and outlook, the rating of JAI 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 JAI 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 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.
- 4.2.4.5 Further AAHL combined with Airport SPVs is domestically rated as A+/Stable by India Ratings, which at JAI Level will be lower than investment grade.
- 4.2.4.6 The transition of the Airport from AAI to JAI happened during the COVID impacted period. This has negatively affected the revenue and cash flow of JAI and its credit worthiness.
- 4.2.4.7 We believe that JAI 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 JIAL 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 171 of CP relating to Inflation for the Third Control Period

9.2.2 *The Authority proposes to consider mean of WPI inflation forecasts (All Commodities) for FY 2023-24 and FY2024-25 as per the recent "Results of the Survey of Professional Forecasters on Macroeconomic Indicators – Round 86" released on February 8,2024, by the Reserve Bank of India (RBI). An extract of the results is reproduced below:*

Table 123: WPI inflation rates as per RBI's annual forecast

Calendar Year	WPI All Commodities	Source
FY22-23 (Cumulative YoY)	9.42%	Index Numbers of Wholesale Price in India for the Month of March, 2023 (Base Year: 2011-12) published by Ministry of Commerce & Industry
FY23-24	Mean as 0.2%	RBI Forecaster Survey 86 th round dated
FY24-25	Mean as 3.8%	February 8, 2024

9.2.3 *The Authority has considered the inflation rate of FY 2024-25 for the subsequent tariff years of the Third Control Period. Accordingly, the following table shows the inflation rates as proposed by the Authority for the Third Control Period.*

Table 124: Inflation rates proposed by the Authority for the Third Control Period

Particular	FY23	FY24	FY25	FY26	FY27
WPI Inflation	9.42%	0.2%	3.8%	3.8%	3.8%

Comments by JIAL: -

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 0.2%, 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, JIAL 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 10.2.2 to 10.2.21 on page 175-179 of CP relating to Allocation of O&M expenses to Aeronautical and Non-Aeronautical activities

10.2.2 JIAL, in their submission proposes 100% of the operating expenses as Aeronautical. The tariff methodology adopted by the Authority, segregates O&M expenses into Aeronautical, Non-Aeronautical and Common considering the nature and purpose of the services for which these expenses are incurred. However, in the absence of any specific information regarding segregation of expenses, due clarifications were sought from JIAL regarding calculation of various allocation ratios such as terminal area. JIAL has maintained that as per the AERA guidelines, airside assets are to be considered as Aeronautical and the Terminal Building is considered as Aeronautical as per the AERA Act. However, if JIAL so desires, they may adopt Single Till methodology wherein all assets and operating expenses are considered as Aeronautical.

10.2.21 The Authority's proposal for allocation of Total Aeronautical O&M expenses of Jaipur International Airport as compared to that submitted by JIAL has been summarized in the table below:

Table 131: Aeronautical O&M expenses proposed by the Authority for the Third Control Period

Particulars	O&M expense allocation as per		Allocation ratio proposed by the Authority
	JIAL's Submission	Authority's Proposal	
Manpower Expenses – AAI employees (up to Deemed Deputation Period)	100.00 %	99.12 %	Employee Headcount ratio of AAI employees
Manpower Expenses – AAI employees (Deficit Employee Cost)	100.00 %	100.00 %	Aeronautical
Manpower Expenses – JIAL employees	100.00 %	97.23 %	Employee Headcount ratio of JIAL's employees
Utility expenses	100.00 %	100.00 %	Aeronautical
IT expenses	100.00 %	90.00 %	Terminal Building ratio
Rates and Taxes	100.00 %	97.88 %	Gross Fixed Asset ratio
Security expenses	100.00 %	97.88 %	Gross Fixed Asset ratio
Security Others	100.00 %	97.88 %	Gross Fixed Asset ratio
Corporate Allocation Cost	100.00 %	97.98 %	Total Employee Headcount ratio
Administrative Expenses – Others	100.00 %	97.88 %	Gross Fixed Asset ratio
Administrative Expenses – Collection Charges on UDF	100.00 %	100.00 %	Aeronautical
Insurance	100.00 %	97.88 %	Gross Fixed Asset ratio
Repairs and Maintenance	100.00 %	90.00 %	Terminal Building ratio
Other Operating expenses	100.00 %	90.00 %	Terminal Building ratio

Comments by JIAL: -

6.1.1 In order to avoid repetition of comment, please refer to 1.3.2 and 3.12 for our request for considering 100% Aero allocation.

6.2 AERA proposal as per clause 10.2.23 on page 180-192 of CP relating to Manpower Cost of AAI and JIAL Employees

10.2.23

i. Manpower Expenses of AAI employees

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f. Further, the Authority proposes to revise the 10% Y-o-Y increase in Payroll costs claimed by JIAL to 6% for the remaining three (03) tariff years of the Third Control Period, as approved by the Authority for other similar airports.

ii. Manpower Expenses of Employees of JIAL

Further, the Authority proposes the following revision in Aeronautical Employee Headcount projected by AO for the remaining three (3) tariff years Third Control Period:

- (i) *Security and Safety department: The Authority observes that certain security and safety activities may be suitably outsourced by JIAL, barring specific activities such as coordination with CISF, BCAS compliance etc. Further, it is pertinent to highlight that since T-III is not envisaged in Third Control Period and JIAL has already considered security costs separately under administrative costs, the Authority proposes to consider only 50% of the Employee Headcount projected by JIAL in the 3rd tariff year (FY 2024-25) onwards.*
- (ii) *Quality department: The Authority has assessed that the headcount for the last two years of the control period is not justified and thus proposes to rationalize to 2 (Two) employees in FY2024-25 and 3 (Three) employees for last two tariff years of the control period.*
- (iii) *Customer Engagement: The Authority observes that as per JIAL submission, till September 2023 there are no employee working in this department. The Authority proposes 1 (One) employee in FY2024-25 and FY2025-26 and 2 (Two) employees in the last tariff year of the Third Control Period. The Authority feels that this function relates to ASQ rating activity, which is performed only on a quarterly basis, that too through outsourced Consultancy Firms.*
- (iv) *Airside Management: The Authority observes that the headcount projected by JIAL for all the tariff years is not justified considering the projected traffic levels at the airport. The Authority also observes that ground handling activities at the airport have been outsourced. Based on the above factors, the Authority proposes to consider twenty seven (27), thirty (30), and thirty five (35) employees in the last three years of the Control Period as against 37 / 38 / 48 employees respectively, claimed by JIAL.*
- (v) *Terminal Operations: The Authority observes that the number of Employee Headcount projected by JIAL is not justifiable as there are existing employees of AAI (i.e., Select employees deputed to JIA) at the Airport till the deemed deputation period. Hence, the Authority has rationalized the manpower for Terminal Operations for the FY2024-25 from 29 employees to 22 employees. Further, manpower has been rationalized for FY2025-26 considering the manpower proposed for FY2024-25. The Authority further observes that since NITB-III has not been considered as per the CAPEX plan proposed by the Authority for Third Control Period, the increase in manpower in last tariff year cannot be justified and has thus been rationalized from 43 employees to 30 employees.*

(vi) *Engineering & Maintenance Department: The Authority observes that there are existing employees of AAI (i.e., 'Select Employees' deputed to JIA) at the Airport during the deemed deputation period similar to Terminal Operations department and hence the Authority proposes to consider 75% of the Aeronautical Employee Headcount of Engineering & Maintenance department, projected by JIAL, for the third tariff year of the Third Control Period. For the remaining two tariff years of TCP, the Authority proposes to consider the number of employees as submitted by JIAL as the Deemed Deputation Period will end in FY 2024-25.*

(vii) *Aircraft Rescue and Fire Fighting (ARFF) including Fire Fighters: The Authority observes that the employee headcount projected by the AO is not justified, with the fact that the same services are being delivered by existing employees of the AAI (i.e., Select employees to JIA) at the airport, at a lower manpower strength. The Authority thus proposes to rationalize the manpower in this department for FY2024-25 on the basis of historical manpower deployment. For next two tariff years, manpower has been increased in a staggered manner. Based on the above factors, the Authority proposes to consider sixty five (65), eighty (80), and ninety five (95) employees in the last three years of the Control Period as against 104 / 104 / 104 employees respectively, claimed by JIAL.*

(viii) *Inline Hold Baggage Screening system (ILHBS): The Authority examined the Employee Headcount projected by the AO ranging from thirty-five (35) in FY 2022-23 to sixty-eight (68) in the last tariff year and compared the same with the number of employees engaged by AAICLAS in FY 20-21, namely, 42 employees (28 Security screeners and 14 Multi tasker) as per the invoice submitted for the month of December 2020.*
Considering the projected traffic growth during the current Control Period, the Authority proposes to consider the Employee Headcount of forty five (45) / fifty five (55) / sixty-eight (68) employees respectively as against 68 / 68 / 68 employees claimed by the AO for the FY 2024-25 to FY 2026-27.

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Further, the Authority proposes to rationalise the growth rate by considering only 6% Y-o-Y for all the remaining three (3) FYs, starting from FY 2024-25 in line with what has been considered for Manpower Expenses of AAI employees.

Comments by JIAL: -

6.2.1 In respect to the Authority's rationalization of Security manpower, 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 JIAL 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.
 Further, As per Concession Agreement clause 18.15.4, JIAL is expected to create Airport Safety Management Unit (ASMU) and designate one of its officers to be in-charge of the ASMU.

6.2.1.3 Accordingly, JIAL has planned for on-roll 20 employees for Security and Safety function with following composition:

Security Function:

1 CSO, 3 Pass Section, 2 Avsec Audit and Compliances, 4 Loss Prevention and Automation, 4 landside operations, 1 Security Risk Assessment and Process compliance.

Safety Function:

1 Aviation Safety Head, supported by 1 resource and 3 manpower for shift duties

6.2.1.4 With respect to the reasoning provided by the Authority, we would like to submit the following:

- *Reason that certain activities are outsourced* – Security function is manpower intensive job which requires round-the-clock monitoring of airport premises and thus JIAL has only considered the roles relating to supervision for in-house. Had the factor of outsourced activities not considered by JIAL, the employee headcount would have been way higher than JIAL's projection.
- *Terminal 3 not envisaged in TCP* – JIAL had projected the headcount increase from 18 to 20 only in last year (ie. FY 27) and hence, no additional impact in security headcount was considered by JIAL.

6.2.1.5 The Authority has rationalized the manpower for Security function with clear disregard to the requirement of various roles essential for smooth airport operations. Hence, we request the Authority to consider the manpower for security and safety function as submitted by JIAL.

6.2.2 In respect to the Authority's rationalization of Airside Management manpower, 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 JIAL is responsible for maintaining and operating Airside including Runway, Taxiways, Approach Areas, Apron Management Service, Airside safety, aerodrome safeguarding and aeronautical information services.

The composition of planned manpower is as below:

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

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. 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 4 associate 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 CAR requirements. Handling DGCA inspection and License renewal processes

- f. ADP/AVP Management - 1 lead supported by 3 associate - Responsible for vehicle movements at the airside and authorizing driving permits for airside vehicle movement
- g. Wildlife & Hazard Mgmt - 1 lead supported by 4 associates - Responsible for monitoring and recording wildlife activities at the airport and mitigation plan

6.2.2.3 With respect to the reason provided by the Authority that ground handling activities at the airport have been outsourced, we would like to submit that the role of airside operations through JIAL manpower is quite different from ground handling operations and thus the reason is erroneous. Hence, we request the Authority to consider the manpower for Airside Management function as submitted by JIAL.

6.2.3 In respect to the Authority's rationalization of Terminal Operations manpower, we would like to submit as follows:

- 6.2.3.1 We had submitted detailed justification along with role-wise requirement of number of in-house Terminal Operations team strength.
- 6.2.3.2 JIAL is expected to maintain and improve quality of service to passengers. In that connection, JIAL will deploy various positions of Terminal Managers, Duty Managers, Shift In-charge, Protocol services. Two terminal T1 and T2 will have addition of various Passenger Processing Systems and also there will be addition in terminal area.

The composition of planned manpower is as below:

- a. Head Terminal Operations - (1 Headcount) Lead Reports to Chief Airport Officer and is responsible for Terminal (Domestic & International), Passenger Service, Facilities and Horticulture Management.
- b. Terminal Operations (1 Head, 3 Shift Managers and 15 Associates) - Responsible for the Passenger Experience at T1 and T2. Works in coordination with CISF/Airlines and ensure that the passenger flow is seamless in Terminals.
- c. Protocol Services & Guest Relations (1 Head, 3 Shift Managers and 9 Associates) - Responsible to facilitate the movement of VIPs with smooth Check-in, VIP Lounge services, Security Check and Boarding after proper coordination with airlines, CISF - Terminal 1 & Terminal 2.
- d. Facilities Management - (1 Head supported by 4 Associates) - Handles the Facilities and Upkeeping team at the airport to maintain the JAI airport facility (Terminal 1,2 and Land Side) at the highest standards. The role will ensure high standards of cleanliness.
- e. GA Facilities Manager - (1 Head and 4 Associates) - to manage the GA operations

6.2.3.3 With respect to the reasoning provided by the Authority, we would like to submit the following:

- *FY24-25 manpower reduced from 29 to 22 in view of AAI employee being available till Deemed Deputation Period* – As the deemed deputation period will be over in Oct'24, JIAL will have to replenish the roles being performed by AAI manpower through onboarding in-house staff at least 3 to 6 months in advance for smooth handover and transition. And hence, the rationalization due to this reason is not correct. Similarly, the effect

for FY 25-26 manpower is erroneously considered based on FY24-25 manpower.

- *Terminal 3 not envisaged in TCP* – JIAL had not considered any additional manpower in the projection as the Terminal 3 project was planned for capitalization in last quarter of FY 27.

6.2.3.4 The Authority has rationalized the manpower for Terminal Operations function with clear disregard to the requirement of various roles essential for smooth airport operations. Hence, we request the Authority to consider the manpower for Terminal Operations function as submitted by JIAL.

6.2.4 In respect to the reason provided by the Authority for rationalization of Engineering & Maintenance Department manpower for FY 24-25, we would like to submit that as the deemed deputation period will be over in Oct'24, JIAL will have to replenish the roles being performed by AAI manpower through onboarding in-house staff at least 3 to 6 months in advance for smooth handover and transition. And hence, the rationalization due to this reason is not correct.

6.2.5 In respect to the Authority's rationalization of Aircraft Rescue and Fire Fighting (ARFF) including Fire Fighters, we would like to submit as follows:

6.2.5.1 We had submitted the Task Resource Analysis as required by DGCA and as per the assessment done, there is requirement for 104 employees in ARFF for category-8. The same was also attached as Annexure R to MYTP.

6.2.5.2 In view of the statutory requirement, we request the Authority to consider manpower as submitted by JIAL.

6.2.6 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 (Refer Annexure S to MYTP). For quick reference the same is provided below.

ILHBS Screening Manpower Assessment at Jaipur Airport											Total with Shift Incharge
Airport	No of Bags per Hr	OOG X-BIS	L2A Work Station	L3 ReCheck Work Station & ETD Check	L3 Standalone XBIS	L4 Physical Check/ Remote	L2B	Reliever / Rotation	Total	Total with Trg / Leave	
Shift A	833	2	5	1	1	2	4	3	18		1
Shift B	833	2	5	1	1	2	4	3	18		1
Shift C	833	2	5	1	1	2	4	3	18		1
Total									54	64	67 + 01 MGR

Level 2
1 hours = 3600 second
Numbers of bags screen in one hour by one screener if time limit is given 20 second
= $3600/20$
= 180 bags
for 833 bags number of level 2A screeners required.
= total number of bags / total number bags screen in one hour by one screener
= $833/180$
= 4.6 (~ 5 screeners)

Level 2 B
1 hours = 3600 second
Numbers of bags screen in one hour by one screener if time limit is given 80 second at 2B.
= $3600/80$
= 45 bags
Suppose there is 20% rejection from 2A.
So 20% of 833 is 167 bags. So we required.
= $167/45$
= 3.71 (~4 screeners)

6.2.7 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. JAI Airport AAI Employees Salary Growth
3. Analysis of Select Employee Cost Paid by JIAL to AAI from COD
4. Analysis of latest orders issued by the Authority

6.2.7.1 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

6.2.7.2 JAI Airport AAI Employees Salary Growth

Avg salary per AAI employee at Jaipur Airport is Rs. 21 lakhs in FY21-22 and the CAGR increase in avg cost per employee is approx. 9.6% in last 5 years from FY17 to FY22. After excluding the effect of 2 years' COVID period, the CAGR increase from FY17 to FY22 comes to 16.5%.

		FY17	FY18	FY19	FY20	FY21	FY22 (upto COD)
Employee Cost (Table 23 of the O&M Study)	Rs. Cr	18.15	27.17	34.36	33.73	25.78	15.97
No. of Aero Employees (Table 20 of the O&M Study)	No. of Employees	137	145	169	163	142	144
Avg Cost per employee	Rs. Crs per Employee p.a.	0.13	0.19	0.20	0.21	0.18	0.21
Year-on-Year Growth in Avg Cost	%		41%	9%	2%	-12%	16%
CAGR Employee Salary Cost Increase (FY17 to COD)	%						9.6%
CAGR Employee Salary Cost Increase (FY17 to COD) After excluding 2 years COVID period	%						16.5%

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

Kindly refer Para 3.4.8 of the Study of Efficient Operation and Maintenance Expenses for JAI, Jaipur provided as Annexure to the CP whereby the Authority has themselves acknowledged the growth in cost in the previous years.

3.4.8 On further examination regarding Employee expenses, it is observed that:

- i. For FY 2017-18 - there was an increase of 45% as against 25% approved in the tariff order of Second Control Period. AAI in its response dated July 18, 2023, has stated that the major reason for the variance is due to, "Pay revision as per 7th Pay Commission Report had been implemented from Jan 2017 and payment of arrears were paid to Executives in December 2017 (FY2017-18) & to Non-Executives in FY 2018-19."*
- ii. For FY 2018-19 – there was an increase of 24% as against 7% Y-o-Y approved in the tariff order of Second Control Period, which was mainly on account of pay revision with arrears pay-out. Additionally, the employee expense of ₹ 34.65 Crores in absolute number was higher than ₹ 31.80 crores projected in the Tariff Order for the Second Control Period.*
- iii. For FY 2019-20 and FY 2020-21 – the employee expenses had decreased from the previous year since there was no arrears pay-out, leading to a decrease in the total employee cost. Hence the employee expenses for the period from FY 2016-17 to FY 2019-20 are considered to be reasonable.*
- iv. For FY 2021-22, the employee expenses include ₹ 15.11 Crores incurred by AAI pre- COD and ₹ 19.72 Crores by Airport Operator post-COD totalling to ₹ 34.83 Crores, resulting in an increase of 31% over the previous year's expense and is higher than the 7% Y-o-Y increase allowed by the Authority in Second Control Period*

6.2.7.3 **Analysis of Select Employee Cost paid by JIAL to AAI**

The Avg cost per employee in FY23-24 (upto Feb'24) has increased by approx. 22% CAGR over Nov'21 cost per employee from Rs. 15.87 Lakhs p.a. in Nov'21 to Rs. 23.53 Lakhs p.a. in FY23-24 (upto Feb'24).

Month	Invoice (Rs Crs)	Employee Count	Avg Annual Cost per employee (Rs Lacs)
Oct'21	1.41	167	15.20
Nov'21	2.21	167	15.87
Dec'21	2.17	167	15.60
Jan'22	2.55	167	18.31
Feb'22	2.31	167	16.63
Mar'22	4.53	165	32.97
Total FY 21-22	13.78	167	18.03
Apr'22	2.97	165	21.58
May'22	2.88	163	21.17
Jun'22	2.81	162	20.84
Jul'22	3.16	162	23.39
Aug'22	2.72	161	20.27
Sep'22	3.03	160	22.76
Oct'22	3.22	160	24.14
Nov'22	3.67	163	27.02
Dec'22	3.34	162	24.74
Jan'23	3.01	162	22.29
Feb'23	2.84	162	21.04
Mar'23	3.18	162	23.59
Total FY 22-23	36.83	162	22.73
Apr'23	3.29	162	24.40
May'23	3.18	160	23.88
Jun'23	3.04	160	22.78
Jul'23	3.37	159	25.43
Aug'23	2.85	157	21.79
Sep'23	2.78	155	21.50
Oct'23	3.20	157	24.43
Nov'23	2.99	155	23.12
Dec'23	2.93	154	22.80
Jan'24	3.12	155	24.19
Feb'24	3.13	154	24.41
	-		
Total FY 23-24	33.88	157	23.53

It is evident from the above analysis that the avg annual cost per AAI employees has been increasing at a rate of 22%.

6.2.7.4 **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 / trainings etc. were deferred. Now with the improvement in the situation from the pandemic, expenses in post Covid period, including FY 2022-23, are expected to reach back to their normal levels. The ISP further submitted that Y-O-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 / trainings etc. were deferred. Now with the improvement in pandemic situation, expenses in post Covid period, including FY 2022-23, are expected to reach back to their normal levels. The ISP further submitted that Y-O-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.

6.2.8 JIAL is a new AO who needs to build its manpower to run the Airport operations. JIAL 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%."

6.2.9 Further, EY's report on "Future of Pay" issued recently in March 2024 (refer Annexure 5 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%**."

- 6.2.10 JIAL 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.
- 6.2.11 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.
- 6.2.12 **We request the Authority to provide at least 10% YoY increase in avg cost of salaries for all employees i.e. AAI and JIAL Manpower. Also, we request AERA to consider the manpower numbers for Security & Safety, Airside Management, Terminal Operations, Engineering & Maintenance, ARFF and ILBS Screeners as submitted by JIAL.**

6.3 AERA proposal as 10.2.24 on page 192 onwards of CP relating to Utilities Expenses

The Authority observes that JIAL has assumed 10% of the total electricity cost as recoveries to be made from the Concessionaires. The Authority further observes that the power recovery percentage is significantly lower than that of comparable airports and proposes that the non-aeronautical operations should increase the power recovery from the Concessionaires, in a gradual manner. Accordingly, the Authority proposes that JIAL shall constitute a Committee to verify the bills relating to Power expenses and submit a report on the same to the Authority as part of Stakeholder comments/feedback. In case such report is not submitted by JIAL, the Authority proposes to consider power recoveries at a notional rate while issuing the tariff order of the Third Control Period.

Comments by JIAL

6.3.1 Please find attached the report as directed by the Authority (refer **Annexure 6**).

6.4 AERA proposal as 10.2.25, 10.2.27 and 10.2.28 on page 194 onwards of CP relating to Year-on-Year growth rate for expenses

10.2.25 JIAL as per the concession agreement is required to upgrade the existing IT capacity infrastructure. JIAL has based its expense projections on the basis of proportionate increase in JIAL's own employee headcount. Further the Authority notes that JIAL has treated the cost as 100% Aeronautical. In respect of the Y-o-Y growth claimed by JIAL, the Authority proposes to revise the same as per inflation rate proposed in Table 83 above and also reallocate the expense based on the Terminal Building ratio of 90% Aeronautical (refer para 10.2.10).

i. The Authority proposes to consider ₹ 5.0 Crores towards IT expenses for FY 2023-24 and use the same as base for future projections. Further, the Authority shall consider a one-time increase of 35.6% on account of increase in Terminal Area. The Authority further proposes to apply Y-O-Y increase towards inflation for the remaining three (3) tariff years on the derived expenses of FY 2023-24 (refer growth rates mentioned in Table 156).

10.2.27 As per JIAL's submission expenses related to security includes outsourced manpower, security guards, security operation maintenance, surveillance vehicles, access controls and expenses related to other automation systems. JIAL has based their security cost increase in line with the forecasted growth in passenger traffic. In addition, JIAL has considered a one-time increase of 11.4% in expense on account of refurbishment of Terminal 2 leading to increase in the terminal area. Further the Authority notes that JIAL has treated the cost as 100% Aeronautical. The Authority notes the dual escalation in the expenses wherein JIAL has considered both increase in traffic and terminal area. The Authority proposes to revise the Y-o-Y growth in security expenses, as per inflation rate proposed in Table 124 and also reallocate the expense based on the Gross Fixed Asset ratio of 97.88% Aeronautical (refer para 10.2.12) in line with similar airports.

10.2.28

viii. JIAL has escalated expenses related to corporate allocation YoY basis growth in employee count. The Authority observed that salary cost constitutes the major portion of the Corporate cost and hence, proposed to rationalize the increase claimed by JIAL to 6% Y-o-Y across the last three (3) tariff years of the Third Control Period which is in line with the increase proposed for manpower expenses of AAI and JIAL.

Comments by JIAL

6.4.1 JIAL, 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, Increase in Corporate Allocation expenses and IT expenses as submitted by JIAL based on the same proportion as the increase in JIAL employee headcount may please be allowed.

6.4.2 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 JIAL employee headcount).

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

JAI Corporate Cost Allocation based on DIAL growth factors												10 year CAGR 19.4%		
Private Airport Operator DIAL Corporate Cost Allocation (Rs Crs) Increase in initial years	AERA Order FCP			AERA Order SCP			AERA Order Projections				10 year CAGR 19.4%			
	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24		
	27	35	54	54	76	85	91	96	117	141	171	207		
	31%	55%	0%	40%	12%	8%	5%	22%	20%	21%	21%	21%		
JAI extrapolated Corporate Cost Allocation in difference scenarios														
	FY22	FY23	FY24	FY25	FY26	FY27	Total							
JAI MYTP filed numbers based on employee growth rate	5	11	19	33	36	41	145							
If DIAL growth in initial years are extrapolated	12	15	24	24	34	38	146							
If 20% CAGR (DIAL 10 year CAGR is applied on JAI)	12	14	17	20	24	29	117							

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

6.4.3 JIAL, 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.

6.4.4 Similarly, JIAL had claimed that the Security Expenses increase in line with increase in passengers at the airport as these costs are driven primarily based on security services required for passengers.

6.4.5 Further, in view of recent initiatives of MOCA/BCAS on increase in security screening infrastructure the operational cost of security expenses increases. Further, as the security related services are manpower intensive services, the same increases in line with increase in salary and wages cost.

6.4.6 **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 JIAL and Salary growth of at least of 10% per annum for Corporate Allocation Expenses, Growth factor equivalent to Employee Headcount Growth for IT expenses in addition to terminal area increase, Growth factor equivalent to Passenger Growth for Security Expenses) subject to true-up on actual basis, instead of applying only terminal area or inflation increase.**

6.5 AERA proposal as 10.2.22 on page 180 of CP relating to One Time escalation claimed by the AO

10.2.22 One-time escalation claimed by JIAL for various Operating expenses in FY 2023-24 and FY 2024-25 have been analyzed by the Authority. In this regard, the Authority considers Capitalization schedule proposed by it (refer Table 108), in which only operationalization of T-I and refurbishment of T-II has been considered during the Third Control Period. Accordingly, the Authority proposes to consider only proportionate increase for determining the one-time escalation in the expenses for the current Control Period. Further, the Authority notes that the escalation in operating expenses such as Utilities, Housekeeping and Upkeep expenses, Horticulture expenses and Outsourced manpower / Hiring expenses may 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. 66.67%) of the increase in total terminal area (2/3(42% + 11.4%) for one-time escalation of expenses related to Terminal Building.*

Comments by JIAL

6.5.1 It is to be noted that it is a practice whereby AERA has allowed increase in utilities, security 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 31 st August 2021	<p>Utilities and Housekeeping expenses increased in proportion to the increase in Terminal Area whereas 50% of area increase was considered for security expenses. Terminal area is increasing from 117,000 sq mtr to 365,809 s mtr i.e. 213%</p> <p><i>Extract from the order Utility Costs</i></p> <p><i>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 result in increase in utility related expenses. The Authority proposed to consider the utility cost projected with FY2020 as the base year.</i></p> <p><i>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.</i></p> <p><i>Further, the Authority approved expansion of the terminal as a driver for</i></p>

Airport	Control Period	AERA Order No.	Reference
			<p><i>the housekeeping cost and therefore accepts HIAL's consideration that increase in housekeeping cost due to expansion has to be factored for the operational months for expanded terminal.</i></p> <p><i>7.4.11 HIAL commented that it agrees to Authority's approach for increasing the housekeeping cost in 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.</i></p> <p><i>Security Cost</i></p> <p><i>7.2.12 The Authority proposed to approve HIAL's consideration of an elasticity of 0.5 for security cost with respect to increase in terminal area.</i></p>
Chennai	Third Control Period	38/2020-21 dated 04 th February 2022	<p>Utilities expenses increased in proportion to the increase in Terminal Area. Terminal area is increasing by 33%</p> <p><i>Extract from the order</i></p> <p><i>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</i></p> <p><i>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.</i></p>
Trichy	First Control Period	55/2020-21 dated 22th October 2020	<p>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%</p> <p><i>Extract from the order</i></p> <p><i>12.2.11 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</i></p>

Airport	Control Period	AERA Order No.	Reference
			<i>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.</i>

6.5.2 **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 ~ 53.4%.**

6.6 Our submission on Page 148 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, JIAL 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 JIAL: -

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 JIAL in the final tariff order.**

6.7 AERA proposal as 10.2.28 on page 197-198 of CP relating to Corporate Cost Allocation

10.2.28

iv. Considering all the above, the Authority proposes to consider the actual cost of ₹ 11.88 Crores for FY 2022-23, as compared to the projected cost of ₹ 11.00 Crores.

v. However, the Authority observes that the aforementioned actual cost includes the costs of inhouse legal team, which is in addition to the cost of employees of Legal department, already considered under the manpower expenses of JIAL (refer Table 144 above) and is not justified. Hence, the Authority proposes to exclude ₹ 0.08 Crores from the Corporate Allocation cost submitted by JIAL and consider the remaining amount of ₹ 11.80 Crores for FY 2022-23.

viii. JIAL has escalated expenses related to corporate allocation YoY basis growth in employee count. The Authority observed that salary cost constitutes the major portion of the Corporate cost and hence, proposed to rationalize the increase claimed by JIAL to 6% Y-o-Y across the last three (3) tariff years of the Third Control Period which is in line with the increase proposed for manpower expenses of AAI and JIAL.

Comments by JIAL: -

- 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 6.4.2.**

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

7.1 AERA proposal as 11.2.4 to 11.3.2 from page 211 onwards of CP relating to Non-Aeronautical Revenues

11.2.4 The Authority notes that JIAL undertook a two-stage tendering process through e-tender mode vide Request for Proposal (RFP) dated August 17, 2021.

11.2.5 The Authority, in this regard examined the extract of the relevant clauses of the RFP which read as under:

11.2.6 From the qualifying criteria specified by JIAL, Authority observes that:
Technical Eligibility Criteria

AERA observation of restrictive criteria: Specifying 100000 sqm commercial space is too high with respect to present scope of work.

Financial Eligibility Criteria

(i) Turnover:

AERA observation of restrictive criteria: As per Public Procurement Guidelines average financial turnover should be 30% of the estimate cost. So in place of 30 Cr. average annual turnover, JIAL has specified 750 Cr. turnover (which is 25 times)

(ii) Net Worth:

Asking net worth of 250 Cr. is very restrictive for a work value of 100 Cr. (Approx.) as many Airport Operators are specifying only Positive Net Worth.

11.1.1.1 Due to such restrictive criteria, only 2 agencies (out of these 2, one was related party) and other is an Airport Operator, participated in the tender and work was awarded to agency quoting 10% revenue share percentage.

11.1.1.2 In fact, now a days other Airport Operators have dispensed with technical eligibility criteria in Non-Aeronautical activities tenders to attract more and more agencies and to encourage healthy competition.

11.2.7 Pursuant to the above RFP, only two prospective bidders (domestic and global) had submitted their proposals to JIAL. The number of prospective bidders was low due to restrictive technical and financial criteria as mentioned in para 11.2.5. Based on technical qualification, financial parameters and evaluation criteria provided under the RFP, Adani Airport Holdings Limited (parent company of JIAL) was selected as the Service Provider, with whom JIAL had entered into a Master Services Agreement. The Authority notes that the revenues projected by JIAL are in line with the said Agreement.

11.2.8 The Authority notes that the total Non-aeronautical revenue projected by JIAL for the Third Control Period is only ₹ 77.76 Crores (refer Table 157) which is substantially lower than the actual Non-aeronautical revenue earned by AAI in Second Control Period (FY 2016-17 till FY2020-21) which was ₹ 96.74 Crores, and ₹ 101.44 Crores till COD (FY 2016-17 till COD).

11.2.9

11.2.10 The Authority also observed that the NAR projected by JIAL 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 the JIAL, the Authority notes that the NAR projected by JIAL for the Third Control Period is ₹ 77.76 crores, which is significantly lower as compared to the O&M

expenses submitted by JIAL, which is ₹ 1389.38 crores (refer Chapter 10), and eventually defeats the ultimate purpose of PPP.

11.2.11 Jaipur, being a tourist destination, is highly flocked by international and domestic tourists and naturally have more propensity to purchase/spend on non-aeronautical activities at the airport. This behaviour is reflected in the passenger's spending pattern and have direct bearing on the NAR of the airport. Hence, there is a significant potential for non-aeronautical revenues and the aspect of appropriately harnessing the same by the AO and has been taken into consideration by the Authority in the non-aeronautical projections as brought out in Table 161.

11.2.12 Jaipur Airport has been given on PPP mode to bring efficiencies in operations by increasing the nonaeronautical revenues by the Airport Operator so that the benefits may be passed on to the users through cross-subsidization.

11.2.13 The Authority takes cognizance of the fact that non aeronautical revenues projected for the Third Control Period by JIAL considers the pandemic and economic conditions on traffic which will reduce the consumer spending at the airport. However, the Authority is not convinced that the revenue from Master Services Agreement is remaining constant for the period, while all the other costs are increasing substantially across the Third Control Period. Further, the Terminal Building space will increase considerably as is planned in FY 2023-24 (42% due to operationalization of Terminal-I) FY 2024-25 (11.4% due to upgradation of Terminal-II) adding more area for Non-aeronautical services.

11.2.14 The Authority takes cognizance of the fact that there would be a gradual increase in Non-aeronautical operations through increase in the Non-aeronautical area within the Terminal Building in FY 2023-24 and FY 2024-25 respectively, which will lead to increase in the Non-aeronautical revenues for the airport. Further, it is the responsibility of JIAL to ensure to achieve higher NAR in the Third Control Period than was achieved by AAI during the Second Control Period. In this context, there was no obligation on JIAL to accept the bid of Master Concessionaire offering such low revenue share.

11.2.15 When an airport operator takes an initiative, such as undergoing an open global competitive bidding process, it is for the betterment of the airport and is in the interest of the airport users. The Holding Company (Group entity of Adani Enterprises Limited itself) was selected as the Master Concessionaire. However, this does not result in enhancing the material gains to the airport users by higher cross subsidization of NAR. It is pertinent to note that JIAL could have leveraged the technical know-how to bring in efficiencies in generating NAR without the Master Concessionaire. No advantages have been provided to the airport users due to the Master Concession Agreement.

11.2.16 Moreover, considering the positive outlook provided by the Expert Agencies, the outlook of the GDP growth predicted by the GoI and the encouraging trend in the traffic numbers reported in FY 2022-23 and the first half of FY 2023-24 (April 2023 to September 2023), the Authority is of the view that the passenger traffic will revert to pre-covid levels by FY 2023-24. Further the traffic is expected to progressively increase during the Third Control Period (as also discussed in Chapter 6).

11.2.17 With the steady increase in passenger traffic and expansion of Terminal Building area (T-I operationalization and T-II upgradation), the Authority foresees an increase in passenger related Non-aeronautical revenue across the Third Control Period. Further, the Authority expects JIAL to bring in efficiencies in Non-aeronautical operations as being followed by other PPP airports wherein the proportion of Non-aeronautical revenue projected by JIAL is equal or comparable to the quantum of O&M expenses,

whereas, in the case of JIA the situation is peculiar wherein the projection of NAR is substantially lesser than O&M expenses. Further, this will impact the interest of the airport users as 30% of the Non-aeronautical revenue is used for cross subsidization. The Authority urges JIAL that it should make efforts to generate non-aeronautical revenue higher than that was earned by AAI during the Second Control Period.

11.2.18 – 11.2.23

11.2.24 Based on the above considerations, the Authority has estimated the total Non-aeronautical revenues for the Third Control Period for JIA 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 JIA for the Third Control Period.*
- ii. *The Authority has considered the actual revenue earned by JIAL for FY 2022-23, as this FY has already passed.*
- iii. *The Authority proposes not to consider ₹ 0.58 crores of Notional Income on Security Deposit as it relates to IND AS adjustment.*
- iv. *The Authority proposes to consider the ₹ 0.26 crores of AEP Charges as part of the Non-Aeronautical Revenue.*
- v. *The Authority also proposes to consider the revenue from space rentals of approximately ₹ 0.24 crores from cargo agencies as Aeronautical revenue and not be considered as part of the NAR for the Third Control period.*
- vi. *The NAR of ₹ 24.03 crores (after excluding space rental revenue collected from airlines) of FY 2019-20 of AAI has been assumed as base for FY 2023-24, since the traffic has significantly reached the pre-COVID level of FY 2019-20 in FY 2023-24.*
- vii. *The Authority has taken cognizance of the following facts and projections of the NAR have been revised with effect from FY 2024-25 onwards:*
 - *Operationalization of T-I to take place in Q4 of FY2023-24 and the refurbishment of T-II is scheduled in FY 2024-25 thereby increasing the terminal building area by 53.4% (42% at T-I and 11.4% for T-II) from the existing terminal area. This will consequently result into increase in the non-aeronautical area at the Jaipur International Airport and expect to augment the non-aeronautical revenue for the Airport Operator on this account. Further, it is relevant to highlight that increase in the terminal building area may not result into directly proportional increase in the non-aeronautical revenue. Hence, the Authority proposes to consider Two third (2/3) increase in the non-aeronautical revenue on account of increase in Terminal Building area.*
 - *The effect of increase in traffic has been considered with effect from FY 2024-25 on the base of FY 2023-24.*
 - *Further, the non-aeronautical revenue projections have taken into consideration the impact of inflation as prescribed in Chapter 9 of the Consultation Paper.*

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 162.

Comments by JIAL: -

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 obviate 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 JIAL 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 JIAL 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 JIAL 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 219 of CP relating to Taxation for the TCP Revenues

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

- *30% Non-Aeronautical revenues 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 JIAL:

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 on page 223-224 CP relating to ARR

14.2.2 The Authority notes that JIAL has on-going capital expenditure projects and other planned works, which have resulted in a higher ARR for the Third Control Period. Whereas the existing traffic base is not sufficient for the complete recovery of ARR in the current Control Period and this would require a significant increase in tariff. 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 only lesser tariff years being available for recovery of the ARR. In this regard, the Authority would like to draw 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 on 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 January 12, 2017. Further, it is pertinent to note that considerable investments in capacity have already been made which would be sufficient for the foreseeable future. Therefore, the subsequent control periods are expected to witness lower capital expenditure requirements while catering to a larger traffic base. 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 JIAL would decide the balance between cost recovery and its potential impact on air traffic demand.

Comments by JIAL: -

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. 790 Crs has been made in Jaipur Airport.

9.1.1.2 Considering the potential demand and operational requirements, AAI planned for the expansion of terminal by FY 2020-21 which was allowed by the

Authority on incurrence basis in the tariff order for SCP. The same project is also mandated under Schedule U of the Concession Agreement.

9.1.1.3 JIAL has earmarked various investments including but not limited to what was envisaged by AAI, and it is mobilizing investments of approx. Rs 6,000 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 Jaipur Airport has been incurring losses since privatization. JIAL has incurred losses in FY22 and FY23 totaling ~Rs. 182 Crs. JIAL is likely to incur losses of Rs. 180 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. 2,142 Crs, approx. 30% (Rs. 644 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 like New Terminal and other 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 JIAL.

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 30% of AAI true-up.**

9.2 AERA proposal as 14.2.8 page 225 of CP relating to Tariff Card for TCP

14.2.8 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 JIAL 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 this Consultation Paper.

Comments by JIAL: -

- 9.2.1 The tariff card was submitted to the Authority on 18th March 2024 and subsequently published by the Authority vide Public Notice No. 38/2023-24 dated 18th March 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 30% 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 JIAL 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 – Cost Estimate for Boundary Wall
- iii. Annexure 3 – Cost Estimate for Landside Road as part of Cargo Terminal Cost
- iv. Annexure 4 – ACRP Report
- v. Annexure 5 – EY Report on Future of Pay
- vi. Annexure 6 – Committee's Report on Recovery of Electricity

Annexure 1



मारत सरकार

केंद्रीय लोक निर्माण विभाग

तकनीकी अनुप्रयोग एवं मानक एकाई

कमरा संख्या 418 ए-विंग, निर्माण भवन, नई दिल्ली।

टैलीफैक्स-011-23062339 ईमेल-delsetascsq.cpwd@nic.in



संख्या: 158 /SE(TAS)/GST/ 2022/ 331-*ट्रैकिंग*

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.18 th 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 2021 or DSR-2021 = W

Hence, amount of P/E and D/E with applicable rate of GST @ 18%

in place of 12% = $W \times 1.0633 = 1.0633 W$

Add applicable cost index (BCI) of the station, say 10% = $0.10633 W$

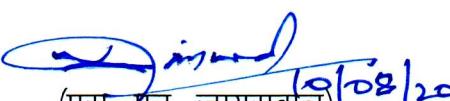
Grand Total=1.16963W

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) 10/08/20
 कार्यपालक अभियन्ता (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 / मुख्य अभियन्ता / परियोजना प्रबन्धक / अधीक्षण अभियन्ता / कार्यपालक अभियन्ता के 0 लो 0 नि 0 वि 0 तथा लो 0 नि 0 वि 0 दिल्ली के सभी अधिकारियों को सूचना एवं आवश्यक कार्यवाही हेतु।



CENTRAL PUBLIC WORKS DEPARTMENT

OFFICE MEMORANDUM

SE/TAS/GST/ 07

ISSUED BY AUTHORITY 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:-

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, Justifications etc executed after the commencement of GST with effect from 01/07/2017	<p>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.</p> <p><u>Model Calculation Sheet</u></p> <table border="1"> <tbody> <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> </tbody> </table>	1.	Bare rate (without GST) of Material, Labour, Sundries POL and T&P etc.	"W"	2.	Asdd 1% water charges on "W"	"A"	3.	Sum after adding Water Charges @1% on "W"	"WC" = (W+A)	4.	Add 12% GST applicable on work contract, by reversible method (multiplying factor 0.1405)	"B" = (0.1405*WC)	5.	Sum after adding GST	"X" = (WC+B)	6.	Add 15% CP & OH on "X"	"C"		Sum after adding 15% CP&OH	"Y"= (X+C)	7.	Add labour cess @1% on "Y"	"D"	8.	Gross total after adding 1% labour cess	"Z"=(Y+D)
1.	Bare rate (without GST) of Material, Labour, Sundries POL and T&P etc.	"W"																											
2.	Asdd 1% water charges on "W"	"A"																											
3.	Sum after adding Water Charges @1% on "W"	"WC" = (W+A)																											
4.	Add 12% GST applicable on work contract, by reversible method (multiplying factor 0.1405)	"B" = (0.1405*WC)																											
5.	Sum after adding GST	"X" = (WC+B)																											
6.	Add 15% CP & OH on "X"	"C"																											
	Sum after adding 15% CP&OH	"Y"= (X+C)																											
7.	Add labour cess @1% on "Y"	"D"																											
8.	Gross total after adding 1% labour cess	"Z"=(Y+D)																											

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.


 Superintending Engineer (TAS)
 CSQ, CPWD, Nirman Bhawan,
 New Delhi
 dated 8/11/2017

No158/GST/SE(TAS)/CPWD/2017/ 258-F

Copy to:-

- 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.

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

Dated 28/05/2018

No158/GST/SE(TAS)/CPWD/2018/ 88
E-file No:-9043757

Copy to:-

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

Superintending Engineer (TAS)

Annexure 2 - Rate Reference for Airport Boundary Wall

WORKSHEET FOR AIRPORT BOUNDARY WALL (UNIT RATE ANALYSIS)

Sr No	Description of Item	No	L	B	D	Quantity	Unit	CPWD DSR 2021 Rate (Rs.)	Amount (Rs.)	Rate Reference
AIRPORT BOUNDARY WALL										
	Cost Index of Jaipur over CPWD PAR 2021	1.088								
	Cost Index of Jaipur over CPWD DSR 2021	1.088								
Given:										
	Assumptions: Columns for Boundary wall Super Structure are considered as Precast and Y angle details considered as per section H-H given in DWG, reinforcement for precast concrete considered on per Cum basis.									TYPICAL DETAILS OF AIRSIDE COMPOUND WALL. Dated 31.01.2021
	Consider 100 Rmt. Of wall for costing	100.00		m						
Sub Structure										
	PCC Thickness Below footing	0.10		m						
	Depth of excavation	1.00		m						
	PCC Projection/ Thickness for footings	0.10		m						
	Working Space	0.30		m						
Foundations										
	Footing	47.00	1.20	1.20	0.25					
	Column	47.00	0.30	0.30	0.65					
Super Structure										
	Details of Columns	47.00	0.250	0.25	2.70					
	Details of Precast Wall Elements	46.00	0.15	1.00	2.70					
	600 dia Concentrina wires	1.00	100.00				Rmt			
	Barbed wires	6.00	100.00				Rmt			
	MS Angle 50 x 50 x 6 mm	47.00	1.50				Rmt			
	MS Plate 75 X 100 X 10	47.00					Nos			
	Flat 50 X 6 X 350	94.00					Nos			
	MS Angle 50 x 50 x 6 mm - Wt per meter in Kg	4.50								
	MS Plate 75 X 100 X 10 - Wt per Nos in Kg	0.59								
	Flat 50 X 6 X 350 - Wt per Nos in Kg	0.94								
A Sub Structure Works										
1.0	Excavation Works in all types of soils									
1.1	Upto 1.50 m					233.31	Cum	205.45	47933.74	CPWD, DSR 2021, Item No 2.6.1
	For Foundation	47.00	1.80	1.80	1.30	197.96				
	For Wall	47.00	0.70	0.10	0.30	0.99				
	For tie beam at ground level	1.00	85.90	0.80	0.50	34.36				

Annexure 2 - Rate Reference for Airport Boundary Wall

WORKSHEET FOR AIRPORT BOUNDARY WALL (UNIT RATE ANALYSIS)

Sr No	Description of Item	No	L	B	D	Quantity	Unit	CPWD DSR 2021 Rate (Rs.)	Amount (Rs.)	Rate Reference
2.0	Disposal of surplus excavated earth upto 20 km to contractor's own dumping ground					37.86	Cum	526.00	19914.03	CPWD, DSR 2021, Subhead - 1.0, Carriage of Materials Item No. 1.1.2
	Excavation Works of hard rock					233.31				
	Backfilling					-195.45				
3.0	Backfilling with approved earth available within the site					195.45	Cum	253.95	49634.94	CPWD, DSR 2021, Item No. 2.25
	For Backfilling (Upto EGL)	1.00	233.31			233.31				
	Deduction for PCC	-1.00	12.65			-12.65				
	Deduction for Raft	-1.00	16.92			-16.92				
	Deduction for Columns	-1.00	2.75			-2.75				
	Deduction for precast wall Element	-46.00	0.15		0.30	-2.02				
	Deduction for precast column Element	-47.00	0.25		0.30	-3.53				
4.0	M-15 Plain Cement Concrete (Blinding upto 100 mm									
4.1	PCC For Foundation					12.65	Cum	8174.75	103394.24	(CPWD, DSR 2021, Item No 4.20.1.2)
	For Boundary Wall	47.00	1.40	1.40	0.10	9.21				
	For tie beam at ground level	1.00	85.90	0.40	0.10	3.44				
5.0	M-30 Reinforced Cement Concrete									
5.1	For Footings					16.92	Cum	8825.35	149324.92	CPWD, DSR 2021, Item No 5.33.1.2
	For Boundary Wall	47.00	1.20	1.20	0.25	16.92				
5.2	For Column					2.75	Cum	8825.35	24265.30	CPWD, DSR 2021, Item No 5.33.1.2
	For Boundary Wall	47.00	0.30	0.30	0.65	2.75				
5.3	For tie beam at ground level	1.00	85.90	0.20	0.40	6.87	Cum	8825.35	60647.81	CPWD, DSR 2021, Item No 5.33.1.2
6.1	Sides of Footings					67.68	Sqm	307.95	20842.06	CPWD, DSR 2021, Item No 5.9.1
	For Boundary Wall	47.00	4.80		0.30	67.68				
6.2	Sides of Column					36.66	Sqm	804.25	29483.81	CPWD, DSR 2021, Item No 5.9.6
	For Boundary Wall	47.00	1.20		0.65	36.66				
6.3	Sides of Tie beams	2.00	85.90		0.40	68.72	Sqm	608.35	41805.81	CPWD, DSR 2021, Item No 5.9.5
7.0	Reinforcement									
7.1	For Footings	45.00	16.92			0.76	MT	89650.00	68259.51	CPWD, DSR Item No 5.22.6
7.2	For Columns	160.00	2.75			0.44	MT	89650.00	39438.83	CPWD, DSR Item No 5.22.6
7.3	For tie beams	100.00	6.87			0.69	MT	89650.00	61607.48	CPWD, DSR Item No 5.22.6
B Super Structure										
1.0	M-30 Reinforced Cement Concrete									
1.1	For Precast Columns					7.93	Cum	12321.25	97722.91	CPWD, DSR 2021, Item No 5.15
	For Boundary wall @ 3m C/c	47.00	0.250	0.25	2.70	7.93				

Annexure 2 - Rate Reference for Airport Boundary Wall

WORKSHEET FOR AIRPORT BOUNDARY WALL (UNIT RATE ANALYSIS)

Sr No	Description of Item	No	L	B	D	Quantity	Unit	CPWD DSR 2021 Rate (Rs.)	Amount (Rs.)	Rate Reference
1.2	For Precast Wall Panels					18.15	Cum	12321.25	223653.24	CPWD, DSR 2021, Item No 5.15
	For Boundary wall	46.00	0.15	1.00	2.70	18.15				
2.0	Reinforcement (TMT 500)					2.36	MT	89650.00	211404.54	CPWD, DSR 2021, Item No 5.22.6
2.1	For Columns	160.00	7.93			1.27	MT			
2.2	For Precast Wall Panels	60.00	18.15			1.09	MT			
3.0	External Weathershield Paint					680.06	Sqm	166.85	113468.68	CPWD, DSR 2021, Item No 13.46.1
	On Precast Wall Panels	46.00	5.16		2.40	569.66				
	On Columns	46.00	1.00		2.40	110.40				
4.0	Concentrina Wires					100.00	Rmt	303.65	30365.00	CPWD, DSR 2021, Item No 16.53
	On Boundary Wall in 2 layer	1.00	100.00			100.00				
5.0	Barbed Wires					600.00	Rmt	19.60	11760.00	CPWD, DSR 2021, Item No 16.18.1
	For Boundary Wall on Columns	6.00	100.00			600.00				
6.0	MS Angle for Concentrina					433.47	Kg	93.05	40334.31	CPWD, DSR 2021, Item No 10.1
	MS Angle 50 x 50 x 6 mm	47.00	1.50		4.50	317.25				
	MS Plate 75 X 100 X 10	47.00			0.59	27.67				
	Flat 50 X 6 X 350	94.00			0.94	88.55				
7.0	Synthetic enamel paint over MS work @ 15 Sqm per MT.	1.00	433.47	0.015		6.50	Sqm	186.95	1215.56	CPWD, DSR 2021, Item No 13.61.1 + Item No 13.50.3
8.0	Add 10% for working restraints in Airside area						LS	10%	144,648	Allowance based on past experience of similar projects
	SUB TOTAL								1,591,124	
	SUB TOTAL (Adding for GST @ 6.33% for DSR Items)								1,691,843	
	COST INDEX OVER PAR / DSR Items								1.088	
	TOTAL (Rs.)								1,840,725	
	Unit Cost (Rs. per metre)								18,407	
	Say Rs.								18,400	

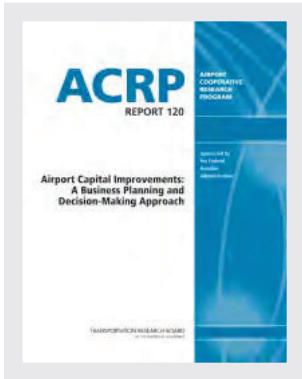
Annexure 3 - Cost Reference for Landside Road (as part of Cargo Terminal Cost)

WORKSHEET FOR AT-GRADE ROADS (UNIT RATE ANALYSIS SHEET 27)

Sr. No.	Description of Item	No	L	B	D/H	Quantity	Unit	Rate (Rs.)	Amount (Rs.)			Rate Reference
									PAR /DSR Items	Amount (Rs.)	Market Rate Items Amount (Rs.)	
AT-GRADE ROADS												
	Cost Index of Jaipur over CPWD PAR 2021	1.088										
	Cost Index of Jaipur over CPWD DSR 2021	1.088										
	Carriage way area	1	10000	14.0		140,000	Sqm.					
	Footpath	1	10000	3.4		34,000	Sqm.					
	Median	1	10000	0.6		6,000	Sqm.					
						180,000	Sqm.					
A	Carriageway area including shoulders											
1.0	Excavation upto 1.50m in all types of soils	1	140000		1.075	150500	Cum	205.45	30,920,225		30,920,225	CPWD, DSR 2021, Item No 2.6.1
2.0	Disposal of surplus excavated earth upto 20 km to contractor's own dumping ground	1	140000		1.075	150500	Cum	526.00	79,163,000		79,163,000	CPWD, DSR 2021, Item No 1.1.2
3.0	Subgrade using approved material	1	140000		0.500	70000	Cum	978.55	68,498,500		68,498,500	CPWD, DSR 2021, Item No 16.3.10 &16.1
4.0	Granular Sub base (GSB)	1	140000		0.200	28000	Cum	3310.00		92,680,000	92,680,000	MoRTH Rate analysis_CPWD; Item No 4.01-iii
5.0	Wet mix Macadam (WMM)	1	140000		0.250	35000	Cum	3440.00		120,400,000	120,400,000	MoRTH Rate analysis_CPWD; Item No 4.14
6.0	Dense Bituminous Macadam (DBM)	1	140000		0.075	10500	Cum	14554.00		152,817,000	152,817,000	MoRTH Rate analysis_CPWD; Item No 5.04-ii
7.0	Bituminous concrete (BC)	1	140000		0.050	7000	Cum	16480.00		115,360,000	115,360,000	MoRTH Rate analysis_CPWD; Item No 5.05-ii
8.0	Primer Coat with bitumen emulsion (PC)	1	140000			140000	Sqm	110.00		15,400,000	15,400,000	MoRTH Rate analysis; Item No 5.01
9.0	Tack coat with bitumen 60/70(TC)	2	140000			280000	Sqm	15.00		4,200,000	4,200,000	MoRTH Rate analysis; Item No 5.02
10.0	Road Markings with ready mixed thermoplastic paint @ 2% of total road area	1	2800			2800	Sqm	623.80	1,746,640		1,746,640	CPWD, DSR 2021, Item No. 16.62
B	Footpath											
		1	34000				Sqm					
1.0	Excavation upto 1.50m in all types of soils	1	34000		1.010	34340	Cum	205.45	7,055,153		7,055,153	CPWD, DSR 2021, Item No 2.6.1
2.0	Disposal of surplus excavated earth upto 20 km to contractor's own dumping ground	1	34000		1.010	34340	Cum	526.00	18,062,840		18,062,840	CPWD, DSR 2021, Item No 1.1.2
3.0	Subgrade using approved material	1	34000		0.500	17000	Cum	978.55	16,635,350		16,635,350	CPWD, DSR 2021, Item No 16.3.10 &16.1
4.0	Granular Sub base (GSB)	1	34000		0.200	6800	Cum	3310.00		22,508,000	22,508,000	MoRTH Rate analysis_CPWD; Item No 4.01-iii
5.0	Wet mix Macadam (WMM)	1	34000		0.200	6800	Cum	3440.00		23,392,000	23,392,000	MoRTH Rate analysis_CPWD; Item No 4.14
6.0	60mm thick factory made cement concrete interlocking paver blocks of M -30 grade with sand bedding	1	34000		0.110	34000	Sqm.	951.00	32,334,000		32,334,000	CPWD, DSR 2021, Item No 16.68, Page No 267
C	Miscellaneous Items											
1.0	Structural Steel work for Cantilever Gantry (4 Nos.) @ 15 MT. per no.	2	15000			30000	Kg	154.90	4,647,000		4,647,000	CPWD, DSR 2021, Item No 10.16.1
2.0	Factory made kerb stone of M-25 grade cement concrete	2	10000	0.175	0.45	1575	Cum.	8613.55	13,566,341		13,566,341	CPWD, DSR 2021, Item No 16.69
3.0	SITC Street lighting with LED					180,000	Sqm	150.00	27,000,000		27,000,000	(Item no. 6.19.1 of E & M PAR 2021)
4.0	IP Based CCTV system					180,000	Sqm.	200.00	36,000,000		36,000,000	(Item no. 6.10.2 of PAR 2021)
D	Median with landscaping											
1.0	Factory made kerb stone of M-25 grade cement concrete	2	10000	0.175	1.00	3,500	Cum.	8613.55	30,147,425		30,147,425	CPWD, DSR 2021, Item No 16.69
2.0	Add for turfing											
2.1	Supplying and stacking of good earth at site (50% of total qty)	1	10000	0.25	0.15	188	Cum	720.00	135,000		135,000	CPWD, Horticulture DSR 2021, Item No 2.2
2.2	Supplying and stacking sludge at site (25% of total qty)	1	10000	0.25	0.15	94	Cum	465.00	43,594		43,594	CPWD, Horticulture DSR 2021, Item No 2.3
2.3	Supplying and stacking at site dump manure screened through sieve of I.S. designation 16 mm (25% of total qty)	1	10000	0.25	0.15	94	Cum	415.00	38,906		38,906	CPWD, Horticulture DSR 2021, Item No 2.4.2
2.4	Mixing earth and sludge or manure	1	10000	0.25	0.15	375	Cum	75.00	28,125		28,125	CPWD, Horticulture DSR 2021, Item No
2.5	Spreading of sludge, dump manure and / or good earth in required thickness	1	10000	0.25	0.15	375	Cum	50.00	18,750		18,750	CPWD, Horticulture DSR 2021, Item No 2.9
2.6	Providing & laying Selection no. 1 grass turf with earth 50mm to 60mm thickness	1	10000	0.25		2,500	Sqm.	80.00	200,000		200,000	CPWD, Horticulture DSR 2021, Item No 2.34
2.7	Grassing with selection No. 1 grass including watering and maintenance of the lawn for 60 days or more till the grass forms a thick lawn	1	10000	0.25		2,500	Sqm.	20.00	50,000		50,000	CPWD, Horticulture DSR 2021, Item No 2.10.2
3.0	Road Signages & sign boards (@ 2% of total cost)						LS	1%	3,662,908	5,467,570	9,130,478	Allowance as per past experience of similar projects
4.0	Surface drainage system including connection to existing drainage system						LS	15%	54,943,627	82,013,550	136,957,177	Allowance as per past experience of similar projects
	SUB TOTAL								424,897,385	634,238,120	1,059,135,505	
	SUB TOTAL (Adding for GST @ 6.33% for PAR / CPWD Items)								451,793,390	748,400,982	1,200,194,371	
	COST INDEX OVER PAR / DSR ITEMS								1.088	1.000		
	TOTAL AMOUNT (Rs.)								491,551,208	748,400,982	1,239,952,189	
	Unit Cost (Rs. Per Sqm.)										6,889	
	Say Rs.										6,900	

Annexure 4 - ACRP Report

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Airport Capital Improvements: A Business Planning and Decision-Making Approach (2014)

DETAILS

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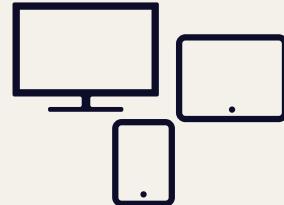
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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP REPORT 120

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

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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

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FOREWORD

By **Lawrence D. Goldstein**

Staff Officer

Transportation Research Board

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.

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.



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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

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

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 “landsides.” 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:

$$\text{Cost} = f(\text{Area}, \text{MTOW}, \text{GearConfig}, \text{PvmtType}, \text{FreezingIndex})$$

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 R²:** R² 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 R² 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.

Project Type	are o ro e ts	are o ur e esponses
<i>Horizontal Construction Projects</i>		
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%
Security access systems	N/A	N/A
<i>Vertical Construction Projects</i>		
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
<i>Horizontal Construction Projects</i>	
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	
<i>Vertical Construction Projects</i>	
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.

Historical Construction Data Tables	
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	PAI
Install weather reporting equipment	Weather
Remove on-airport obstructions (vegetation)	On-airport Veg Removal
Construct aircraft rescue and fire fighting facility	ARFF
Construct snow removal equipment building	REBldg
Ancillary Data Tables	
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.

Field	Example
Record identifier	Data point CETR 9
Airport FAA identifier	MV
State	MA
Project description	Shift Runway 6-2 0 Northeast
Year	2000
Total project cost	,9,6

Table 8. Structure of construction data tables—CIV values.

Project Type: Construction or rehabilitation runway	
Field	Value
Runway area	0,000 ft ²
MTO of design aircraft	9,000 lbs.
Landing gear configuration	Dual wheel (D)

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.

Conversion	Conversion	Multiplication Factor
Single wheel	Dual wheel	0.
Single wheel	Dual tandem	0.
Dual wheel	Dual tandem	0.6
Double dual tandem	Dual tandem	.0
Dual tandem	Single wheel	2.0
Dual tandem	Dual wheel	.
Dual wheel	Single wheel	.
Double dual tandem	Dual wheel	.

Source: 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.

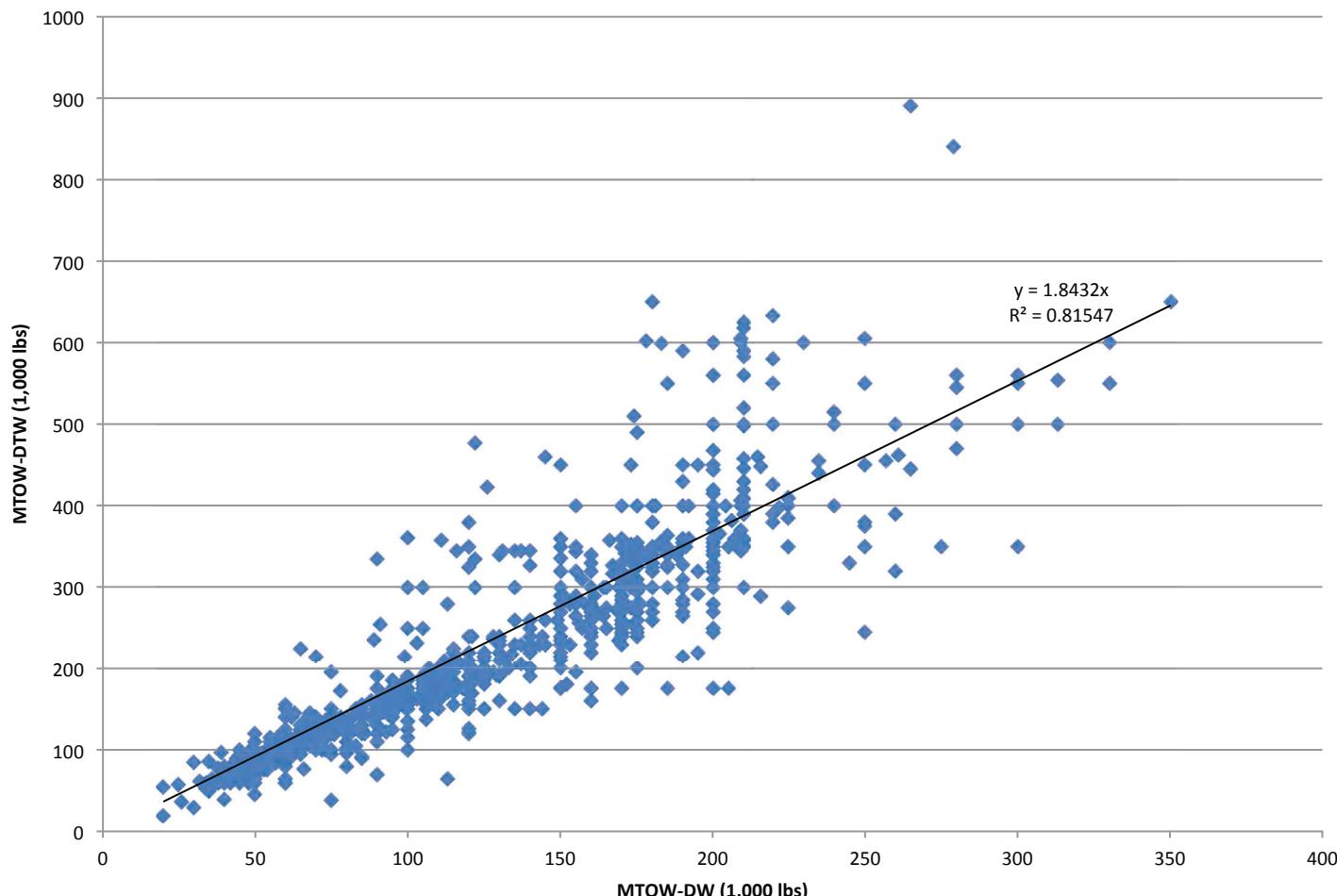


Figure 1. Relationship between MTOW in DW and DTW landing gear configurations.

Table 10. Results of data collection.

Project Type	Total Data Points	Collected Data Points	Yield (%)
Construction Projects			
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)			
Capital Projects			
Construct ARFF facility	2	2	9. %
Construct RE building		2	.6%
All Projects			
Total	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,

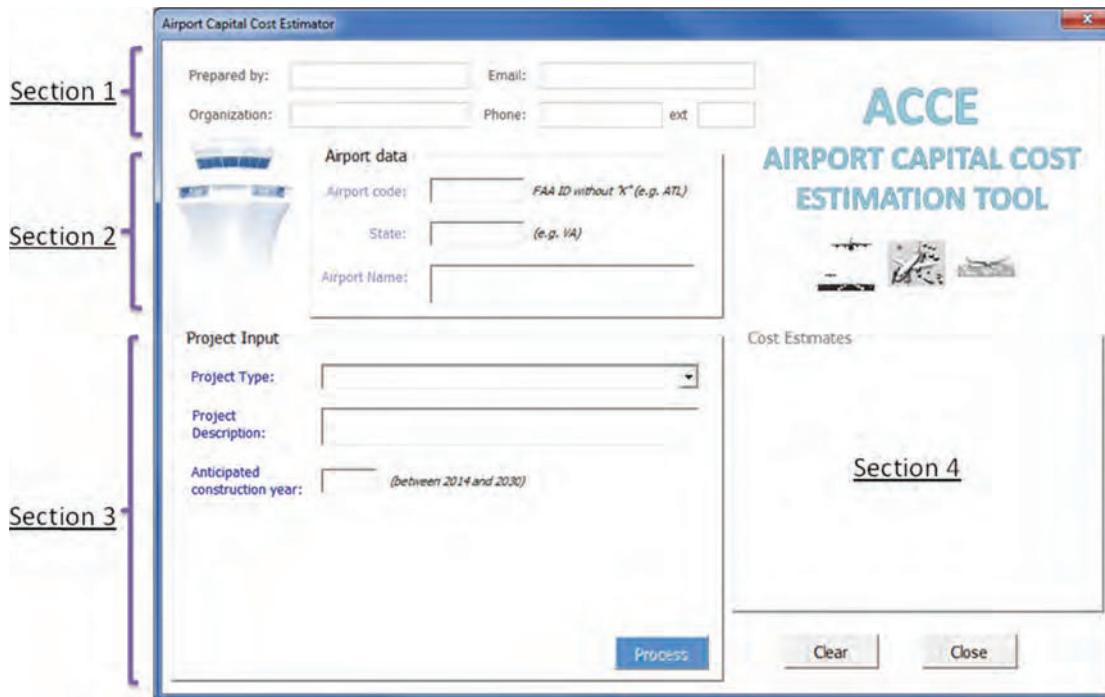


Figure 2. ACCE main user interface.

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 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.

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.

Table 12. Values used to establish low and high cost estimates.

Project	o n e	i n 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%.

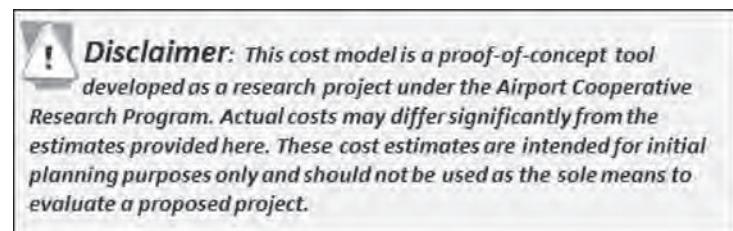
5. **Disclaimer:** Each cost-estimating report generated by ACCE is accompanied by a disclaimer (Figure 5). The purpose of the disclaimer is to remind the user that the ACCE model was developed as a proof-of-concept tool, using a cost database limited in scope and through an applied research project 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.

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

- **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.

Project Category	C	C	C	C	C	C
Initial site selection	No. of intersections	Airplane design group	Control tower			
Constructor responsibility	Area	MTO	Landing gear configuration	Airport type	Design free flying index value	
Construction plan lot	No. of spaces	Drainage type				
Construction expansion or re-configuration apron	Area	MTO	Landing gear configuration	Airport type	Design free flying index value	
Construction extension or re-configuration runway	Area	MTO	Landing gear configuration	Airport type	Design free flying index value	
Install airport visual aids	Type of system	No. of systems/runway ends				
Install signs	Type of NAVAID					
Install perimeter fencing	Length	No. of automatic gates	No. of manual gates	No. of pedestrian gates		
Install or re-configure runway lighting	Length	Runway approach type				
Install eaters or reporting equipment	Type of equipment					
Runway lighting	Length	Runway approach type				
Location airport structures	Acres					
Runway alignment	Length	Runway approach type				
Runway access	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.

Project Category	C	C	C	C	C	C	C
Construction area	Area	No. of stories	No. of bays	Construction type	Building skin type	Site conditions	
Construction expansion or re-configuration terminal building	Area	No. of stories	No. of spaces	Structural system	Architectural treatment	Lobby area	
Construction plan area	Area	No. of stories	Construction type	Building skin type	Site conditions		
Construction E building	Area	Annual enplanements	No. of stories	Building skin type	Site conditions		

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 recommended 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), β_0 is the intercept, β_1 is the coefficient multiplying the value of the first candidate independent variable (CIV_1), and β_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., β_1 and β_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

A-2 Airport Capital Improvements: A Business Planning and Decision-Making Approach**Table A.1. Final cost-estimating relationships.**

Project Type	Intercept (FY 2014 KS \$)	Coefficient 1	Coefficient 2
<i>Horizontal Projects</i>			
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		
<i>Vertical Projects</i>			
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 β_1	P-value β_2	P-value F-statistic
<i>Horizontal Projects</i>				
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
<i>Vertical Projects</i>				
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.

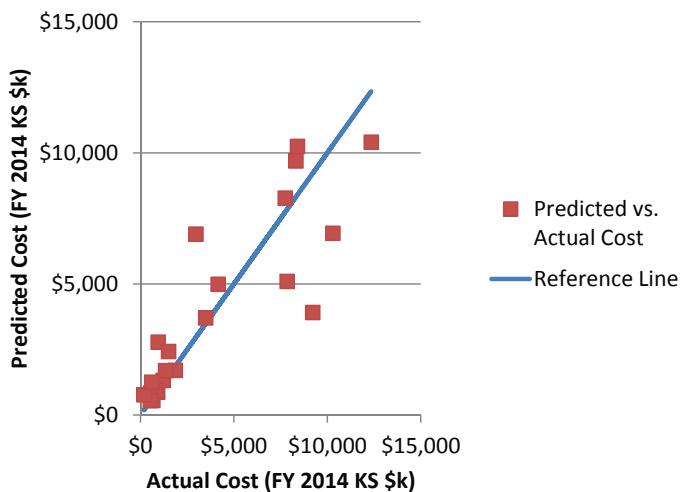


Figure A.1. *Predicted vs. actual cost—construct or rehabilitate taxiway.*

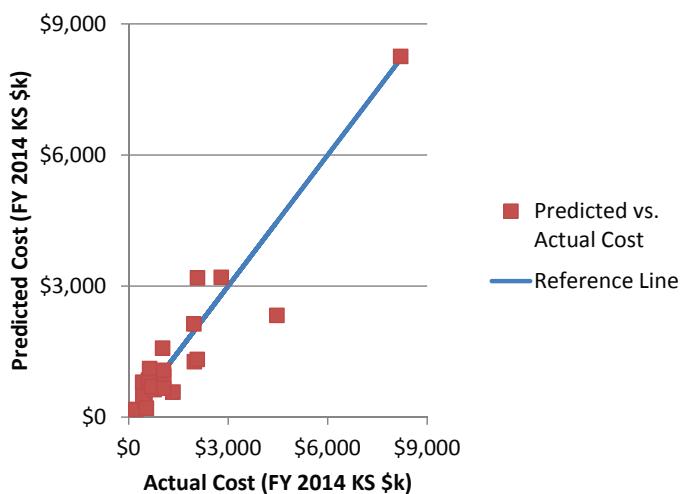


Figure A.2. *Predicted vs. actual cost—construct, expand, or rehabilitate apron.*

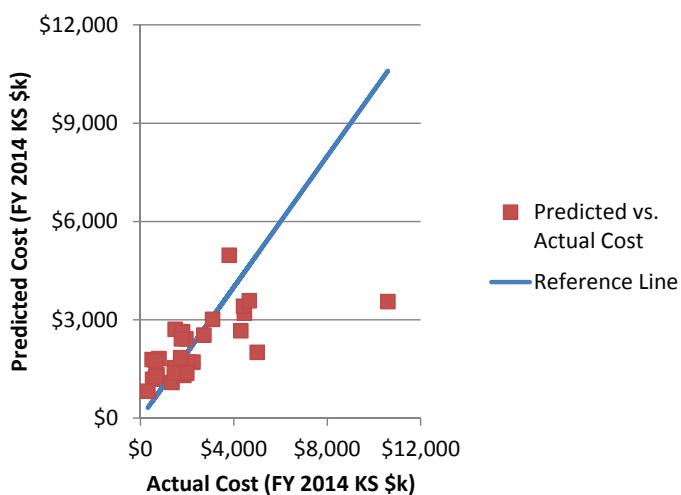


Figure A.3. *Predicted vs. actual cost—construct, extend or rehabilitate runway.*

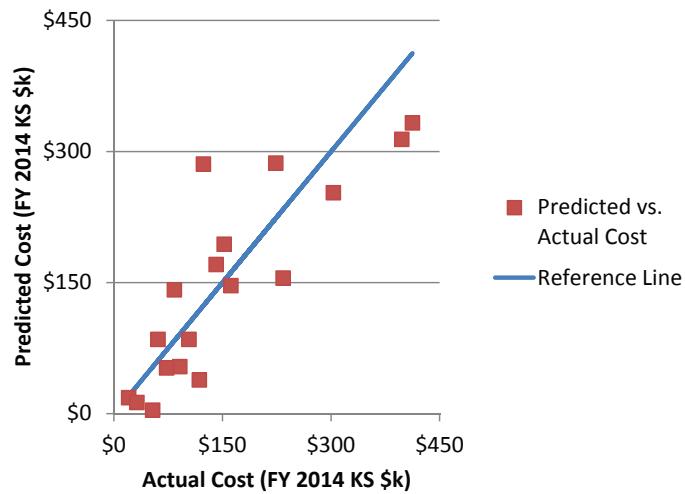
A-4 Airport Capital Improvements: A Business Planning and Decision-Making Approach

Figure A.4. *Predicted vs. actual cost—install perimeter fencing.*

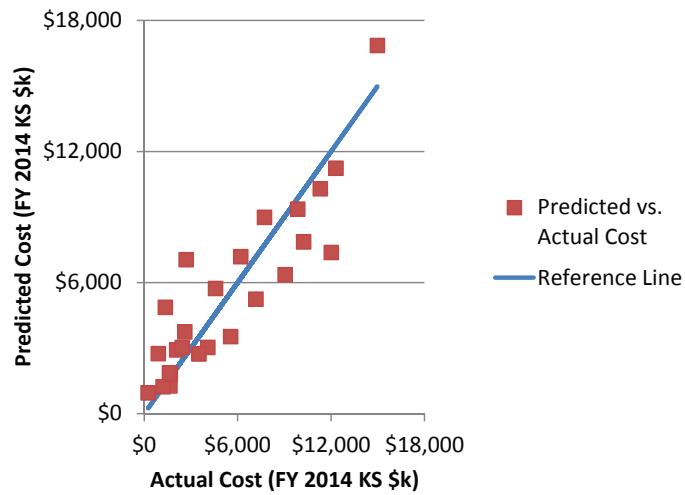


Figure A.5. *Predicted vs. actual cost—construct ARFF facility.*

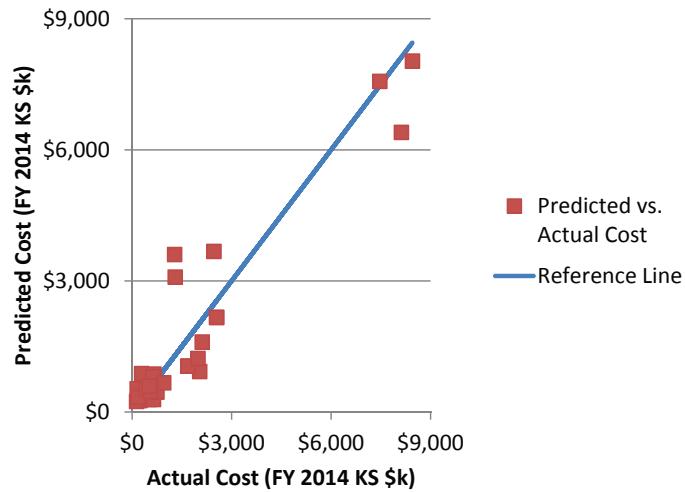


Figure A.6. *Predicted vs. actual cost—construct SRE building.*

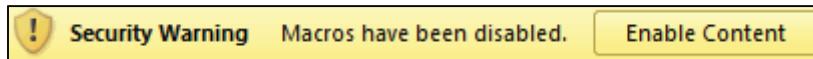


APPENDIX B

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

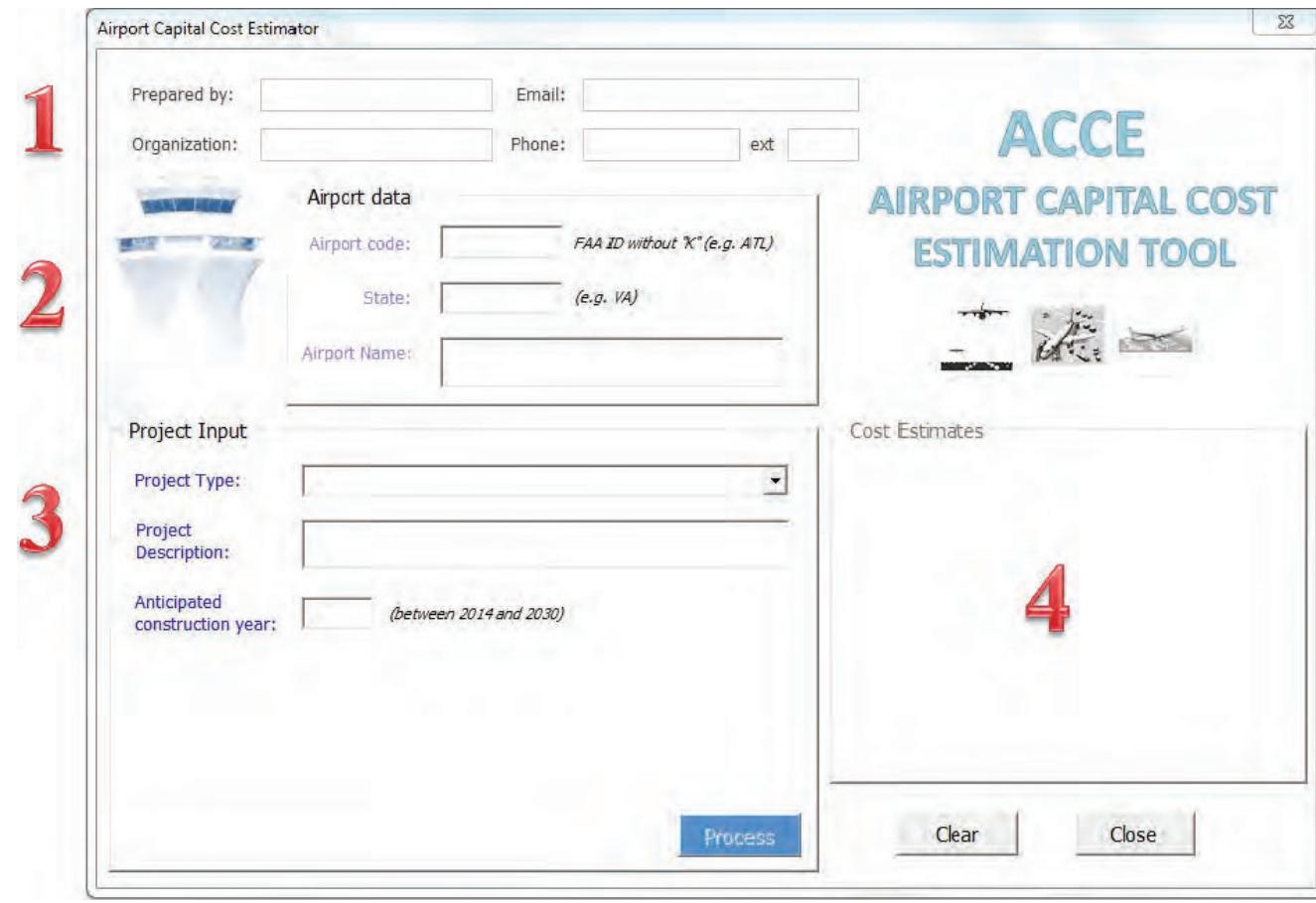
Before starting, have the following information ready:

- 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.

B-2 Airport Capital Improvements: A Business Planning and Decision-Making Approach



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:

Project Input

Project Type:	Runway
Project Description:	Extend Runway 14/32
Anticipated construction year:	2020 (between 2014 and 2030)
Pavement Area	145,000 Sq. Ft.
Design Aircraft MTOW	120,000 lbs.
Landing Gear Configuration	Dual tandem (DTW)
Process	

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:

Cost Estimates			
Inflation 2014 to 2020: +11.2%			
State: NH			
	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
Generate Report			

Other features:

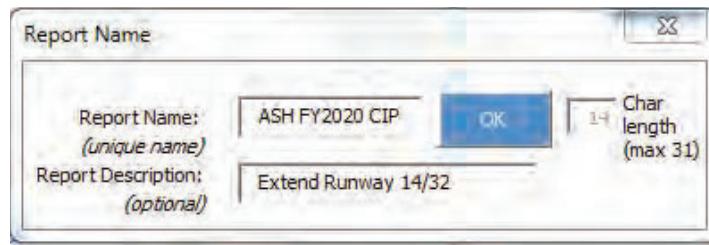
- ✓ The “Clear” button can be used to clear the input values, in order to generate a brand new cost estimate.
- ✓ The “Close” button closes the ACCE tool and returns the user to Microsoft Excel.

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.

B-4 Airport Capital Improvements: A Business Planning and Decision-Making Approach

- ✓ 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	Inflation 2014 to 2020: +11.2%													
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 <table border="1"> <thead> <tr> <th></th> <th>Cost Estimate</th> <th>Low Estimate</th> <th>High Estimate</th> </tr> </thead> <tbody> <tr> <td>FY2014\$</td> <td>\$2,100,000</td> <td>\$1,600,000</td> <td>\$2,700,000</td> </tr> <tr> <td>FY2020\$</td> <td>\$2,400,000</td> <td>\$1,800,000</td> <td>\$3,000,000</td> </tr> </tbody> </table>					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
	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												
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:

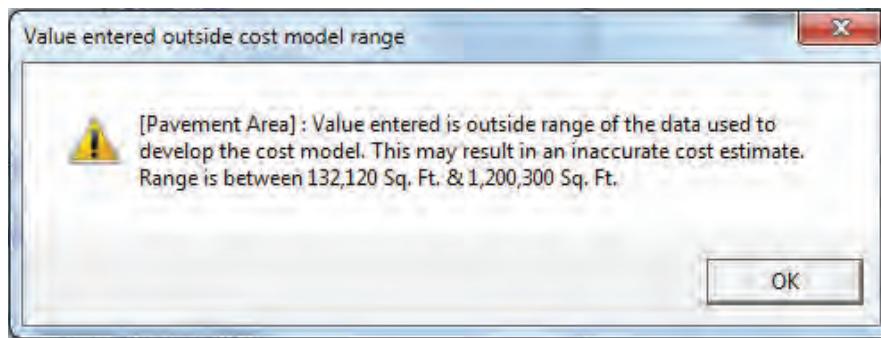


This toolbar supports the following functions:

- 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:

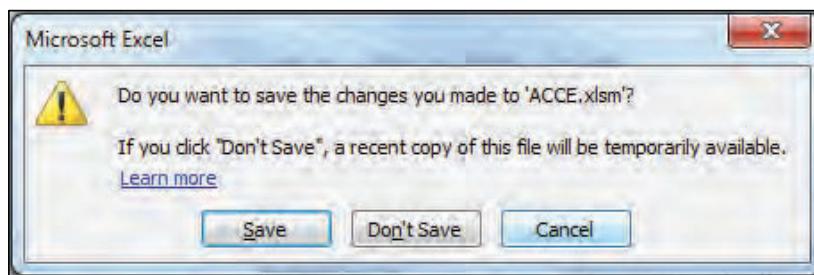


This warning does not, however, preclude use of the entered value—it is only a cautionary note explaining that the value may result in a greater than usual level of uncertainty.

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



Annexure 5 - EY's Report on Future of Pay

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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Notes to Editors

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Future of pay

March 2024



Building a better
working world



Agenda

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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.



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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



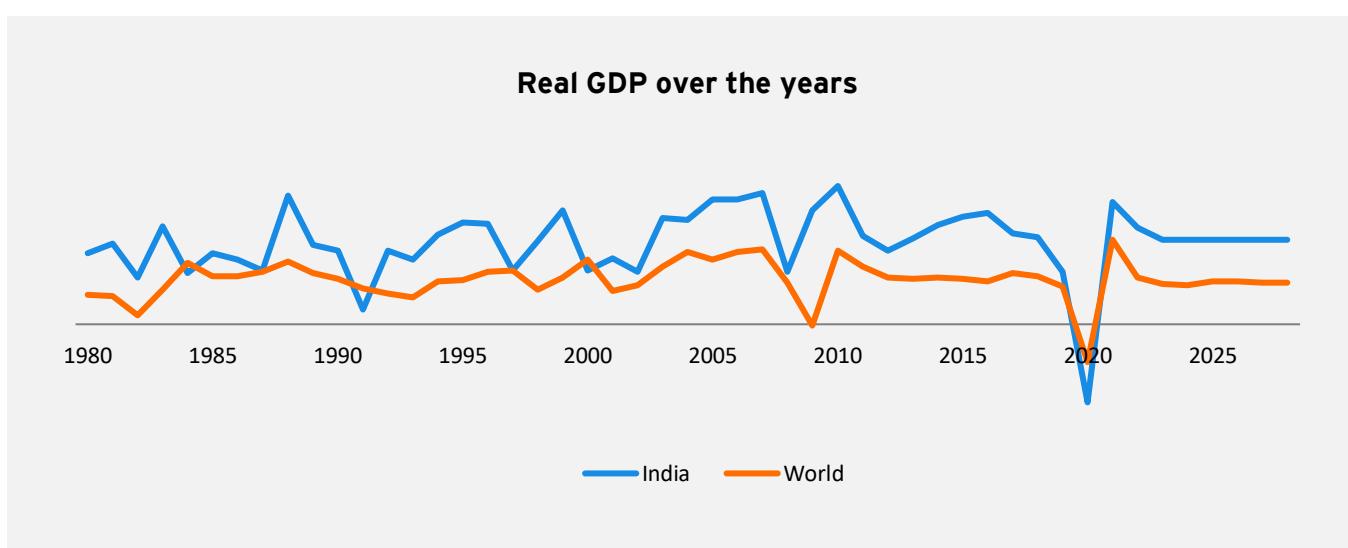
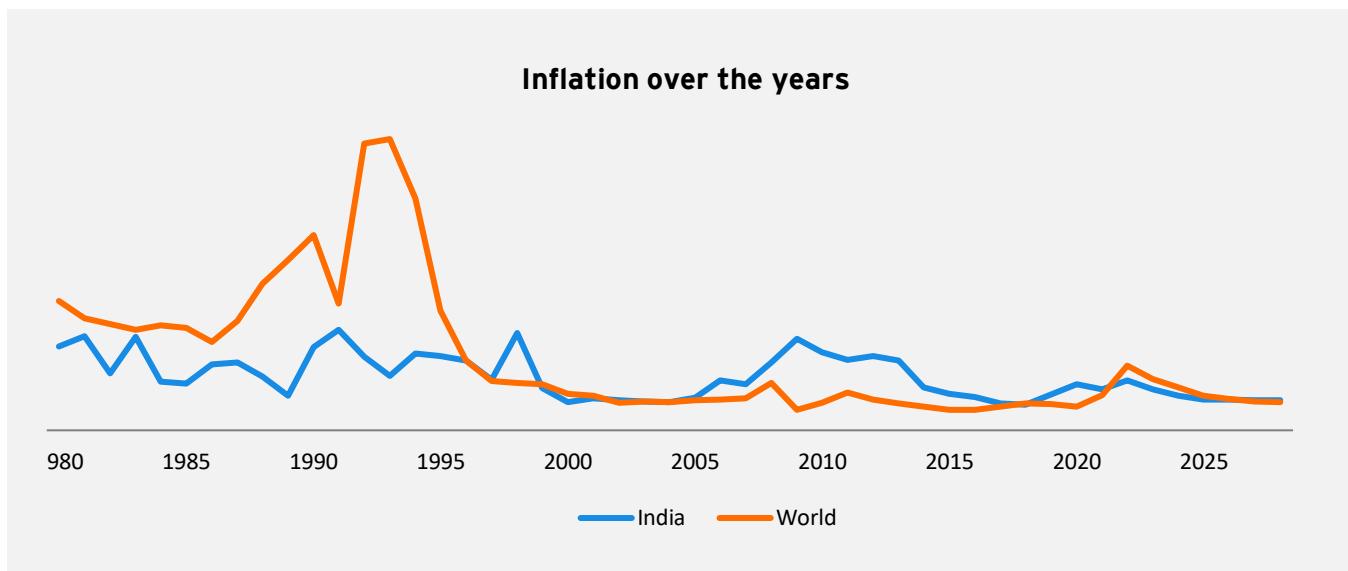
02

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.



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



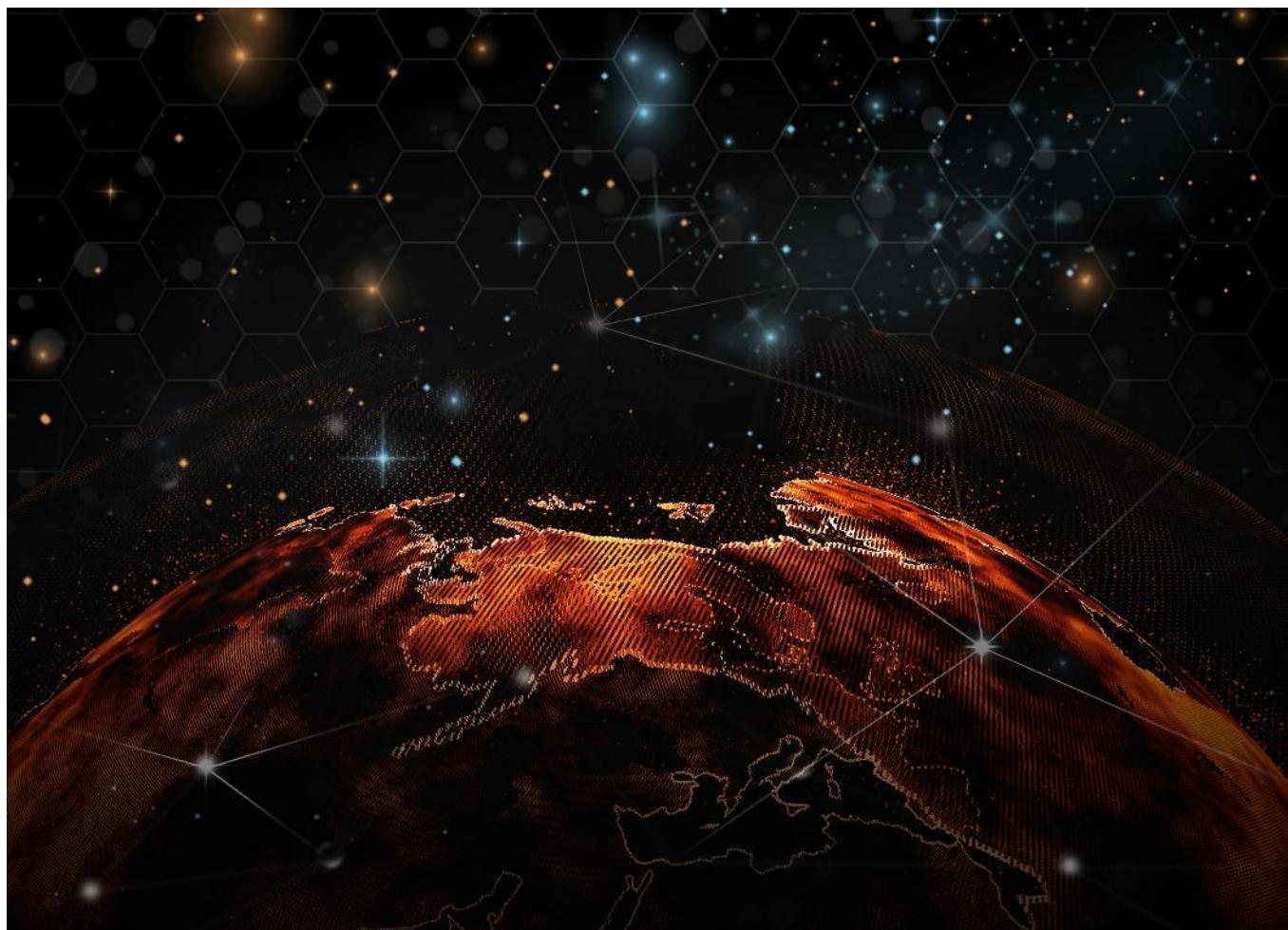
- ▶ India's 2023 G20 presidency highlighted its major role in global policy and growth, contributing 16% to worldwide expansion and reinforcing its international influence



- ▶ 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

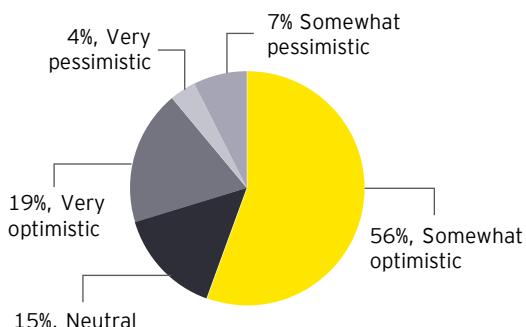
India positions itself as a compelling foreign investment hub, poised to surpass China's growth forecast of less than 5% in 2024. By 2027, India will surpass Japan and Germany to become the world's third-largest economy with a GDP of over US\$5 trillion, according to IMF. Shedding some light on the growing sectors in India.

Renewable Energy	Automobile Sector (EVs)	Capital Goods Sector	Infrastructure	Healthcare and Pharmaceuticals
 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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



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

Top 3 factors driving the business outlook

- 1 Digitization and automation
- 2 Market/Product expansion
- 3 Supply and demand of labor/employees

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 are 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

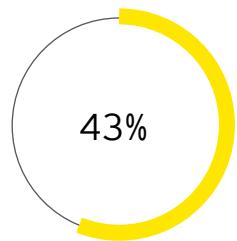
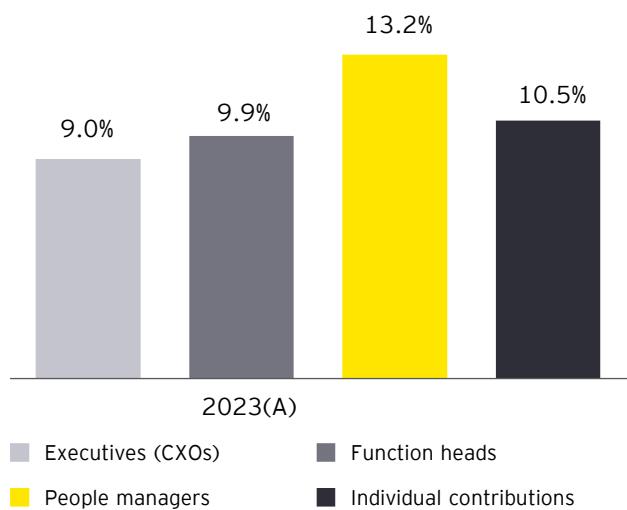
Key insights

- 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

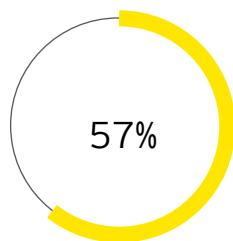


Addressing attrition requires a multifaceted approach that encompasses various aspects of the employee experience

Attrition across levels



Organizations are facing challenges in attracting talent



Organizations believe 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

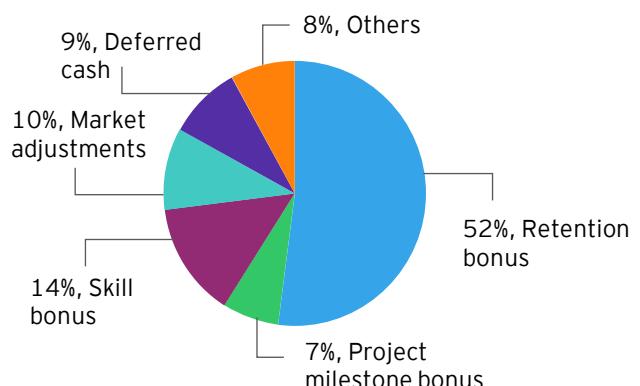
➤ Remote and hybrid work options

- ▶ Hybrid work models: A blend of in-office and remote work for flexibility
- ▶ Remote work infrastructure support

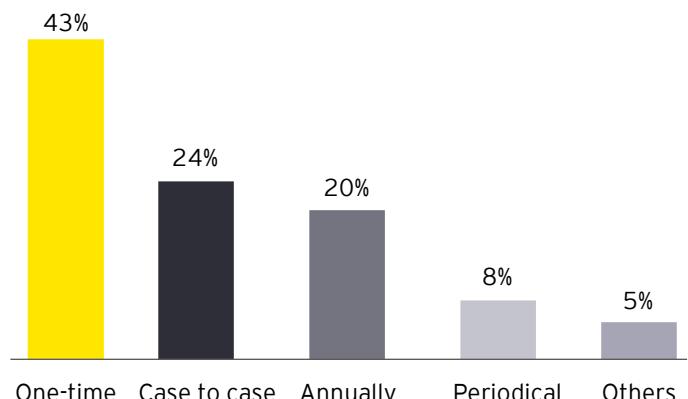
➤ Recognition and reward systems

- ▶ 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

A close-up, low-angle shot of two people in business attire (blue shirts and dark trousers) looking down at a large, light-colored document or blueprint spread out on a table. One person's hand is visible, holding a blue pen and pointing at a diagram on the paper. The scene is lit with a warm, focused light on the hands and the document, while the background is blurred.

05

Total rewards: increments,
incentives and executive compensation



Salary growth trends and movements across different sectors

Salary Increment %



Sector	2022 (A)	2023 (A)	2024 (P)
	2022 Actual	2023 Actual	2024 Projected
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

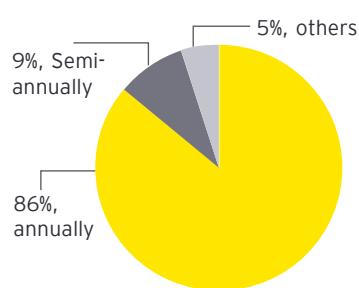
- In 2022, certain technology sub-sectors, like cloud platforms and consumer technology, experienced notable growth. However, there is a projected decrease across all technology sub-sectors by 2024, potentially due to market saturation following rapid digital transformation in previous years
- E-Commerce, 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

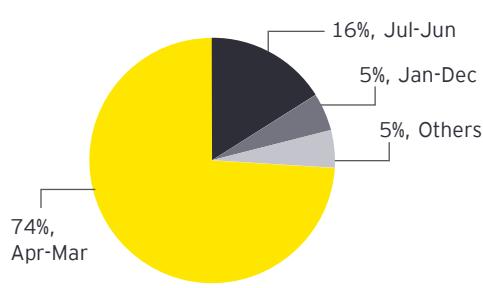


Adapting performance management to navigate the evolving talent landscape..

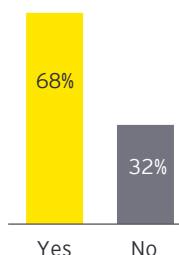
Pay cycle frequency



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

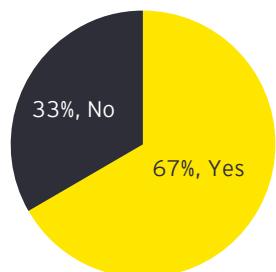
Key insights

- 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

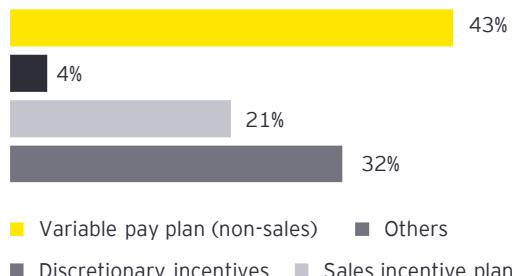


As businesses adapt to dynamic market conditions, short-term incentives emerge as a pivotal strategy, driving employee motivation and fostering performance excellence

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 %

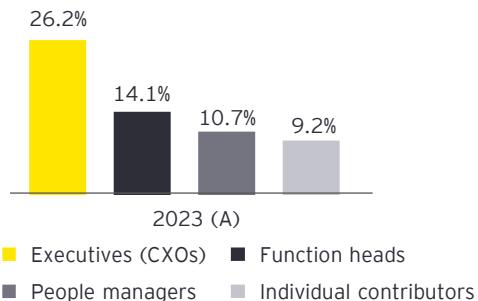
2023 (A)

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

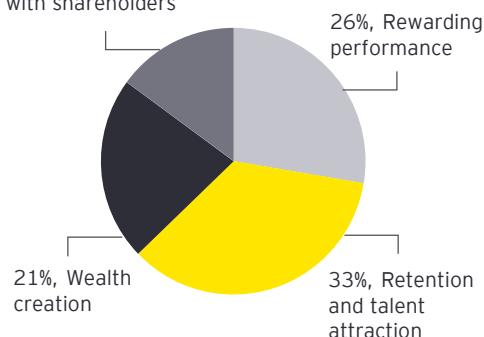
Does not meet expectation



LTIPs are becoming increasingly diverse, flexible, and strategic in their design and implementation..

Objective of LTIP

14%, Alignment of interest of employees with shareholders



Key insights

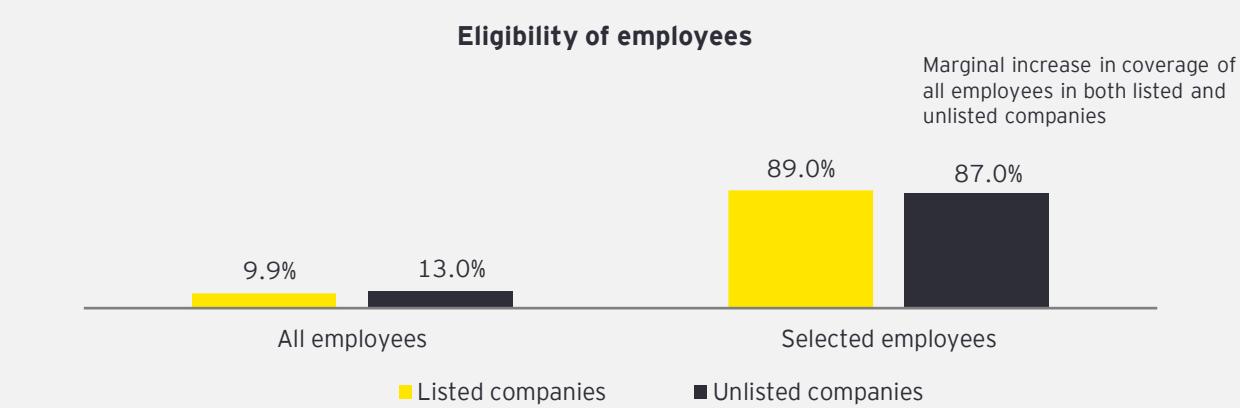
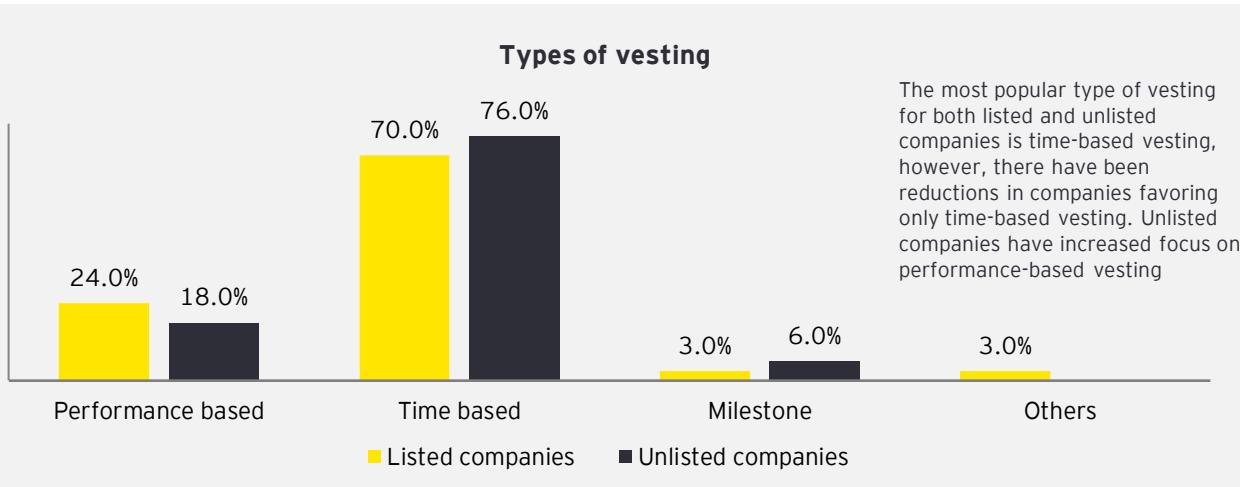
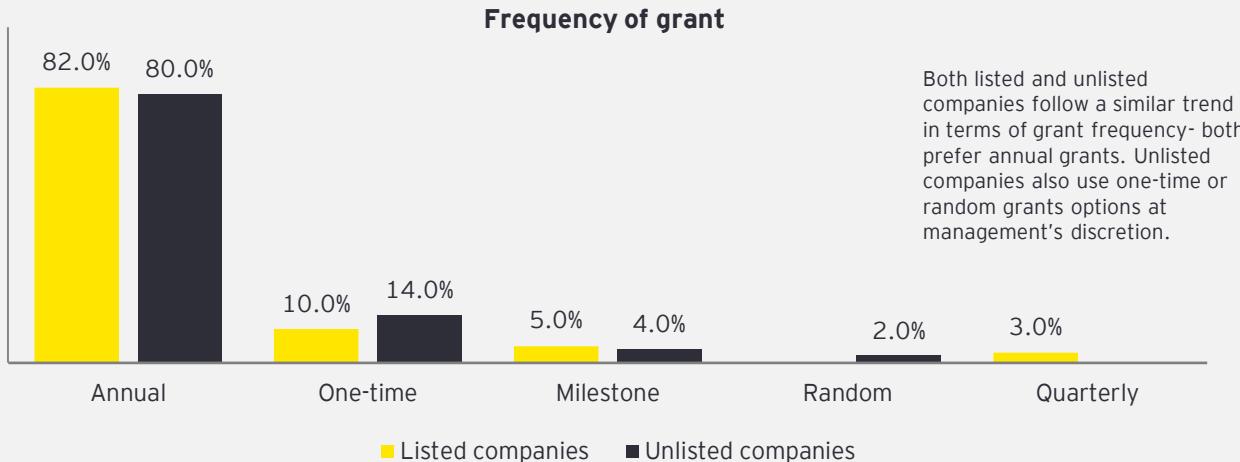
- ▶ Organizations have been creatively revamping their long-term incentive plans (LTIPs) in recent years, making compelling adjustments to better suit their workforce and align with strategic goals
- ▶ It indicates a readiness among companies to tailor LTIP components creatively, ensuring these incentive 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





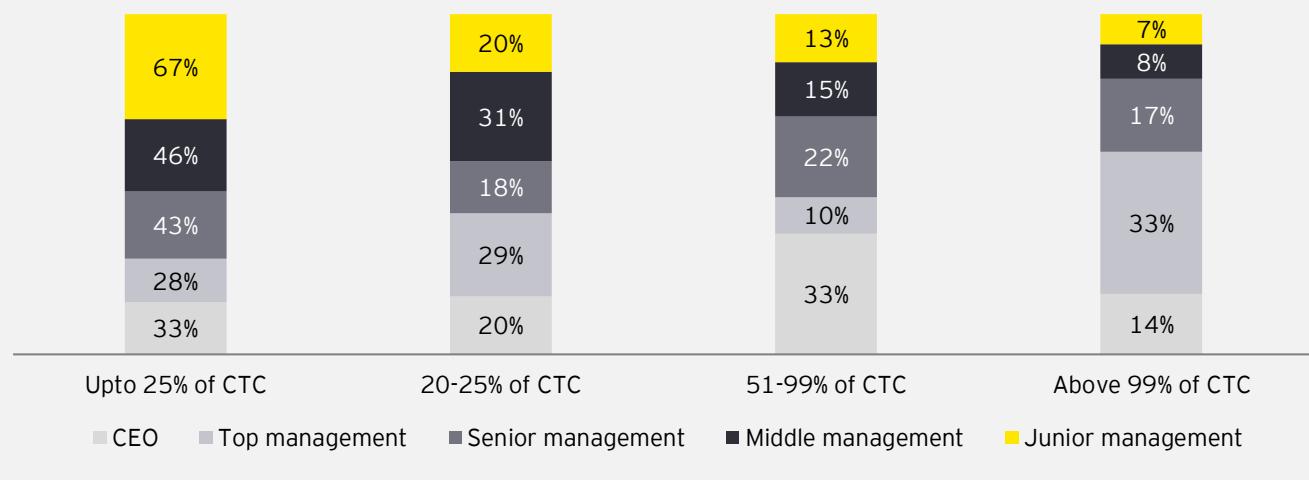
Executive compensation trends: Analyzing the balanced pay structure for CEOs

Key trends in executive compensation

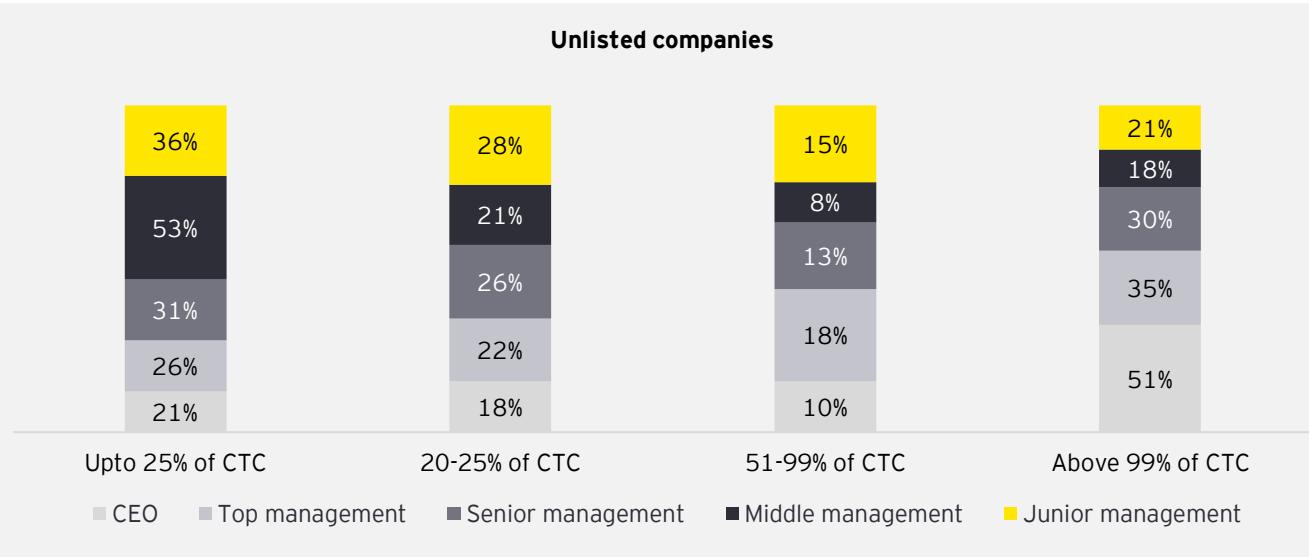
- On an average, approximately 70% of CEO compensation is tied to performance
- LTIs become a more significant part of total rewards as one moves up the hierarchy, signaling that companies are focusing on retaining top-level talent by aligning their interests with the long-term success of the company
- 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

Listed companies



Unlisted companies



Source: EY LTI Report 2024

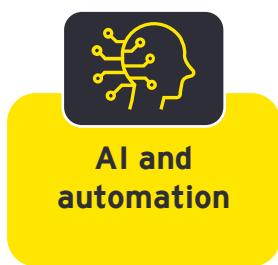
06



Emerging trends

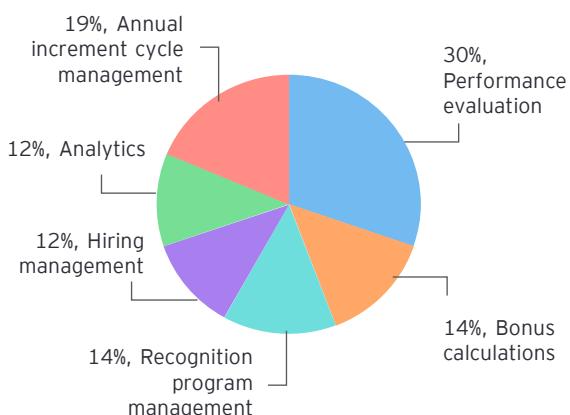


Redefining employee value: Emerging trends in total rewards



- ▶ **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



- ▶ **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

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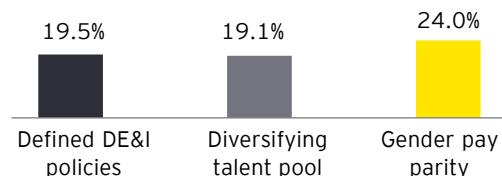
Redefining employee value: Emerging trends in total rewards (cont'd.)



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

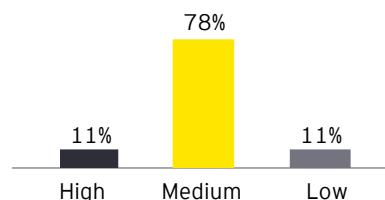
Top 3 DE&I initiatives



Environmental, social and governance

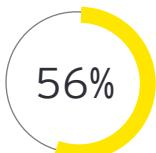
- There was an increasing trend towards ESG reporting among Indian companies. The number of companies publishing sustainability reports had been growing, with many adopting international frameworks like the GRI
- 60% organizations are already utilizing or on their way to utilize ESG policies
- The market 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	Performance based pay	Objectivity and fairness in pay	Globalization	Skill-based pay
 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 	 <ul style="list-style-type: none"> ▶ 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 <ul style="list-style-type: none"> ▶ Niche: 15% - 30% ▶ Super niche: 30% - 50%

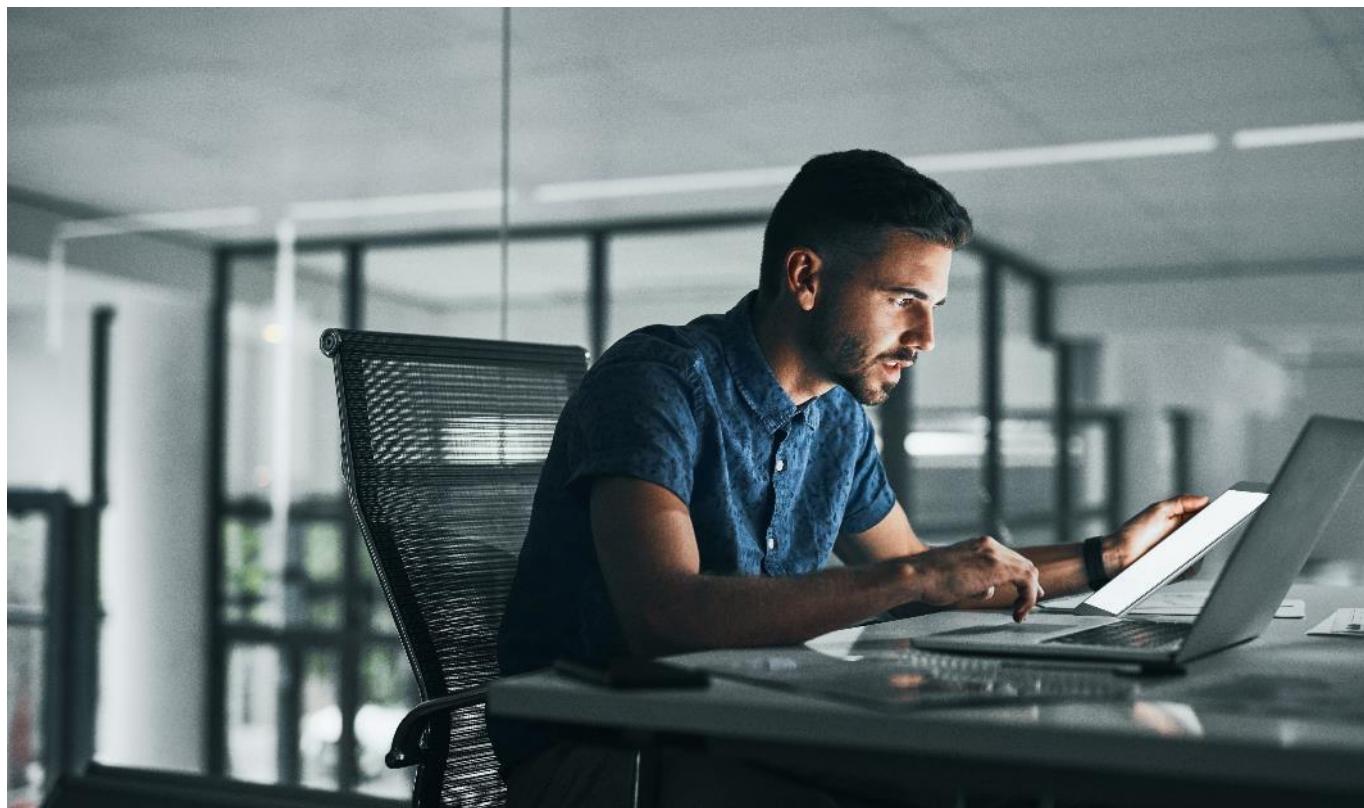




Revamping total rewards: key focus areas in benefits and wellness

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	Work flexibility	Employee wellbeing	Dynamic workforce
			
<ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ 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

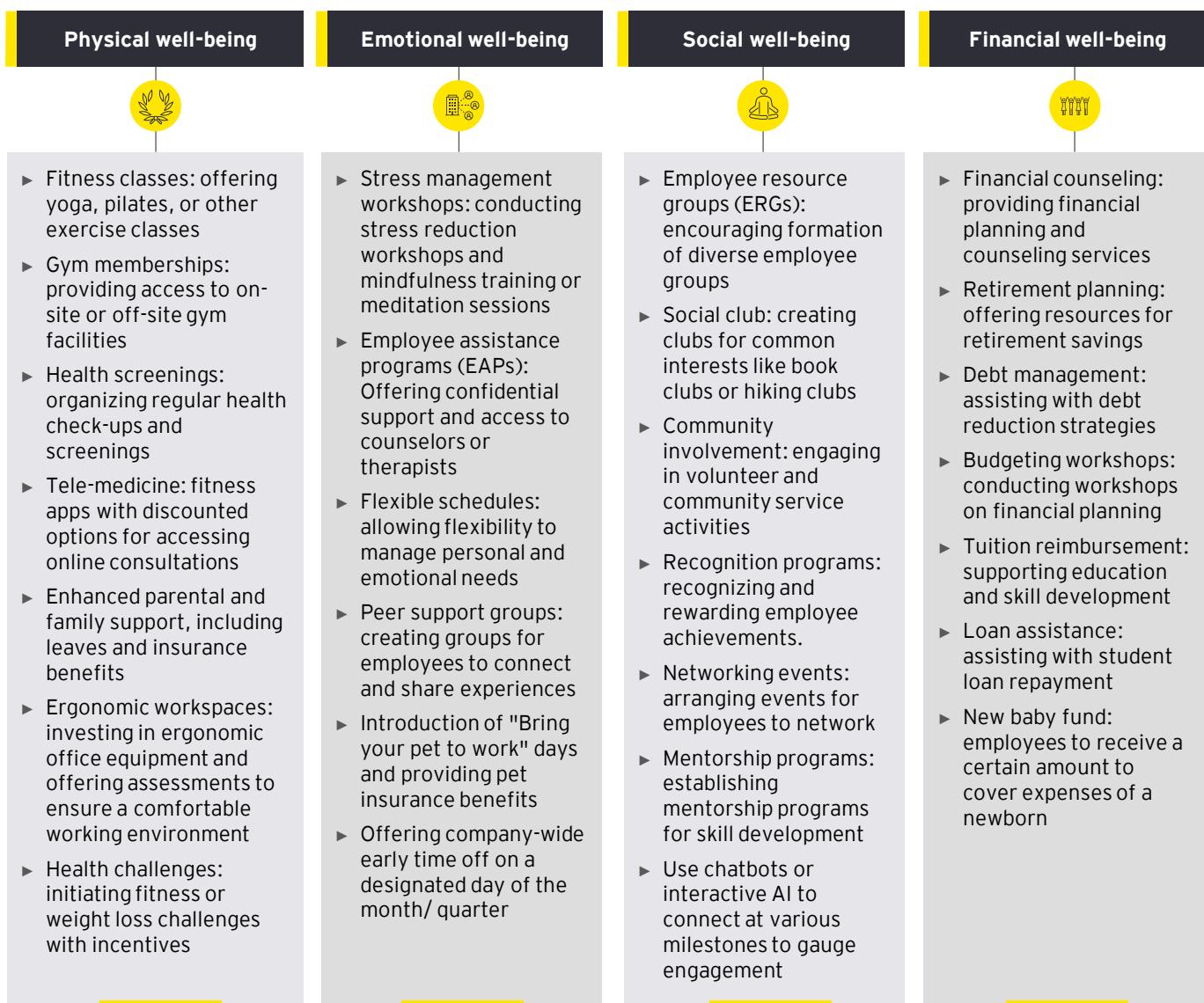
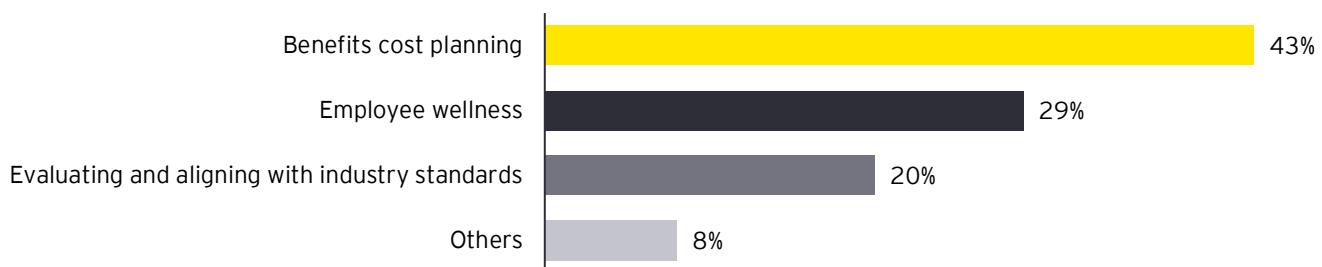




Revamping total rewards: key focus areas in new-age benefits

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





EY offices

Ahmedabad

22nd Floor, B Wing, Privilon
Ambli BRT Road, Behind Iskcon
Temple, Off SG Highway
Ahmedabad - 380 059
Tel: + 91 79 6608 3800

Bengaluru

12th & 13th Floor
"UB City", Canberra Block
No.24 Vittal Mallya Road
Bengaluru - 560 001
Tel: + 91 80 6727 5000

Ground Floor, 'A' wing
Divyasree Chambers
11, Langford Town
Bengaluru - 560 025
Tel: + 91 80 6727 5000

Chandigarh

Elante offices, Unit No. B-613 &
614
6th Floor, Plot No- 178-178A
Industrial & Business Park, Phase-I
Chandigarh - 160 002
Tel: + 91 172 6717800

Chennai

6th & 7th Floor, A Block,
Tidel Park,
No.4, Rajiv Gandhi Salai
Taramani, Chennai - 600 113
Tel: + 91 44 6654 8100

Delhi NCR

Ground Floor
67, Institutional Area
Sector 44, Gurugram - 122 003
Haryana
Tel: +91 124 443 4000

3rd & 6th Floor, Worldmark-1
IGI Airport Hospitality District
Aerocity, New Delhi - 110 037
Tel: + 91 11 4731 8000

4th & 5th Floor, Plot No 2B
Tower 2, Sector 126
Gautam Budh Nagar, U.P.
Noida - 201 304
Tel: + 91 120 671 7000

Hyderabad

THE SKYVIEW 10
18th Floor, "SOUTH LOBBY"
Survey No 83/1, Raidurgam
Hyderabad - 500 032
Tel: + 91 40 6736 2000

Jamshedpur

1st Floor, Fairdeal Complex
Holding No. 7, SB Shop Area
Bistupur,
Jamshedpur - 831 001
East Singhbhum Jharkhand
Tel: + 91 657 663 1000

Kochi

9th Floor, ABAD Nucleus
NH-49, Maradu PO
Kochi - 682 304
Tel: + 91 484 433 4000

Kolkata

22 Camac Street
3rd Floor, Block 'C'
Kolkata - 700 016
Tel: + 91 33 6615 3400

Mumbai

14th Floor, The Ruby
29 Senapati Bapat Marg
Dadar (W), Mumbai - 400 028
Tel: + 91 22 6192 0000

5th Floor, Block B-2

Nirlon Knowledge Park
Off. Western Express Highway
Goregaon (E)
Mumbai - 400 063
Tel: + 91 22 6192 0000

Pune

C-401, 4th Floor
Panchshil Tech Park, Yerwada
(Near Don Bosco School)
Pune - 411 006
Tel: + 91 20 4912 6000

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Annexure 6 - Committee Report on Recovery of Electricity Charges

Constitution of Committee for Review of Electricity Charges

Upon execution of the Concession Agreement between Airports Authority of India (AAI) and Jaipur International Airport Ltd (JIAL) [formerly known as Adani Jaipur International Airport Ltd] and after handing over the commercial operations to JIAL, power connections from JVVNL were handed over as a part of the agreement:

A committee has been constituted on 15th March 2024 with the following members of JIAL and AAI (Select employees) to review the electricity charges billed to concessioner based on units' consumption thereof.

Sr. No.	Name	Designation	Department
1	Mahesh Pal Singh	Manager (Engg.-E)	AAI
2	Tarun Kumar Yadav	Manager (Engg.-E)	AAI
3	Kalpant Tyagi	Deputy Manager, E&M	JIAL
4	Shashikant Tiwari	Associate officer, Finance	JIAL

Committee has verified the following:-

1. The separate meters are installed for each concessionaire/user
2. The meter readings are done on monthly basis and necessary records are maintained
3. JIAL raises the invoice for the electricity usage charges to concessionaire/user on monthly basis
4. JIAL charges to concessionaire/ user on cost-to-cost basis (without any mark-up) based on actual meter reading and units consumed by each concessionaire/user
5. Based on review of electricity invoices raised on concessionaire/ users for the period from April 2023 to February 2024, the average power supply utilized by concessionaire/ user is 12% of the total utilization of the Airport.

 10/4/24	 10/4/2024	 10/4/24	
Mahesh Pal Singh	Tarun Kumar Yadav	Kalpant Tyagi	Shashikant Tiwari
Manager (Engg.-E)	Manager (Engg.-E)	Deputy Manager, E&M	Associate officer, Finance