

Standard Operating Procedure for Remote-Hybrid Audit of Public Works



Foreword



The Indian Audit and Accounts Department has, over the years, continuously endeavoured to strengthen public audit processes in response to the changing landscape of governance, public financial management and technological advancement. The rapid expansion of digital systems and increasing availability of electronic data across Government departments present significant opportunities for enhancing the effectiveness, coverage and timeliness of audit.

Public Works expenditure constitutes a substantial component of expenditure and directly impacts the creation of public infrastructure and delivery of essential services. Given the scale, complexity and distributed nature of public works operations, conventional audit approaches based primarily on manual scrutiny and sample-based examination face inherent limitations in identifying systemic risks and ensuring comprehensive coverage.

This Standard Operating Procedure (SoP) on Remote-Hybrid Audit of Public Works seeks to provide a structured framework for adoption of data-led and technology-enabled audit methodologies in the field of public works audit. The SoP integrates domain knowledge of works audit with data analytics and digital audit tools to facilitate risk-based planning, targeted verification and evidence-based reporting.

The document presents both Base and Advanced Models for data analytics, enabling field offices to progressively adopt the framework based on availability of datasets and institutional capacity. It also incorporates innovative initiatives such as AuditWise and the Irrigation Intelligent Data Management System (IIDMS), developed within the Department, which demonstrate the transformative potential of data-driven audit ecosystems.

The approach envisaged in this SoP marks a significant transition from traditional unit-centric audit practices towards a more dynamic, systemic and insight-driven model of assurance. By enabling integration of financial, engineering, procurement and external datasets, the framework seeks to strengthen audit quality, improve identification of risk-prone areas and optimise deployment of audit resources.

I hope that this SoP will serve as a valuable guide for field audit offices and contribute towards institutionalising a culture of data-led auditing within the Indian Audit and Accounts Department. The continued refinement of this framework through field experience, feedback and innovation will further strengthen the Department's ability to provide independent and credible assurance in an increasingly digital governance environment.

Date:
New Delhi

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Comptroller and Auditor General of India

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Preface

The complexity of Works Audit emanates from the multifarious nature of activities in public works and their distributed capture in various data/accounts sources. Historically, the Public Works accounts (PWA) were to serve a useful purpose as they are a combination of Management Information System and backend data (albeit in manual form). IA&AD has had a structured method of examination of these accounts in the Central Audit Section of Audit Offices to generate leads for field audit parties. The Central Audit function has, over time got relegated to routine procedural checking for completeness and classification of expenditure, even as the volume and value of Public Works has increased over the years. Resultantly, the output of works-audit has seen a gradual decline over the period.

This SOP establishes a risk-based, data-driven framework for the audit of public works, transitioning from traditional sample-based audit methodologies to a comprehensive, analytics-enabled approach that facilitates deeper risk assessment, enhanced audit coverage and more effective oversight. It leverages digital data from accounting, financial, tendering, engineering and other external systems to enable end-to-end visibility and examination of the project lifecycle.

The overall framework follows a **stepwise Audit Cycle** from dataset identification to data integration to developing lines of audit enquiries (risk flagging) to be run on the dataset, which ultimately lead to field audits for verification, the results of which go back into the feedback loop for reporting and further optimization.

This enables detection of anomalies and generation of red flags across the project lifecycle. Audit is driven by risk flags generated through data analytics, allowing focused deployment of field audit teams for confirmatory verification. Each identified risk is to be tracked to closure, ensuring accountability through formal audit observations and Departmental Inspection Reports.

To effectively oversee this comprehensive lifecycle, the audit process should begin with ensuring that Field Audit Offices (FAOs) have access to relevant data. Once access is in place, the data must be mapped systematically, ranging from manual accounts to engineering/tendering portals to define the complete audit universe before any data processing begins.

The SoP is divided into two models—Base and Advanced—developed by the Office of the Principal Accountant General (Audit), Haryana, enabling Field Audit Offices to adopt the approach best suited to their data availability, analytical requirements and institutional capacity. This is detailed as Part A in the SoP.

The **Base model** focuses on core data sources that are traditionally used or readily available within CAG audit offices for public works audit. It primarily uses the VLC data, Monthly Accounts data, and IFMS data to carry out audit checks. This model enables offices to begin data-driven auditing without requiring complex integrations and is particularly useful where data access is limited, or technical resources are still developing. It helps in identifying basic financial and compliance issues through structured analysis of available records.

The **Advanced model** builds upon the Base model by incorporating a wider range of data sources for deeper and more comprehensive analysis. In addition to VLC, Monthly Accounts, and IFMS data, it uses inputs from e-tendering/e-procurement systems, Engineering Works Portal (EWP)/ Works and Accounts Management Information System (WAMIS), and external databases such as Goods and Services Tax, Mining records, Parivahan/Regional Transport Offices (RTOs), etc. By combining these datasets, the Advance model allows for more detailed checks such as cross-verification of contracts as well as contractors, material usage, tax compliance, and movement of goods, thereby improving the chances of detecting irregularities and risks.

AuditWise, developed by the Office of Accountant General (Audit), Uttarakhand, is an AI-enabled audit analytics platform that integrates data from IFMS, e-Procurement, WAMIS, PWD MIS, Engineering Portals and GST systems to support data-led auditing. By converting audit knowledge into systemic risk parameters, it helps auditors identify risk indicators such as fake mining passes, invalid GST payments and procurement anomalies, while also facilitating automated audit planning and generation of audit enquiries. This is detailed as Part B in the SoP.

In addition, the **Irrigation Intelligent Data Management System (IIDMS)** is a modern digital platform developed by the Principal Accountant General (Audit-I), Uttar Pradesh, Prayagraj, to streamline the management, monitoring, and audit of irrigation projects. It integrates centralized databases, real-time analytics, and intelligent reporting, serving both governmental operational needs and audit oversight efficiently. This is detailed as Part C in the SoP.

Field audit offices can choose from above models based on the availability of data and their technical capability. However, irrespective of the model adopted, sound domain knowledge of public works audit remains essential to use the SoP effectively and derive meaningful audit outcomes.

The data-analytics approach can enhance audit planning by prioritising audit units through risk flags and heat maps, enabling focused coverage of high-risk areas. The heat map can be prepared by mapping risk flags (such as expenditure trends/variations, time overruns, abnormal payments, high-value material consumption, abnormally low bids, high non-schedule items, and data mismatches) to audit units. A composite risk assessment can be made by compounding the quantum of risk flags and their respective transaction amounts. These scores can then be combined at the level of divisions or works. The results are shown visually, making it easy to identify high, medium, and low-risk units for audit selection.

Acknowledgement

The Indian Audit and Accounts Department acknowledges with appreciation the contributions of the offices and officers whose efforts, innovations and domain expertise have enriched the development of this Standard Operating Procedure (SoP) on Remote-Hybrid Audit of Public Works.

Special appreciation is extended to the Office of the Principal Accountant General (Audit), Haryana, under the leadership of Shri Ashutosh Sharma, Principal Accountant General (Audit), Haryana, for conceptualising and developing the Base and Advanced Models for data analytics incorporated in this SoP. The contributions of Shri Aditya Pant, Senior Deputy Accountant General, Shri Ashok Singla, Senior Audit Officer, Shri Tushar Bhadecha, Assistant Audit Officer, Shri Naveen Kumar, Auditor, and Shri Manish Kumar, Data Entry Operator, are also gratefully acknowledged.

The Department also acknowledges the contributions of Shri Pavan Kumar Reddy R, Senior Deputy Accountant General, and Shri Abhinav Kumar, Assistant Audit Officer, from the Office of the Accountant General (Audit), Uttarakhand, under the guidance of Shri Sanjeev Kumar, Accountant General (Audit), Uttarakhand, for developing AuditWise, an AI-enabled audit analytics platform demonstrating the practical application of data-led auditing in public works.

The contribution of Shri Amritesh Shukla, Deputy Accountant General, and his team comprising Shri Deepak Srivastava, Senior Audit Officer, and Shri Latief ur Rahman Khan, Data Entry Operator, under the guidance of Shri Raj Kumar, Principal Accountant General (Audit-I), Uttar Pradesh, Prayagraj, in conceptualising and developing the Irrigation Intelligent Data Management System (IIDMS), an important component of this SoP, is sincerely acknowledged.

The Department further acknowledges the valuable inputs, technical support and practical insights provided by the officers and officials of the above offices, as well as the concerned Wings at Headquarters, during the preparation and refinement of this document. Their collective efforts have significantly contributed to the development of a robust framework for data-led and technology-enabled public works audit.

Introduction to Standard Operating Procedure for Remote-Hybrid Audit of Public Works

Public Works represent a sizeable portion of government expenditure, making effective oversight vital to ensure economy, efficiency, and compliance. Traditional audit methodologies are being challenged due to their reliance on manual voucher scrutiny, sample testing, and exploratory field visits which are Unit-centric, and File-focused, primarily driven by expenditure based DDO/Division risk categorisation and audit planning. These conventional methods often yield limited coverage and have a low detection rate for systemic risks/deviations. Conversely, the rapid growth of digital financial/operational systems now produces vast amounts of data, presenting new opportunities for deeper, more comprehensive analysis for audit planning and execution.

Objective of the SOP

In response to these multiple limitations in audit scope and yield, this Remote-Hybrid Audit Model has been developed as a process re-engineering exercise. The model seeks to leverage data analytics and technology by combining them with domain expertise to enhance audit coverage, improve the quality of audit observations, and optimise the deployment of audit resources. By complementing conventional volume-based scrutiny with data-led, risk-based analytics, this approach seeks to transform audit from a largely periodic exercise into a more dynamic and responsive oversight mechanism.

Guiding Principle

The SOP is meant for the readers of Indian Audit and Accounts Department who are familiar with the public works-audit process including public works accounting.

This document serves as a foundational baseline and field offices are actively encouraged to devise and integrate further data-driven checks tailored to their specific risk landscapes, drawing upon past audit findings, local inputs, and matters reported in the public domain and report them by October end and April end of every year to PPG Wing at Headquarters through their functional wings for use in updation of this SOP.

Scope

This SOP governs the audit of public works executed by works departments in a State such as PWD (Public Works Department), PHED (Public Health and Engineering Department), Irrigation and Rural Engineering Services encompassing the entire project lifecycle from initial estimation and tendering through execution, billing, and the Defect Liability Period (DLP). The entire analysis to confirmatory field audit cycle is staggered into a step-wise approach depicted in the following flow chart/formations:

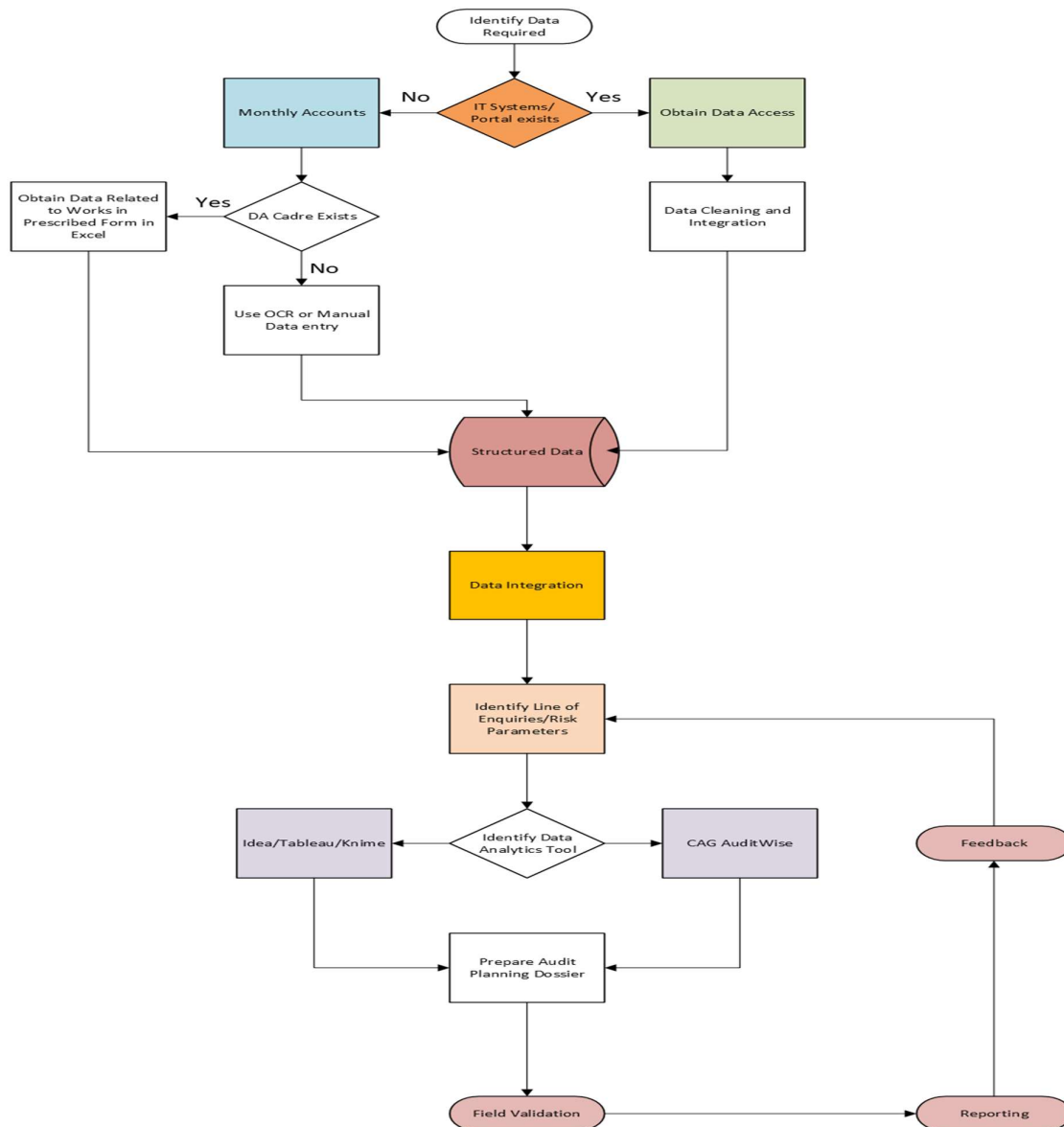


Figure 1: Flowchart showing the entire process cycle of approach for Remote-Hybrid works audit.

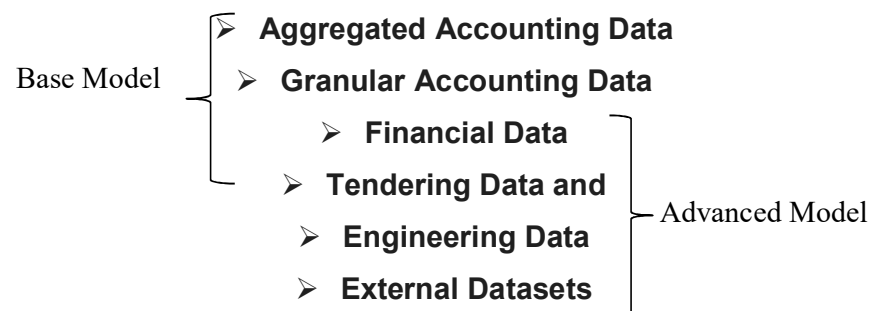
Base Model for Data Analytics
(Prepared by Office of PAG (Audit), Haryana)

Base Model for Data Analytics

To effectively oversee this comprehensive lifecycle, the audit process must first establish a **unified digital foundation** by aggregating records from all relevant stages.

Identification, Curation and Analysis of Datasets

This foundational step focuses on the identification of all relevant data sources related to public works, encompassing both digital and documentary data to ensure that relevant audit parameters for the entire project cycle are accounted for. The data must be mapped systematically, ranging from manual accounts to engineering portals in order to define the complete audit universe before any data processing begins. Indicative data sources include:



It is important that Field Audit Offices (FAOs) get access to the datasets to optimally proceed further. The various stages of the preparatory/ exploratory process for each are given below:

Stage 1: Analysis of Aggregated Accounting Data (VLC)

IAAD has accounting data upto voucher level in the form of VLC in a large number of States. However, for public works, voucher level information has not been captured in the present version of VLC, hence, the aim would be to capture DDO Wise/Major Head wise Data for each public works division in the State for standardized statistical analysis-like tendencies of distribution of expenditure and receipt to identify potential deviation and skewness. These statistical techniques have been long known to the department personnel and hence not elaborated here further. Before detailing process to risk identification there are two forms which are part of monthly accounts viz. form 64/27 (Schedule of Work Expenditure) using expenditure details from Forms

containing work expenditure. Form 64 is the nomenclature of form in Central Public Works Accounts Code (CPWA) and Form 27 is the nomenclature for similar form in Accounts Code Volume –III issued by Comptroller & Auditor General of India. There may have different nomenclature in various States/UTs and are to be accordingly identified for use in this exercise. Another component of Works Expenditure related to Deposit Works is captured in Form 65A of CPWA Code. Similar details would be needed to be identified from the Monthly Accounts in respect of Deposit Works. These forms contain work wise expenditure details. Apart from this, an important check is to run a comparative check between the monthly and year-end figures of Form 27/64 (containing details of work-wise expenditure) of the divisions and the VLC Data to identify any discrepancy¹ which if detected indicates *risk of* diversion of funds which is a risk flag and would necessitate detailed scrutiny of the monthly accounts of the respective division(s) in the Financial Attest Audit Wing/Works Audit Department wing of the Audit office. Any lead from detailed scrutiny of the accounts needs to be passed to the concerned Audit Management Group in the form of Audit notes in OIOS for further examination for audit planning in conjunction with other analysis as detailed later in the SOP.

¹ VLC provides head-wise and DDO-wise totals, which are reflected in Form 42/80 also. Form 27 gives work-wise, head-wise totals for the DDO. Being manual entry operations, discrepancy between the head-wise totals can be noted which require reconciliation in Monthly Account.

The following self-explanatory illustrations depict Tableau enabled data analytics in the Base Model

Illustration 1: Creation of Master Data Table for DDO-wise and Head-wise Expenditure Analysis Using Tableau Relationships

Data table from VLC (Works expenditure of a division), Form 27/64 (Schedule of Work Expenditure) of a division and VLC & DDO mapping tables are used, and all the tables are joined in Tableau using “Relationship”. Then this Master Data table can be further used for DDO wise expenditure analysis and Head-wise expenditure analysis for a particular DDO.

⊖ VLC Works Data - Form 27 Mapping

Connection
☒ Live ☐ Extract

Filters
 0 | Add



Form 27 11 fields 4388 rows 100 rows

Major Head	Head	Sd.N O.	Name of work	Total charges of the mo...	Total progressive Expdr...	Total charges of the year
4250	01-08-4250-51-800-94-51 N...	null	Constn of Govt ITI at Village ...	0	58,229,649	58,229,649
4250	01-08-4250-51-800-94-51 N...	null	S/R of ITI Pinjupara at Kalayat	0	3,831,382	3,831,382
4250	01-08-4250-51-800-94-51 N...	null	Constg. a Rain Water Harvest...	0	1,530,038	1,530,038
4250	01-08-4250-51-800-94-51 N...	null	S/R of internal road of ITI at ...	0	1,289,761	1,289,761
4250	01-08-4250-51-800-94-51 N...	null	Raising of existing boundary ...	0	447,269	447,269
3054	054-04-ODR-337-98-51-18 M...	null	A/M Dumerkha to Karsindhu...	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Uchana Litani road	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Uchana via Karsindhu C...	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Mohal khera link road	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Shimla link road	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Batta Sajuma Nakalgar...	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Batta link road	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Dhakal bye pass	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M of Katwal to Bighana road	0	0	0
3054	054-04-ODR-337-98-51-18 M...	null	A/M Budain to Makhand San...	0	0	0

Figure 2: Mapping of VLC Data with Form 27/64 (Schedule of Work Expenditure). While Form 27/64 gives work-wise expenditure, VLC gives DDO-wise expenditure. Both mention the Head of Accounts. The snapshot above shows the result of merging of VLC data with Form 27/64. This Master Data table can be further used for DDO-wise expenditure analysis and Head-wise expenditure analysis for a particular DDO. The results of which are shown in Figure 3 and 4.

Illustration 2: Division-wise Analysis of Works Expenditure for Identification and Selection of High-Value Works

VLC - DDO Wise Works Expenditure

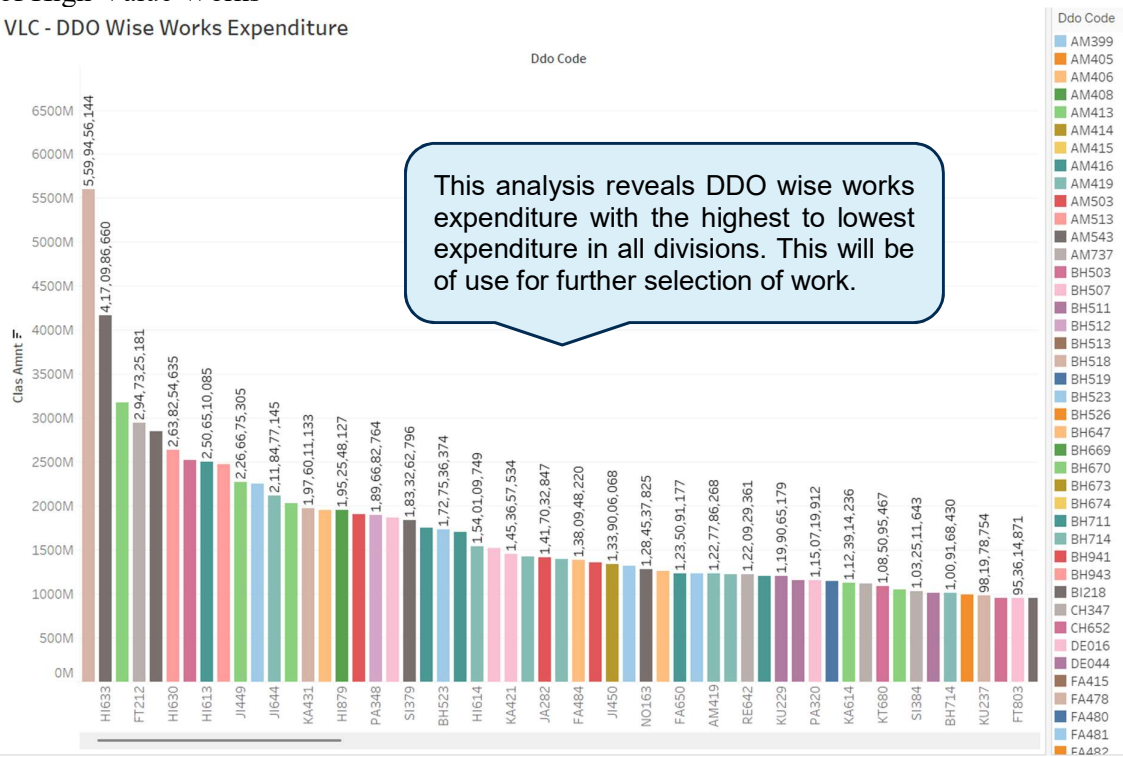


Figure 3: DDO-wise Works Expenditure: A trend chart.

Illustration 3: Head-wise Analysis of Works Expenditure for Identification and Selection of High-Value Works in a Division.

Head-wise Expenditure of individual Division

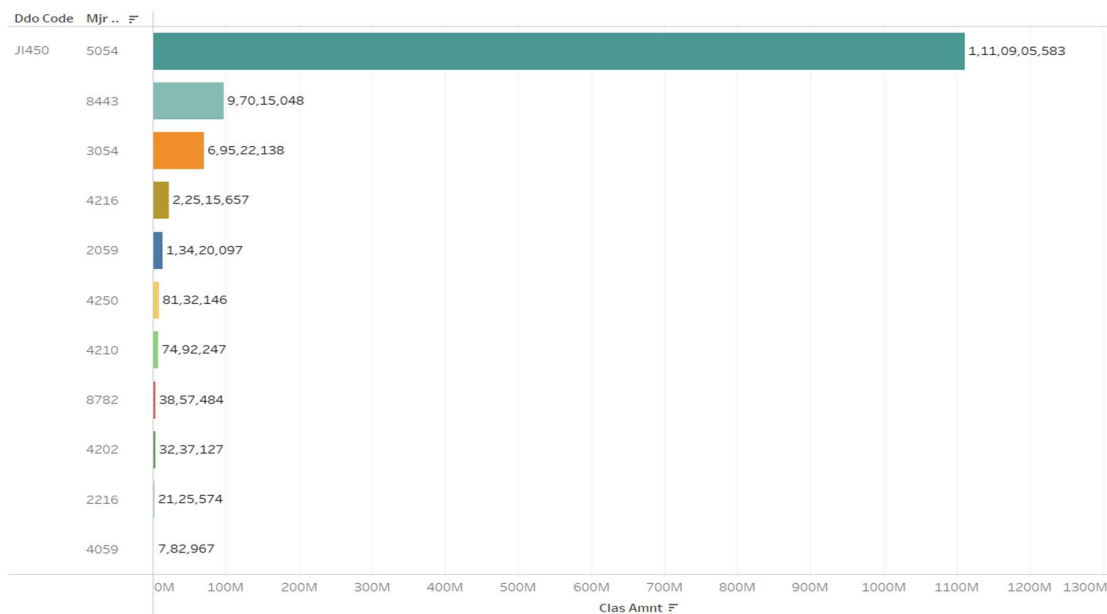


Figure 4: Head-wise expenditure of division using VLC data.

Stage 2: Analysis of Granular Accounting Data (Monthly PW Accounts)

In a Remote-Hybrid public works audit, the availability and completeness of monthly Public Works Account forms and statutory records is critical because these documents form the backbone for validating financial propriety, execution progress, and statutory compliance. In the PWD monthly accounts, a few key PWA forms provide a concise view of financial transactions, expenditure classification, and statutory tracking. A table depicting concordance between the CAG Accounts code and CPWD Accounts code (Annexure A), and list of applicable checks to these forms is given below:

PWA Form No.	CPWA Form No.	Description of Form/ Schedule	Checks to be applied (Detailed with reference to PWA and CPWA Code in respective columns)	If Yes	If No
44	83	List of Schedules / Forms	Whether all prescribed Forms / schedules attached with monthly account	OK	Risk Flag
42	80	Monthly Account	Whether figures depicted in Form 42 tally especially with Form 9, 41, 37, 34 / 35, 37 & 39 enclosed with account Any minus figures may be flagged.	OK	Risk Flag
9	46	Schedule of Revenue	Whether totals of individual items of Form 9 agree with the gross amount given in the Form.	OK	Risk Flag
			Whether individual items of receipts contain challan / voucher number	OK	Risk Flag
41	74	Classified Abstract of Expenditure	Whether Head-wise figures of Form 41 tally with Head-wise figures of Form 27	OK	Risk Flag
27	64	Schedule of Works Expenditure	Whether Form depicts Head Wise Expenditure for the month and progressive expenditure for all works taken up by the division	OK	Risk Flag*
33	65	Schedule of Deposit Works	Whether total of Form 33 is tallied with figures shown in Part III – Deposit Works - Form 34/35.	OK	Risk Flag
			Whether there is any minus balance against any work	Risk Flag	OK
38	69	Cash Settlement Suspense Account (CSSA)	Whether there are substantial amounts shown in closing balance	Risk Flag	OK
37	76	TDS -Income Tax (Adjusting Account between Central & Government)	Whether Form 37 contains complete details of name of contractor, PAN Number voucher number with dates against which deductions of TDS- Income Tax has been made	OK	Risk Flag
34/35	79	Schedule of Deposits	Whether totals of individual items of Form 34 agree with the gross amount given in the Form 35	OK	Risk Flag
			Whether there is any minus entry as per closing balance	Risk Flag	OK
			Whether any Major Head for booking of labour cess has been prescribed by	OK	Risk Flag

SOP for Remote-Hybrid Audit of Public Works

PWA Form No.	CPWA Form No.	Description of Form/ Schedule	Checks to be applied (Detailed with reference to PWA and CPWA Code in respective columns)	If Yes	If No
			State Govt. as required under BOCW Rules		
			Whether credits and corresponding debits of labour cess are being routed through Form 34 under Major Head - 8443	Risk Flag	OK
			Whether any specific list / document containing voucher wise deductions of labour cess is attached	OK	Risk Flag
			Whether there is positive / minus figure in closing balance against labour cess	Risk Flag	OK
			If substantial amount of labour cess is outstanding against the Department as a whole, whether Management letter for incorporating the same in SFAR as per Guidance Note / Model SFAR issued / being considered for issuance.	Risk Flag	OK
			Whether TDS under GST is shown against Major Head 0005 /0006 /0008	OK	Risk Flag
			If no, whether Credits and corresponding debits of TDS under GST are being routed through Form 34 under Major Head -8443	Risk Flag	OK
			Whether any specific list / document containing voucher wise deductions of TDS under GST is attached	OK	Risk Flag
			Whether there is positive / minus figure in closing balance against TDS under GST	Risk Flag	OK
39	77	Schedule of Debits / credits of Remittances	Whether figures shown in Form 39 contain voucher wise details of (i) TDS under GST, (ii) labour cess (iii) Net amount payable to contractors / other payees	OK	Risk Flag

Table 1: Illustrative list of checks applied to monthly accounts forms; the sequence is not ad seriatim, but as per the checking sequence.

*As a starting point to use information captured in monthly accounts, it is essential that **at least Form 27/64 (Schedule of Work Expenditure)** (Schedule of Work which captures work-wise expenditure and progressive totals.) **is available electronically**; the common available fields in Form 27/64 (Schedule of Work Expenditure) are given below:

Form -27 (See Chapter IV, Article 215) Schedule of work Expenditure								
Provincial Division Narwana						For the month of 1/2025		
Minor head detailed Head of classification	Sd. No.	Name of work (i.e full name as given in the estimate) NB Administrative approval and Financial sanction may be noted in red ink when a work is entered for the first time	Total charges of the month	Total progressive Expdr. (month in which expenditure last appeared)	Total charges of the year	Expdr upto	Total upto date Expdr.	Estimated cost

In case of unavailability of electronic Form 27/64, the following is recommended:

- Experience has shown that very often form 27/64 is sent to A&E offices by the Divisional Accountant by taking a print-out of an MS Excel/MS Word file. In such cases the electronic records in Spreadsheets should be obtained from the DAs with the support of the A&E Offices.
- In case only physical forms are available even with the DAs, then OCR (Optical Character Recognition) based scanning must be used. A python-based model developed by RCB&KI, Jaipur may be used. An illustration of the process of OCR conversion is pictorially depicted below.

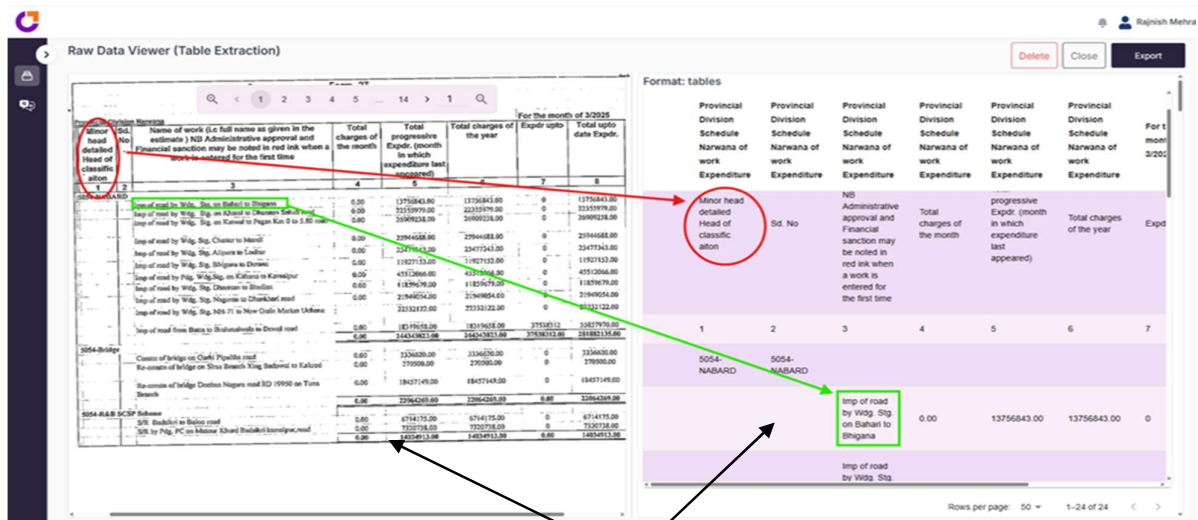


Figure 5: OCR Conversion of Scanned Form 27/64. The left half of the image shows the scanned copy of the physically received Form 27/64, while the right half shows its processing on the OCR application (Fexo) interface. The output of the process is an MS Excel file as shown in figure 6.

Minor head detailed Head of classification	Sd. No	Name of work (i.e full name as given in the estimate) NB Administrative approval and Financial sanction may be noted in red ink when a work is entered for the first time	Total charges of the month	Total progressive Expend. (month in which expenditure last appeared)	Total charges of the year	Expend upto	Total upto date Expend.
		Udodan nagura road					
	10	Wdg. Stg. Lodhar to Bhalang road	-742000.00	10141055.00	9399055.00	0	9399055.00
	100	A/M Kalayat link road	-16000.00	401544.00	385544.00	0.00	385544.00
	101	A/M Khatkar to Chatter via Kasoon Goghrian Kuchrana Kalan to Kuchrana Kluird	-270000.00	1739517.00	1469517.00	0.00	1469517.00
	103	A/M Makhand to Kakrod road	-71780.00	71780.00	0.00	0.00	0.00
		S/R by Pdg. Stg. On Kakrod to Chaan road	0.00	149726.00	149726.00	34217783	34367509.00
		Constn. Of road from Badsikri Kamalpur road to irrigation at village Badsikri	0.00	14314060.00	14314060.00	0	14314060.00
		S/R by Pdg. Stg. On Kalwan to Gelha road	0.00	12392885.00	12392885.00	0	12392885.00
	104	A/M Dohana Khara to Daroli Khara road	-25859.00	25859.00	0.00	0.00	0.00
	106	A/M Katwal to Pega	-35000.00	547679.00	512679.00	0.00	512679.00
		Constg. a road from village Sacha Khara to Badanpur	0.00	33108617.00	33108617.00	0	33108617.00
		Constg. a road from Karsindhu Goghrian & Karsindhu chatter	0.00	19704400.00	19704400.00	0	19704400.00

Figure 6: Form 27/64 in excel format after downloading the OCR converted file.

Once the Form 27/64 (Schedule of Work Expenditure) is available in electronic form, data analytics should be performed on it to identify:

- **Contracts with high expenditure of works, abandoned work especially after high expenditure, expenditure exceeding original sanction and Time series data of payment for works.**

Such identified works/contracts should be further examined through the attached Scheduled Dockets/Vouchers to check for **splitting of works**, deductions/accounting of Income-Tax/Goods & Services Tax/Labour-Cess, high value material consumption, etc. Any discrepancy should be red flagged for further examination by the field audit party in the concerned division.

Illustration 4: Visualization of Work-wise Expenditure Using Form 27 Data in Tableau

Form 27 in Excel format is an important data source which is imported in Tableau and 'Name of the Work' versus 'Total Expenditure for the work in a Financial Year' is plotted using Bar chart in Tableau.

Form 27 - Work Expenditure for the Year

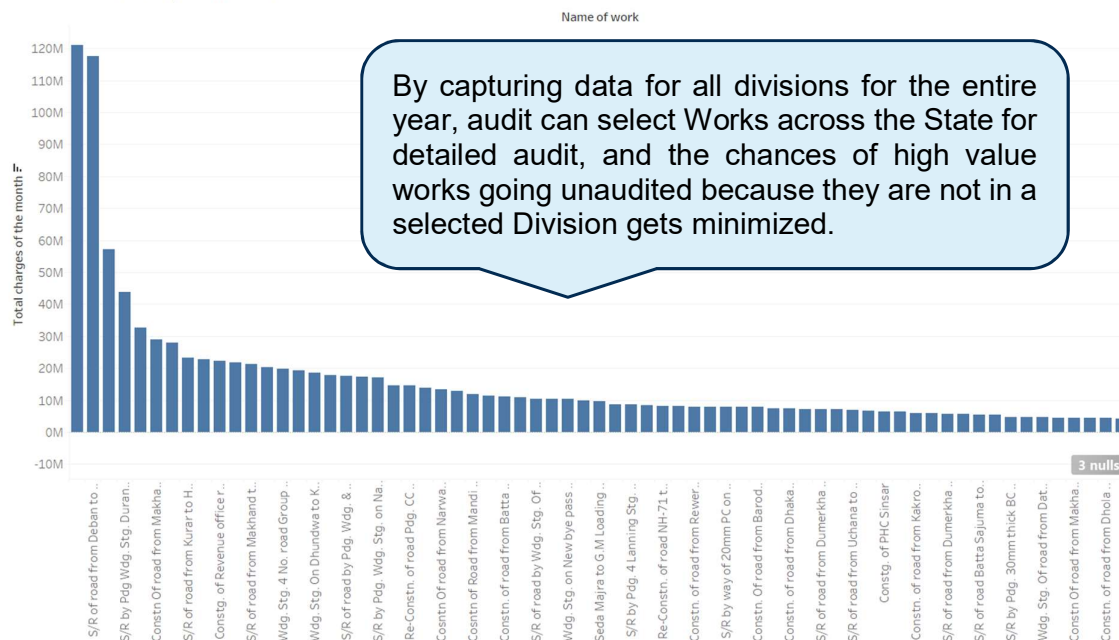


Figure 7: Work-wise expenditure for the year for a select Division using Form 27/64.

An examination of the Time Series data for monthly expenditure and deductions captured in form 27/64 leads to very interesting insights which are depicted in the next two illustrations:

Illustration 5: Patterns of high value Works in a given timeframe.

“Name of the work”, “Expenditure for the work” and “Month/Year” fields from Form 27/64 are selected in Tableau and line chart visualization is done on the fields (For Top 5 Works in a division in the illustration given below)

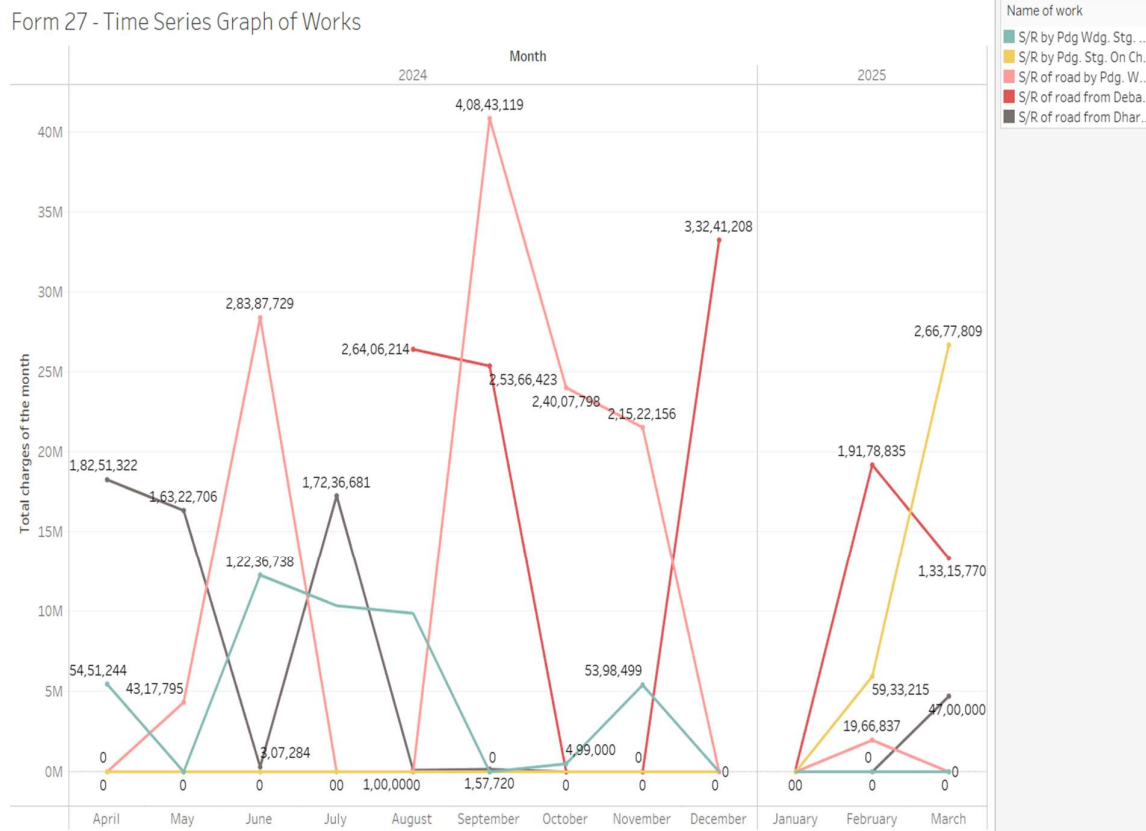


Figure 8: Month-on-month expenditure of top 5 works for the year for a selected division using Form 27/64. This allows the auditor to look at the progressive trend of expenditure and focus on works based on unexplained peaks or falls in the expenditure booking which may otherwise go undetected in the current processes which sample only selected months for further audit scrutiny.

Illustration 6(a): Details of Expenditure and Deductions for a Division (Month Wise)

Using all the Forms of Monthly Accounts of a division, an excel spreadsheet is compiled which has all the expenditures/deductions of each month of each form in a Financial Year and the excel spreadsheet is uploaded to Tableau and used as Data Source.

PD Jind (Filled up Proforma of works divisions)

Connection: Live | Extract | Edit | Refresh | Filters: Add

Extract will contain all data.

Need more data? Drag tables here to relate them. [Learn more](#)

PD Jind	Month	Quarter	Form 42 Receipt	Form 42 Disbursement	Form 42-41	Form-9 Labour cess coll...	Form-9 F7	Form-9 Labour cess coll...	Form-9 Labour cess
01-04-2024	null		178,074,611	178,074,611	7,067,847	0	17,805.80		16,604
01-05-2024	null		189,053,089	189,053,089	2,373,310	0	18,903.38		19,307
01-06-2024	null		213,881,758	213,881,758	3,805,854	0	21,386.11		20,639
01-07-2024	Quarter 1		581,009,458	581,009,458	13,247,011	0	58,095.29		56,550
01-08-2024	null		70,023,585	70,023,585	32,541,601	0	7,001.81		5,515
01-09-2024	Quarter 2		243,540,726	243,540,726	1,004,215	0	24,351.70		23,741
01-10-2024	null		255,170,942	255,170,942	1,139,253	0	25,511.87		52,240
01-11-2024	Quarter 3		568,735,253	568,735,253	34,685,069	0	56,865.38		81,496
01-12-2024	null		221,351,364	221,351,364	7,811,741	0	22,133.10		20,320
01-01-2025	Quarter 4		99,301,072	99,301,072	5,001,490	0	9,929.18		9,223
01-02-2025	null		220,867,306	220,867,306	17,151,106	0	22,064.75		19,614
01-03-2025	Quarter 1		541,519,742	541,519,742	29,964,337	0	54,147.04		49,357
01-04-2025	null		133,369,625	133,369,625	2,577,564	0	13,335.78		11,875
01-05-2025	Quarter 2		94,311,121	94,311,121	11,586,827	0	9,430.46		6,476

Figure 9: Filled Up Proforma of Monthly Accounts for work divisions. The above generated excel sheet was prepared by data entry operation from across Forms, of select parameters which were deemed crucial for Central Audit.

Illustration 6(b): Outcome of data analysis for a Division in respect of Collections/Deductions of Labour Cess/EMD/Tender Doc fee/Income Tax and Electronic Payment System Statements.

From the above compiled spreadsheet, the images below (Figure 10) show deductions and payments which are supposed to be within a percentage range of expenditure on Works (for example, labour cess is 1% of Work value). By plotting these against total expenditure by the Division on works for the corresponding period, the outliers can be identified for further scrutiny.



Figure 10: Graphical representation of different forms of monthly accounts.

Illustration 7: Variation between Estimated Cost and Expenditure through data analysis of Work, Cost Estimate and total expenditure upto date.

Form 27 Excel spreadsheet is uploaded to Tableau and fields “Name of Work”, “Cost Estimate of Work” and “Total Expenditure upto Date” are then used for analysis. “Cost Estimate of Work” is depicted in Circle & “Total Expenditure upto Date” is depicted in Bar format, both kept in Columns & the “Name of Work” is kept in Rows in Tableau.

Expenditure greater than Cost Estimate using March Form-27

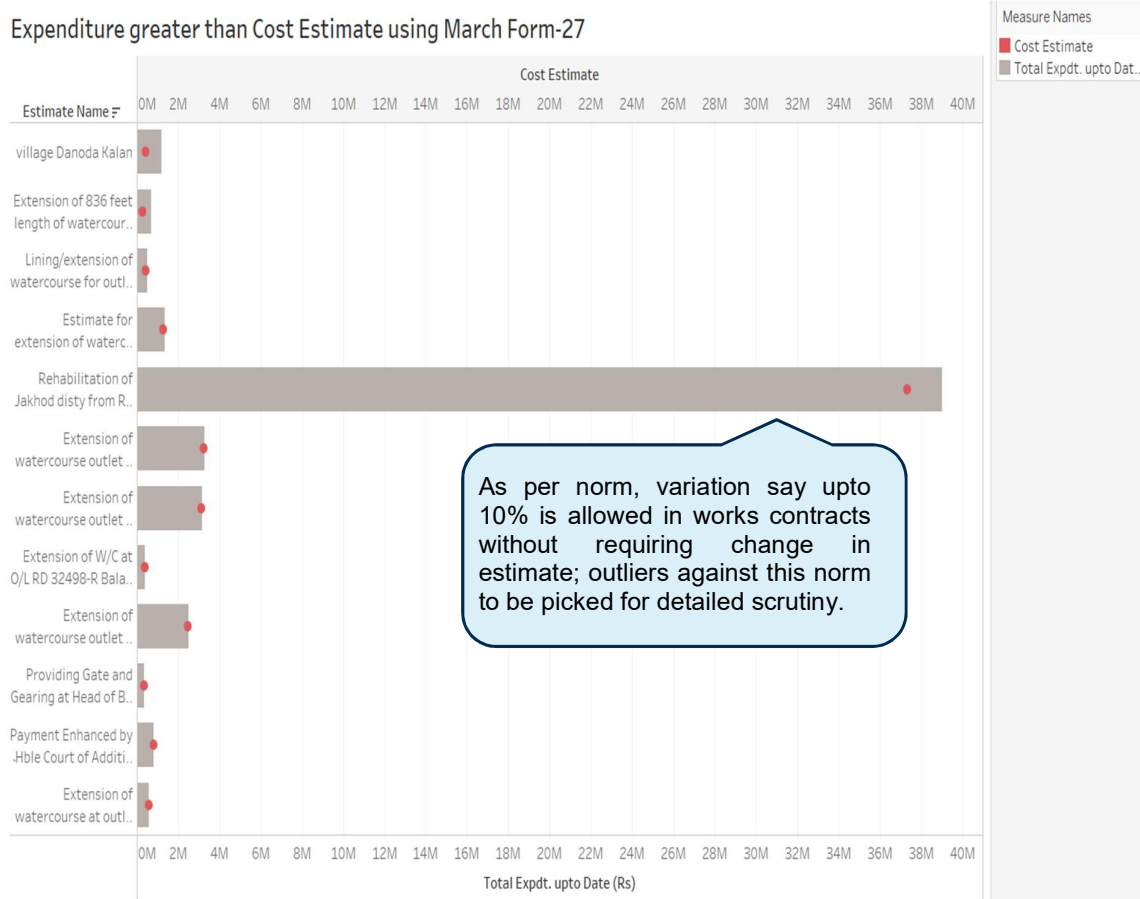


Figure 11: Shows works where the actual expenditure exceeds original estimate using Form 27/64(Schedule of Work Expenditure).

Illustration 8: Identification of Dominant Contractors through Analysis of Contractor-wise Payment Data.

Excel Sheet is prepared from Monthly Accounts which includes fields like the “Name of Work”, “Name of Contractor”, Major Head, Voucher No, Amount of Voucher etc, which is used as Data source in Tableau and Fields namely “Name of Contractor”, “Amount of Voucher” & “Name of the work” are used for a bar chart analysis.

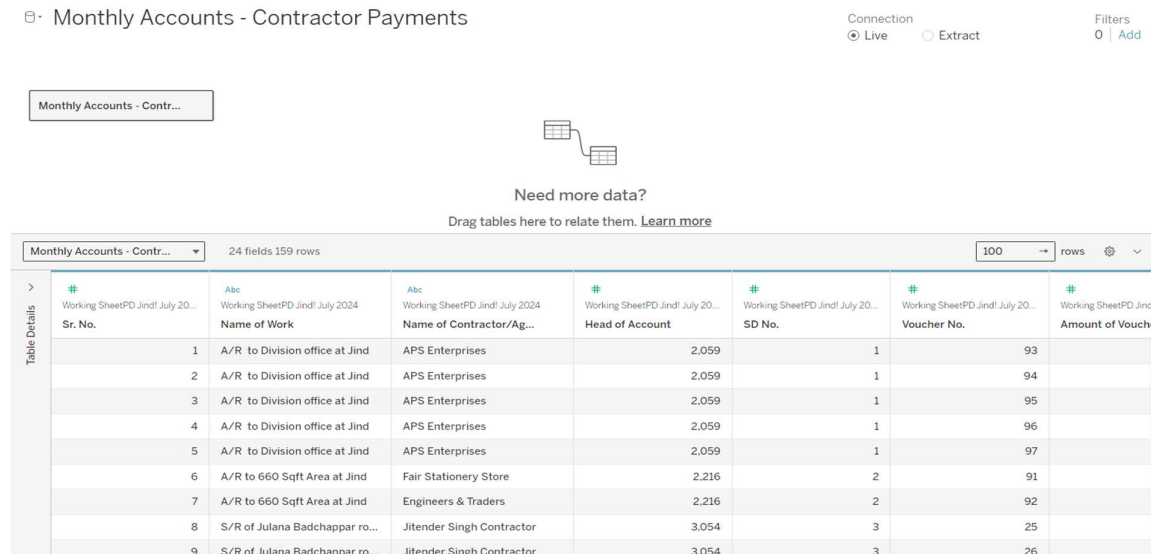


Figure 12: Contractor-wise payments for a division. This insight can be used to identify dominant contractors in the Division. Audit can further develop contractor profiles to investigate collusive bid patterns as is demonstrated in AuditWise.

Illustration 9: Identification of Dominant Contractors through Analysis of Contractor-wise work allotment

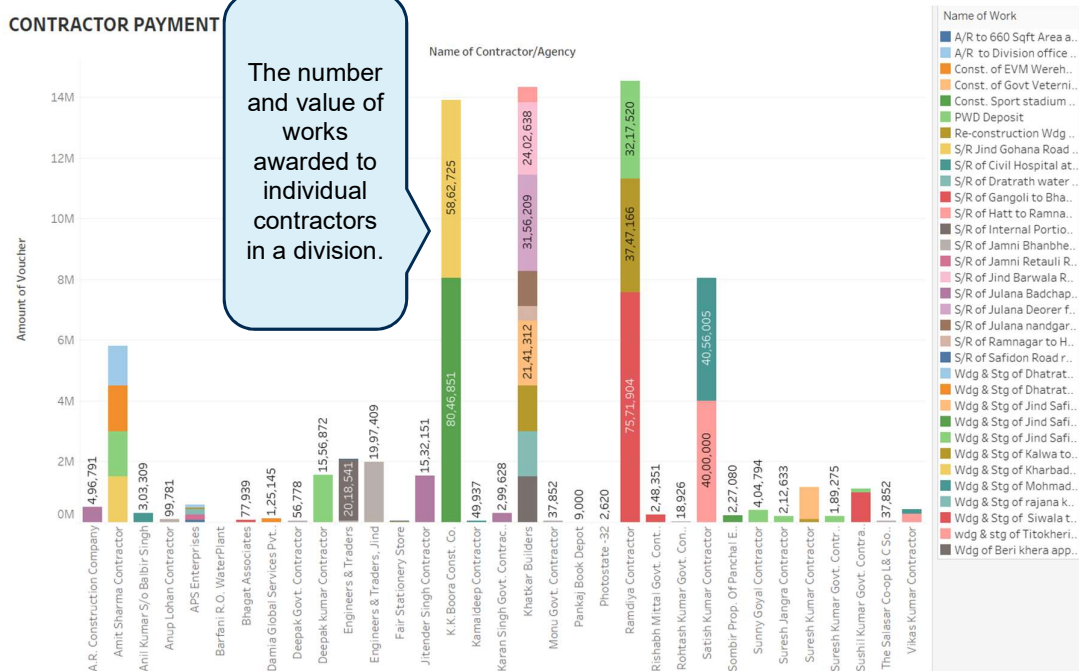


Figure 13: Contractor Payment Graphical representation for different works in a division-an insight which was not possible in the traditional method of audit of public works.

Illustration 10: Cross-analysis of VLC and Form 27 Data for Verification of Head-wise Expenditure Booking

A cross-analysis between VLC data and Form 27 data to be performed to check for consistency in head-wise expenditure bookings.

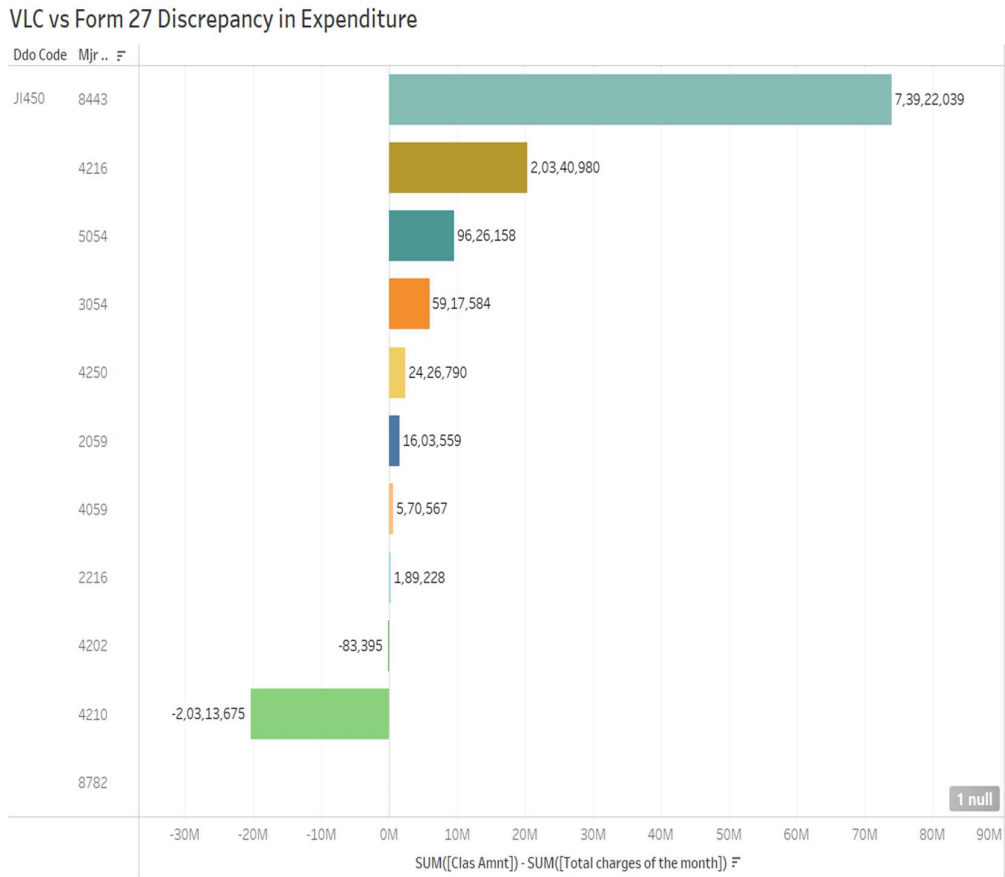


Figure 14: Discrepancy in expenditure in VLC vs Form 27/64.

Stage 3: Analysis of Financial Data (IFMS)

This stage deals with analysis of data from Integrated Financial Management System and cross data analysis with Public Works Account, sourcing data from the IFMS to capture billing, gross/net payments (DDO-wise, head-wise), and granular financial transaction details².

Illustration 11: Analysis of Head-wise Expenditure of Divisions Using IFMS Transaction_Payment_Token table in Tableau

T_P_Token.csv file of IFMS database was used in Tableau to generate Head-wise expenditure of divisions by putting Major Head in columns and the sum of Payment Amount in rows in Tableau. The data was further filtered to include Head wise expenditure of a single division by applying filters on District Treasury Officer, Sub-Treasury officer and Drawing and Disbursing Officer.

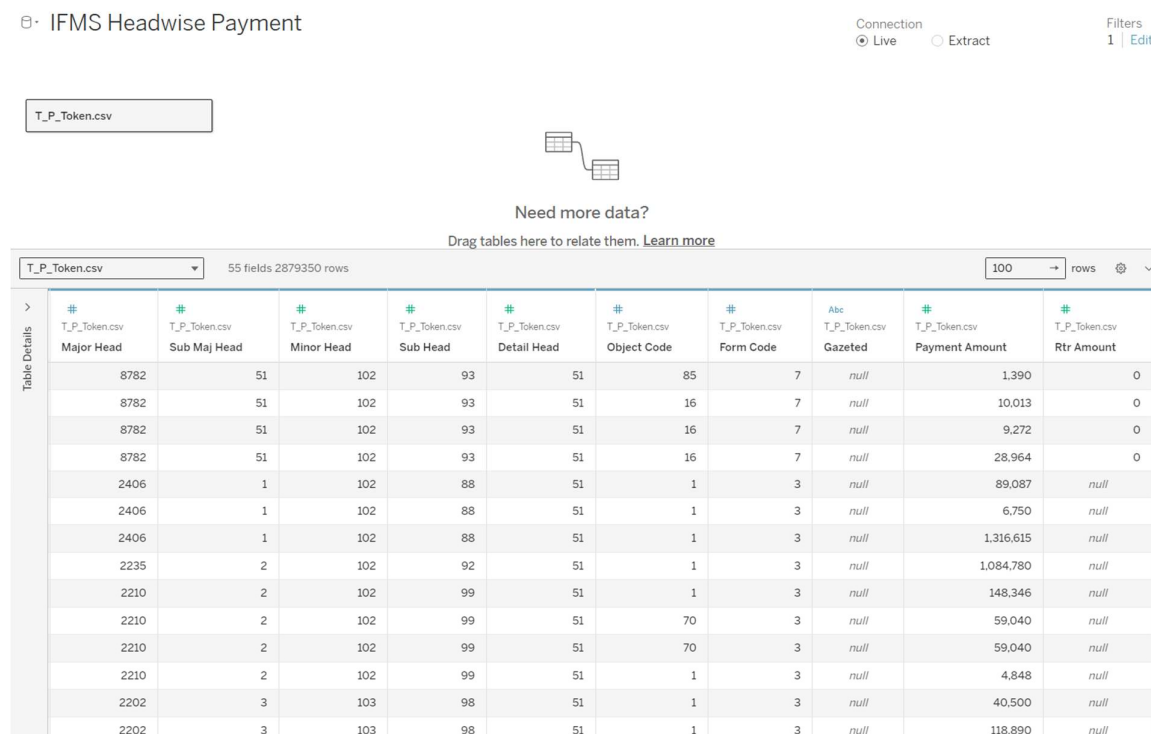


Figure 15: IFMS Head-wise Payment Data Source. IFMS data to be used to check for correct booking of expenditure as it gives booking till Object head. For example, Roads & Bridges (major head 3054/5054) should ideally have major booking of expenditure under minor heads 102 (bridges) and 337 (road works), which can be used to check excess/irrelevant booking under minor head 800 (other expenditures).

² The table nomenclature in this model is from Haryana IT systems such as e-procurement, Haryana E-Works Portal (HEWP) and IFMS. The various Field Offices will require to map the logical process flow in this model to the table nomenclature of the relevant datasets in their respective states.

Illustration 12: Head-Wise Expenditure in a division using IFMS

IFMS - Headwise Expenditure of Division

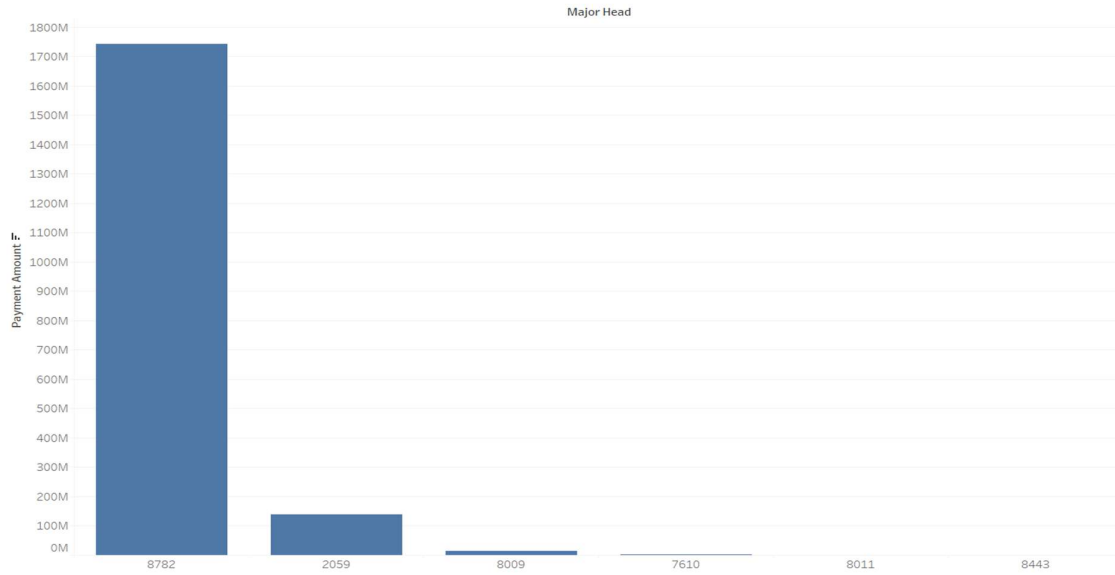


Figure 16: Head-Wise Expenditure in a division using IFMS. The analysis explained under Figure 15, can be further visually presented using bar charts as above displaying Head of Account wise expenditure booking.

Illustration 13: Integration of T_P_Payees and T_P-Token Data for Contractor-wise Payment Analysis in Tableau

T_P_Payees (Containing Unique ID of contractors) and T_P-Token.csv (ID Wise payment to contractors by respective DDOs) file of IFMS database were first filtered to include data of a F.Y. and then the tables were “inner-joined” in Tableau with “Id” as a common key.

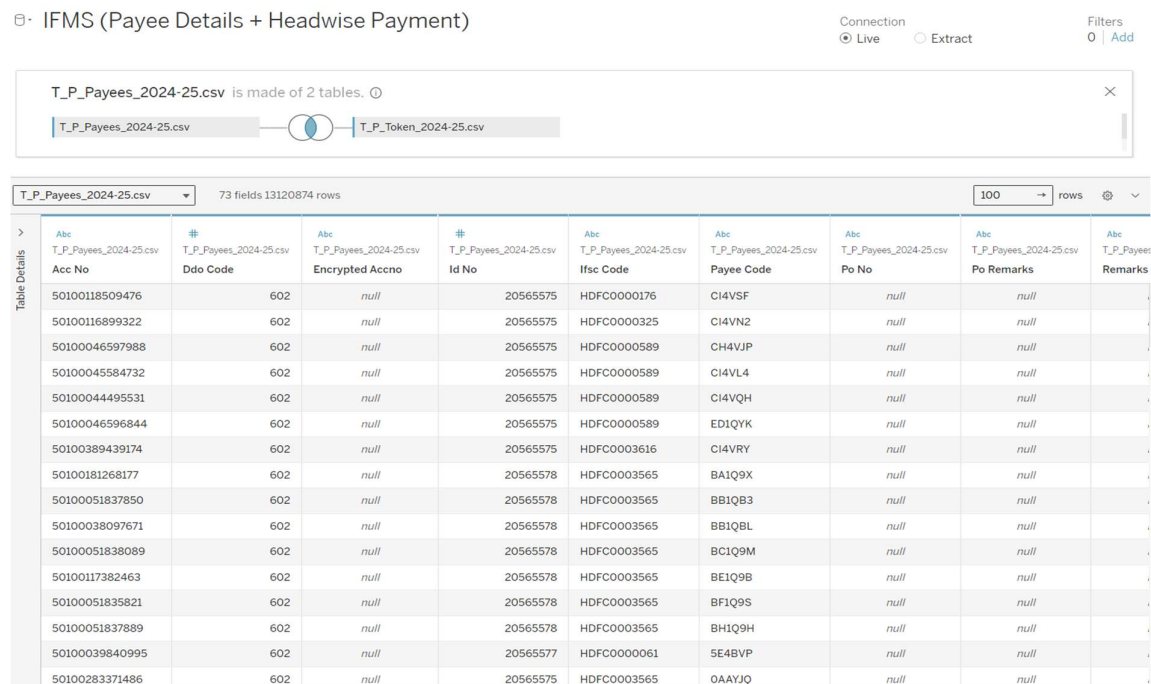


Figure 17: IFMS Payee Details and Head-Wise Payments. IFMS data provides for contractor-wise payments made DDO-wise. Such data provides an insight into contractor concentration in divisions.

Illustration 14: Identification of dominant Contractors through payment data

Payee Code was kept in the row and the sum of amount kept in column. Filter was applied on DTO, STO and DDO code to include UCP's (Unique Code of Payee) for a single division on Tableau

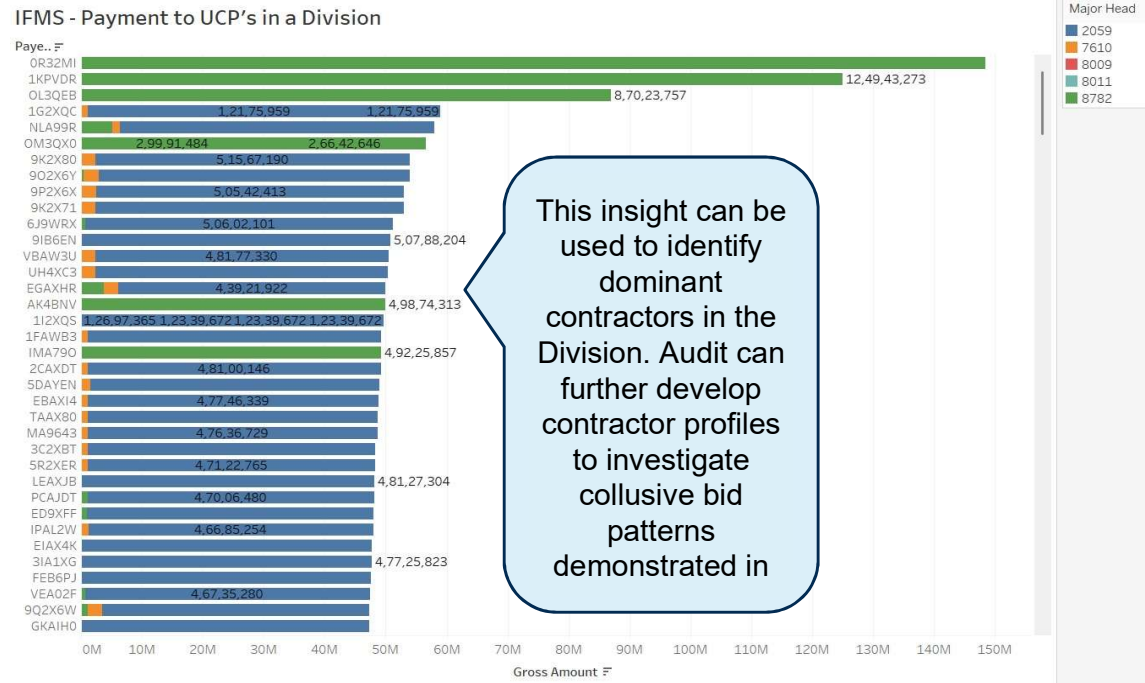


Figure 18: Payment to Contractors in a division using IFMS. The feeder data for this is shown in Figures 19 and 20. UCP identifies individual payees in IFMS in respect of State of Haryana.

Illustration 15(a): Cross-verification of Expenditure Bookings through Integration of Form 27 and IFMS Data between Form 27 and IFMS may be joined based on common singular/joint fields to check for consistency in expenditure bookings between the two.

	A	B	C	D	E
1	Payee Code	Amount			
2	EJ4BQG	1,45,69,57,88,662			
3	7P3613	61,13,21,61,514		Mean	2,02,19,05,382
4	UO0L1W	57,67,52,43,922		Median	26,20,21,043
5	TJ0LNP	52,47,30,73,534			
6	UK0LNN	40,21,05,36,795			
7	CN0L1O	28,47,05,15,983			
8	OKBF2O	17,24,70,21,629			
9	SK0L6F	16,04,86,93,753			
10	RQ0LG0	16,02,80,54,684			
11	LQ0LRD	15,10,39,35,105			
12	TK0LNO	14,87,93,21,887			
13	9J4BNX	14,84,01,34,000			
14	UMPGSW	14,77,25,07,000			
15	RJPMIF	14,40,70,00,000			

Figure 19: Payment to contractors in the State (Extract from IFMS).

Illustration 15(b): Identification of Top Contractors through DDO-wise Payment Analysis Using Tableau/IDEA/MS Excel

Further, DDO-wise top contractors can be conveniently brought out by use of any tool such as Tableau, IDEA/Microsoft Excel; The pivot table of **Tableau** and **MS Excel** respectively are shown below.

DDO Wise top UCP's

Dto Code	Sto Code	Ddo Cod..	Payee Co..	
1	1	365	HR4BV0	8,44,64,831
			JGBDQ5	6,87,41,735
			LM3QME	8,00,23,906
			NMARAP	76,69,09,475
			PM0B8F	10,94,09,048
			QPAMVL	6,13,58,394
		666	HL3G2V	6,25,85,393
			PM0B8F	14,11,88,477
		671	7NADOD	6,02,20,861
	3	675	2QAB68	6,17,33,397
			GR026U	5,21,50,742
			PR4BQ6	7,72,61,689
			VOANSS	22,36,66,664
2	0	665	1JAFNV	7,79,10,156
			6RPIT3	13,68,66,945
			IMA790	13,85,06,742
			KO21U4	54,75,34,761
			uqaj32	10,33,85,163
3	0	673	OKBF2O	5,48,36,377
5	0	2112	4A61VT	27,04,88,173
			SO618A	10,01,60,253
			5Q1AC0	13,17,78,374
			6FBIP6	27,48,15,157
			ALAFUM	7,32,39,671
			BRA9GH	17,48,71,555
			DNA67V	9,58,74,924
			VM610U	21,89,71,311
			VQBJS5	24,90,03,441

Row Labels	Sum of Amount
EE CD NH PWD B AND R HARYANAPANCHKULA	14949883
RAM KUMAR CONTRACTOR PVT LTD KUMAR CONTRACTOR	14949883
EE PD BHIWANI	85209787
JS SYNERGIES PVT	13686694
S S BUILDERS	2918942
HISAR CONSTRUCTION COMPANY	54753476
PANKAJ KUMAR CONTRACTOR	13850674
EE PD Faridabad	35021976
B K CONTRACTORS CONTRACTOR	21897131
GAURI BUILDCON PVT LTD	9587492
MS CONSTRUCTION	3537352
EEPD-1, Sonapat	46858770
AJIT CONSTRUCTION COMPANY	4296221
GAURI BUILDCON PVT LTD	4788356
HISAR CONSTRUCTION COMPANY	6592844
KRISHANA CONSTRUCTION CO	3398137
M S SHIV SHAKTI CONSTRUCTION CO	5372775
MAHASHIV PROMOTERS PVT LTD PROMOTER PVT	3365920
R K EARTH MOVERS BAHADURGARH	6166534
RAMEHAR SINGH CONTRACTOR	6876950
SATISH KUMAR CONTRACTOR	6001030
EEPD2 SWONIPAT	29982596
AJIT CONSTRUCTION COMPANY	9115026
DEEPAK KUMAR CONTRACTOR	5102307
KRISHANA CONSTRUCTION CO	5702074
M S SHIV SHAKTI CONSTRUCTION CO	10063188
executive engineer	6345198

Figure 20: DDO Wise top contractors in B&R Department (Extract from IFMS).

These Illustrations bring completely new insights, on dominant contractors in a division, dominant contractors across divisions & concentration of contractors in divisions / geographical areas. Similarly, division wise contract value is also captured by such analysis in the next Illustration.

Illustration 16: Use of Pivot Tables for Identification of Multiple Payments to the Same UCP Across Divisions

Similarly, pivot tables in excel can be used to find out if the same UCP is getting paid in multiple divisions.

Row Labels	Sum of Amount
B K CONTRACTORS CONTRACTOR	561063479
EE PD Faridabad	218971311
Executive Engineer Provincial Division No 1 PWD Band R Branch Gurgaon	24489782
Executive Engineer Provincial Division PWDB&R Palwal	47317052
Executive Engineer PWD B&R Nuh	270285334
JS SYNERGIES PVT	327923853
EE PD BHIWANI	136866945
Executive Engineer Provincial Division PWDB R Branch Charkhi Dadri	80014813
Executive Engineer PWD B and R Jhajjar	111042095
S S BUILDERS	405949694
EE PD BHIWANI	29189425
Executive Engineer prov div no 1 PWD BSR	23013074
Executive Engineer, Provincial Division No. 3, PWDB&R Br., Hisar	353747195
SHREE BALAJI CONSTRUCTIONS	116777056
Executive Engineer prov div no 1 PWD BSR	35270040
Executive Engineer Provincial Division PWD BandR Fatehabad	20845722
Provincial Division PWD B R Hansi Hisar	60661294
VINOD SAHARAN CONTRACTOR HISAR	106520172
Executive Engineer prov div no 1 PWD BSR	38541517
Executive Engineer Provincial Division PWD BandR Fatehabad	29679525
Provincial Division PWD B R Hansi Hisar	38299130
AJIT CONSTRUCTION COMPANY	388322928
EEPD-1, Sonapat	42962217
EEPD2 SWONIPAT	91150263
Executive Engineer P2 PWD B and R Mall Road Karnal	47592763
Executive Engineer Provincial Division No 2 Ambala Cantt	62585393
Executive Engineer, Provincial Division No. 1, PWDB&R Bg Rohtak	45374483

Figure 21: Payments to contractors across different divisions in B&R Department.

The following analysis mapped the works contract with the contractor, thus providing access to a completely new information set, hitherto unavailable to auditors, for analysis:

Illustration 17: Integration of IFMS T_P_Token Data with Form 27 (Schedule of Work Expenditure) for Comparative Analysis of Expenditure Data

The T_P_Token .csv table from IFMS data is “inner joined” with the Form 27 of a division with the payment amount as key to compare the data between form 27 and IFMS.

IFMS & FORM 27 COMPARISON

Connection ☒ Live ☐ Extract Filters 0 | Add

NARWANA IFMS TPTOKEN 24-25.csv is made of 2 tables.

NARWANA IFMS TPTOKEN 24-25.csv						
Voucher No	Major Head (Sheet1 (2))	Head	Sd .N.O.	Name of work	Total charges of the mo...	Total progressive Expd
8	3.054	054-04-ODR-337-98-51-18 M...	14	S/R of road from Dhanouri to...	18501	6C
59	4.210	P-01-08-4210-01-110-99-51-...	17	A/R to PWD Office at Kalayat	26824	
67	5.054	5054-C.O R&B (Roads) 01-O...	14	Constn. of road from Kuchra...	207498	20
201	5.054	5054-C.O R&B (Roads) 01-O...	9	S/R of road from Bhonsla to ...	865134	21
null	5.054	5054-C.O R&B (Roads) 01-O...	4	S/R of road by Pdg. Wdg. & S...	4317795	22
176	5.054	5054-C.O R&B (Roads) 01-O...	4	S/R of road by Pdg. Wdg. & S...	4317795	23
59	2.059	51-09-2059-80-053-99-51-R...	38	A/R to PWD Office at Kalavat	26824	
118	3.054	54-04-ODR-337-98-51-18 MC...	null	22 A/M Mohal khera link road	99000	
12	3.054	54-04-ODR-337-98-51-18 MC...	27 A	A/M of Kalayat to Gurthali ro...	300000	
52	3.054	54-04-ODR-337-98-51-18 MC...	27 A	A/M of Kalayat to Gurthali ro...	300000	
12	3.054	54-04-ODR-337-98-51-18 MC...	25	A/M Kalwan to Gelha Road	300000	
52	3.054	54-04-ODR-337-98-51-18 MC...	25	A/M Kalwan to Gelha Road	300000	

Figure 22: Linking of Form 27 with IFMS data is required to link a contract to the respective contractor's ID/name. For this purpose, payments made were matched in the two datasets as shown in next picture.

Form 27 vs IFMS comparison

Name of work	Total cha..	Gross A..	Remarks
22 A/M Mohal khera link road	99000	99000	Gurdev Sanction
A/M Kalwan to Gelha Road	300000	300000	somdutt a r payments 300000 Somdutt ar payment 300000
A/M of Kalayat to Gurthali road via Bhana Brahmawala road	300000	300000	somdutt a r payments 300000 Somdutt ar payment 300000
A/M of old NH-65 from KM 135 to 138 village portion Danoda	300000	300000	somdutt a r payments 300000 Somdutt ar payment 300000
A/M Old NH-65 from Km 121.375 to 124.875 New PWD Rest House Narwana to NH-52 Devi Lal School	400000	400000	Gpf bill GPF Non refund bill of Sh Adha Ra.. Shamsher ar payments 400000 somdutt various a r payments 4000.. somutt a r payments 400000
A/R to PWD Office at Kalavat	26824	26824	salary HDM 26824
A/R to PWD Office at Kalayat	26824	26824	salary HDM 26824
Constn. Of Govt. Veternary Dispensary in village Sudkain Kalan	156770	156770	Somdutt GVD Sudkain Kalan Gst 15..
Constn. of Health Wellness center (HWC-SHC) in village Dumerkh..	302073	302073	Gst bill somdutt HWC Dumerkha Kal..
Constn. Of New Bus Stand Alewa	367169	367169	bus stand alewa 367169
Constn. of road from Kuchrana Kalan to Dhani Deva Singh road	99810	99810	mics 99810
	207498	207498	The Gavens Pro Infra Rohtak 207498
Pdg. & Fixing of Shed of (ROB) on Delhi Bathinda railway line cros..	284054	284054	GST Narwana Grover ROB 284054
S/R of Pega to Shamdo Thua road	1687645	1687645	GST 2 no road chahal 1687645
S/R of road by Pdg. Wdg. & Stg. From RD 0.00 to 17.83 Km on Uchana to Litani road (MDR-112) CRP Scheme	1966837	1966837	Krishan Lal Gst uchana litani 19668..
	4317795	4317795	Krishan Lal Uchana Litani GST 4317.. r
S/R of road from Bhonsla to Khatkar road	865134	865134	Chahal GST sr of 5nos road of group ..
S/R of road from Dhanouri to Barta to Nandsinghwala	18501	18501	mics 18501
S/R of road from Dharodi to Kanherian road	100000	100000	Gpf bill of Sh Rajinder Kumar WS PAYMENT OF LUMP SUM EX GRATIA payment of lump sum ex gratia to t.. payment of lump sum ex gratia to t.. Shamsher contractor ar payments 1.. shamsher singh ar 100000

Figure 23: Comparing total amounts of works of Form 27 and IFMS.

Stage 4: Contingency for Non-Digital Data

Recognizing that monthly accounts are not received from divisions in some states, or that data may exist in non-OCR-convertible formats, the specific records required to bridge these gaps shall be identified. This will also require collection of data from DAOs/Divisions directly pertaining to Works audit specific parameters. Annexure B provides illustrative list of such documents, ensuring that no sanctioned or ongoing project is excluded from the audit analysis due to digital unavailability.

The parameters are provided below.

Tendering Process	Form 27 Schedule of Work Expenditure	Payments and Deduction
Name of Division	Name of Division	Name of Division
IFMS Code of Division	Month/Year	IFMS Code of Division
VLC Code of Division	IFMS Code of Division	Work ID
GSTN Code of Division	VLC Code of Division	Tender ID
Work ID	Work ID	Name of Work
Tender ID	Tender ID	Head of Account
Name of Work as per Administrative Approval of Rough Cost Estimate	Head of Account	Name of Claimant
Date of Administrative Approval of rough cost estimate	Name of Work as per Agreement	GSTN of Claimant
Amount of Administrative Approval	Agreement Amount	Unique Code of Payee (UCP) as per IFMS
Date of Revised Administrative Approval	Name of Contractor	Amount of Voucher

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Amount of Revised Administrative Approval	GSTN of Contractor	TDS/GST
Date of Technical Approval	Date of Start of Work	TDS/Income Tax
Amount of Technical Sanction	Date of Intended Completion of Work	Labour Cess
Date of DNIT	Actual Date of Completion	Security Deposit
Amount of DNIT	Defect Liability Period	Amount withheld
SCHEDULE OF RATES Item Amount	Last date of DEFECTS LIABILITY PERIOD	Other deductions, if any
NS Item Amount	SD. No	Other deductions, if any
Bid Submission Start Date	Bill Status (Running /Final)	Other deductions, if any
Bid Submission End Date	Total Charges up to Previous Financial Year	Net Amount
Number of Bidders Participated	Total charges of the current month	
Scheduled Start Date of Work	Total charges up to previous month (current F.Y.)	
Scheduled Completion Date of Work	Total charges of the year	
Date of Award of Work	Total Expenditure up to date	
Name of Work as per Agreement	Remarks 1. If the work is completed, say so. 2. If an excess over the agreement amount, if sanctioned by the Divisional Officer and the work is still in progress, the orders may be recorded here. 3. Any Other	
Agreement No.		
Date of Agreement		
Amount of Agreement		
Date of Actual Completion		
Letter of Acceptance		
Letter to proceed		
Name of Contractor		
GSTN of Contractor		

After identification and collection of data, we move to create a unified database which allows an auditor to see the full lifecycle of a project in a single row of data thus obviating the risk of the fact that works data is often "siloesd" meaning payment data lives in one system while technical/administrative data live in another.

This brings to an end the Base Model of data analytics for auditing public works. The Advanced Model would require not only higher technical IT competence but also domain knowledge of Works Accounting and the audit of Works operations.

Advanced Model for data analytics
Prepared by Office of PAG (Audit),
Haryana

Advanced Model for data analytics

The mechanics of the base model are explained in the previous section wherein three primary datasets namely VLC, Monthly Works Accounts and IFMS were used to conduct data analytics to gather insights/risk flags for further verification by the field audit parties. This section describes the advanced model which comprises of datasets in addition to the primary ones. These additional datasets include Engineering Works Portal/ Works and Accounts Management Information System (which captures the estimation, processing of RA bills etc.), e-procurement/e-tendering and other non-related datasets such as Mining/Regional Transport Offices/Goods & Services Tax etc.

Integration of base model with datasets

This stage involves the technical consolidation of disparate data sources to **build a unified relational model**. The goal is to move from isolated tables which are structured collections of data organized into rows (records) and columns (fields) to a master table where every project's history is linked. This integrated model allows for the tracking of a project's lifecycle from its sanctioned estimate to its final disbursement enabling the detection of anomalies that are invisible when viewing tables in isolation.

Key Implementation Stages:

Stage 1: Identification of datasets for advanced model:

➤ Tendering Data (e-Procurement Portal)

Identifying datasets within the e-Procurement Portal, specifically focusing on the Notice Inviting Tender (NIT), Tender documents, Type of Tender, Advertised Cost, Earnest Money, NIT Period, Tender validity and Award of Contract (AOC) data to capture the critical transition from estimated cost to awarded contract value.

➤ Engineering data (WAMIS/HEWP portal)

Locating primary project modules within the Works and Accounts Management Information System (WAMIS) or the state-specific Works Portal like Haryana Engineering Works Portal in Haryana, to identify data regarding project estimates, Administrative Approvals (AA), Technical Sanctions (TS), engineering workflows, physical and financial progress, e-Measurement Book (e-MB) tracking and billing.

➤ **Supplementary Datasets**

Identifying any other auxiliary datasets related to works, such as, Goods & Services Tax portal, Parivahan data, departmental asset registers, progress report, payment portal, mining pass permits etc.

➤ **Data Cleaning and Standardization**

Before integration, it must be ensured that "Join Keys" (the common fields used to link different datasets) are uniform. This involves Work ID, Tender ID, Agreement Number, Contractor GSTN, etc. across all tables. This ensures that a same common field match across multiple tables e.g., 'Work ID', in the Estimate table perfectly matches the same 'Work ID' in the Payment table.

➤ **Data Parameter Validation**

An initial verification shall be performed to ensure that the identified datasets, both digital and documentary, covering the same period and the total "Population" of works are consistent across all platforms (HEWP (similar platform in other States), e-Procurement, and IFMS), to avoid reconciliation errors in later stages

➤ **Unified Data Environment**

Treasury data, engineering data, tender data, and contractor payment information, etc., needs to be integrated to create a unified audit data environment. This eliminates "data silos" and allows to see the financial and physical progress of a work simultaneously.

➤ **Relational Joining (Table Merging)**

Logical joins to be performed on the common field to merge the identified tables.

➤ **Creation of the Master Table**

The final output of this stage is a comprehensive single file where each row represents a unique field, populated with its corresponding sanctioned amount, awarded cost, date of sanction/award of work, and total payments.

➤ **Integrity Reconciliation**

A "Summation Check" is required to ensure the total expenditure in the integrated Master Table matches the gross totals in the standalone IFMS and Works and

Accounts Management Information System/HEWP (Similar platform in other States) dashboards. Any variance must be investigated to ensure no data was lost or duplicated during the joining process.

➤ The figure below shows an illustration of the merge operations performed on the HEWP data tables available with Haryana.

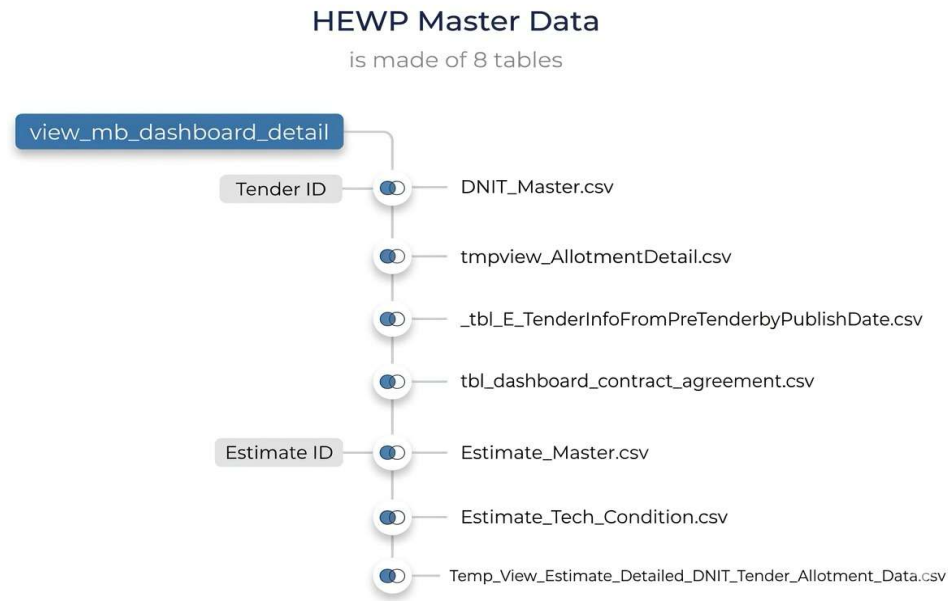


Figure 24: Flowchart of Joining of different tables in HEWP Master Data using Tender ID and Estimate ID as primary keys.

Stage 2: Domain Knowledge based Data analytics and risk-based prioritization

This stage involves querying the integrated Master Table to uncover "audit insights" and systemic anomalies that warrant closer inspection. By subjecting structured datasets to advanced analytics including trend analysis, anomaly detection, and contractor network mapping, risk flags are generated that are often overlooked in manual scrutiny. Using tools like Tableau and AuditWise, the audit transitions from a sampling-based approach to a comprehensive, risk-led investigation of the entire project lifecycle.

Depending on the needs and expertise of the office, various generic Data Analytics tools can be used. However, AuditWise offers domain specific logic based on data sources identified and will automate sizeable portion of data analysis, field validation and real-time compilation of findings for monitoring of risk flags.

The checklist approach:

Before proceeding to AuditWise, it is important to understand that without a proper appreciation of the domain logic, for works audit, it may be challenging for an auditor to proceed further. Hence, a brief checklist of each step of the project lifecycle from conceptualization and tendering to execution and final payment covering the entire project cycle has been prepared.

The checklist lays down a framework for audit of public works. Its implementation, however, would depend upon the level of data availability in field offices. Given the variations in availability of record and digital infrastructure in field offices the checklist may be applied in a graded and scalable manner. The implementation checklist is, therefore, intended to maintain uniformity in audit objectives while allowing flexibility in its application. The identified data analysis areas are illustrative, and field offices may suitably expand and refine them based on domain knowledge and audit-specific requirements, but it must be ensured that rule-based as well as contractual provision-based checks shall be applied to all the records (entire database) to assess compliance with applicable financial and procedural rules.

Domain knowledge-based implementation checklist for remote/hybrid audit of public works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
1. Preliminary estimate and administrative approval stage	1.1 Validity of Administrative approvals; Dataset = works portal/ WAMIS	Extract date of administrative approval and apply rule-based validity period as defined in the extant rule.	Flag cases where approvals have lapsed, or works were taken up without revalidation after expiration of validity period.	1. Whether revised approval was taken 2. Whether the rule for validity period updated	1. Works were executed or payments made based on lapsed administrative approvals 2. Unauthorized expenditure.
	1.2 Booking of estimate under correct major head; Dataset = Form 27/ 64 of the PWA	Extract head of account from estimate and compare with nature and objective of work as per classification rules Major/Minor Heads	Flag cases of incorrect or inconsistent booking under Major/Minor Heads	Whether classification is in line with prescribed rules and nature of expenditure	Misclassification of expenditure

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
	1.3 non-preparation of reduced estimate despite savings; Dataset = works portal/ WAMIS + e-procurement	1. Extract original sanctioned estimate, tendered cost, and actual expenditure. 2. Identify cases where significant savings exist (estimate vs awarded cost / final cost). 3. Extract total expenditure booked under the estimate and payment made for actual work	1. Flag cases where no reduced/revised estimate was prepared despite substantial savings. 2. Savings retained without formal sanction 3. Excess budget booking compared to actual payments	1. Compare sanctioned estimate vs tendered cost vs final expenditure 2. Verify rules/instructions regarding preparation of reduced estimates 3. Check whether competent authority was informed of savings 4. Examine financial reporting and budget control records	1. Non-preparation of reduced estimates 2. Inefficient utilisation of budget provisions 3. Risk of misclassification or parking of funds
2. Detailed estimate and technical sanction stage	2.1 Technical sanction obtained before Award of Contract (AoC); Dataset = works portal/ WAMIS + e-procurement	1. Extract technical sanction approval date and AoC date	1. Flag cases where technical sanction was after AoC or not obtained	Whether any justification for irregularity	Execution of work without technical sanction
	2.2 Analysis of Non-Schedule (NS) Items; Dataset = works portal/ WAMIS + e-procurement	1. Extract estimate data from work portal to compare Schedule of Rates items and NS items 2. Analysis of same item in more than one work/office/Department	1. Flag projects/ office/ department with an unusually high proportion of NS items. 2. Flag continuous use of same item as NS item across offices/work 3. Flag variation in rates of same items 4. Flag cases where rate analysis was not based on standard rule guidelines	1. Whether the rates of NS items are available in similar Schedule of Rates of neighbouring states or CPWD 2. Whether the rates of NS items could be derived from available similar items. 3. Obtain copy of invoices to get actual purchase price	1. NS items adopted without proper rate derivation or benchmarking, despite availability of comparable Schedule of Rates items 2. Rate inflation or deliberate bypass of standard items 3. Extra burden due to improper market survey

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
				4. Compare actual purchase price (market price) and estimated prices	
	2.3 Inclusion of irregular/avoidable item or item incidental to work; Dataset = Works Portal/WAMIS + e-procurement	1. Identification of such items based on domain knowledge 2. Extract respective item data from work portal to flag such items		Cross-verify the Estimate items and quantities against the various instructions, circulars, and SOPs issued by the State or Central Government regarding permissible work items.	1. Preparation of inflated estimate 2. Avoidable expenditure
3. Tendering and contract award stage	3.1 Splitting of work; Dataset = PWA form 27 (schedule of works expenditure) and Schedule Dockets + works portal/WAMIS + e-procurement	1. Analyse data of PWA form 27 (schedule of works expenditure) and Schedule Dockets 2. Extract data of smaller awards to the same contractor just below financial thresholds	Flag cases of splitting	1. Analyse justification for splitting	Splitting of work
	3.2 Adequate tender publicity and bid submission period; Dataset = e-procurement/e-tendering	1. Extract date of start of bid submission and date of end of bid submission 2. Extract tender notice publication date and date of start of bid submission	1. Flag cases of inadequate time for bid submission 2. Flag cases of inadequate bid publicity period	Cross verify and analyse justification for inadequate time	Inadequate tender publicity and bid submission period
	3.3 Bid rigging and cartelization; Dataset = e-procurement/e-tendering using AuditWise	1. Run trend analysis and anomaly detection algorithms 2. Extract data of bids submitted by multiple bidders through similar particulars Mobile No. IP address, email ID, PAN, etc.	Flag cases of suspected cartelization	1. Obtain supporting document 2. Analyse pattern	1. Suspected cartelization and bid rigging in procurement

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
		3. Map contractor networks to detect unusual contractor concentration or cartelisation risks.			
	3.4 Inadequate competition in procurement; Dataset = e-procurement/ e tendering using AuditWise	1. Extract number of bidder per tender 2. Extract number of total rejected bids vis a vis rejected bids per tender 3. Cross link with the bid submission period	1. Flag cases with single bids 2. Flag cases of suspected avoidable rejection of bids 3. Flag pattern for inadequate competition and inadequate time for bid submission	1. Obtain supporting document 2. Analyse pattern	1. Inadequate competition in procurement
	3.5 Scrutiny of performance security and unbalanced Bids and Additional Performance Security; Dataset= works portal/ WAMIS + e-tendering; using AuditWise	1. Extract the DNIT amount, agreement amount, and submitted Bank Guarantee (BG) 2. Link with rule-based checks for amount as well as validity period and highlight anomalies.	1. Flag Unbalanced/Front-Loaded Bids 2. Flag inadequate performance security 3. Flag inadequate additional Performance Security 4. Inadequate validity period of the BG	1. Cross verify with actual record. 2. cross verify whether verification was made about genuineness	1. Short receipt of the performance security
	3.6 Blacklisted/ debarred contractors; Dataset= works portal/ WAMIS + e-tendering; using AuditWise	1. Extract data of blacklisted contractors 2. Extract contractor-wise work award data from WAMIS/tender portal across divisions. 3. Map and match blacklisted contractors with awarded works using identifiers (name, PAN, GSTIN). 4. Identify cases where works were awarded/continued despite blacklisting.	1. Award of work to blacklisted/debarred contractors 2. Continuation of work after blacklisting without approval 3. Same contractor operating under different names/entities (PAN/GSTIN linkage)	1. Verify blacklisting orders and validity period 2. Check contractor identity (PAN, GSTIN, registration details) to detect duplicates/aliases 3. Examine contract agreements and termination clauses 4. Verify approval, if any, for continuation of work	1. Award or payment to blacklisted/debarred contractors 2. Undue favour 3. Poor internal control

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
				5. Scrutinise payment records post-blacklisting	
4. Execution stage	4.1 Cost overrun due to variation, enhancement or time overrun; Dataset= works portal/ WAMIS using AuditWise	1. Compare the executed quantities of individual items against the original Bill of Quantities to identify any variations (positive or negative) that exceed permissible limits. 2. Cross-verify the rates applied to "extra" or "substituted" items	1. Flag cumulative deviations exceeding standard permissible limits 2. Flag extra/substituted items billed without a formally approved Deviation Statement. 3. Flag exceptionally high, non-standard rates sanctioned for new, non-Bill of Quality items.	1. Validate the Rate Analysis for new items against the prevailing Schedule of Rates (Schedule of Rates) or authenticated market rates. 2. Ensure the competent authority explicitly sanctioned the extra items <i>before</i> execution. 3. Verify if a Revised Estimate was approved and whether if the overall project cost breached the original Administrative Approval limit.	Irregular expenditure due to unapproved deviations or unwarranted extra items
5. Payment and financial control stage	5.1 Delayed payment to contractor; Dataset= works portal/ WAMIS using AuditWise	1. Extract date of bill submission and date of payment 2. Compare with rule-based time allowed	1. Flag bills processed beyond the prescribed time limit. 2. Flag instances of arbitrary or out-of-sequence payment releases 3. Flag recurring delays that could trigger arbitration or interest penalty clauses.	1. Verify if the delay was justified or strictly due to administrative lapses. 2. Ensure no avoidable interest liability is created under the contract.	1. Extra financial liability through interest claims 2. Irregular financial management and potential bias
6. Completion and	6.1 Final Billing, Asset Handover,	Extract dates of physical and financial	Flag projects marked as physically	Verify the presence and authenticity	Irregular final payments made prior to

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage	Sub-stage	Action	Risk flag	Validation	Findings
closure stage	and Financial Closure; Dataset= works portal/ WAMIS using AuditWise	completion, final bill generation, from project management systems (e.g., WAMIS) and financial portals (e.g., IFMS). Cross-reference the final billed amount against the original/ revised estimate/ approval.	completed where the final bill has been pending for an extended period (e.g., >6 months). Flag final payments processed without completion / quality test reports.	of the official Completion Certificate. mandatory test reports (e.g., Third Party Quality Assurance, material, commissioning). Ensure all material reconciliation is finalized, statutory deductions (GST, TDS, Labour Cess) are correctly applied to the final bill.	actual physical completion or without statutory certifications/ test report.

Apart from the checklist given above which can be used with the existing dataset, a supplementary checklist is given in Annexure B, for a scenario where further datapoints such as Schedule of Rates, Measurement Book are either available or captured/converted in electronic format.

Annexure–A
Concordance table between PWA Forms and CPWA Forms

PWA Form	CPWA Form	Description of Form/ Schedule
44	83	List of Schedules / Forms
42	80	Monthly Account
9	46	Schedule of Revenue
41	74	Classified Abstract of Expenditure
27	64	Schedule of work expenditure
29	73	Stock Account
28	72	Schedule of debits/credits to stock
32	70	Schedule of Miscellaneous works advances
33	65	Schedule of Deposit Works
38	69	Cash Settlement Suspense Account (CSSA)
37	76	TDS -Income Tax (Adjusting Account between Central & Government)
34/35	79	Schedule of Deposit
39	77	Schedule of Debits / credits of Remittances
40	76	Schedule of debit/ credits to miscellaneous heads of accounts
26	51	Schedule with settlement with treasuries

Annexure B

Collection of Data (Haryana) – To be collected from Divisions

1. Tendering Process

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
Name of Division	IFMS Code of Division	VLC Code of Division	GSTN Code of Division	Work ID	Tender ID	Name of Work as per Administrative Approval of Rough Cost Estimate	Date of Administrative Approval of Rough Cost Estimate	Amount of Administrative Approval	Date of Revised Administrative Approval	Amount of Revised Administrative Approval	Date of Technical Approval	Amount of Technical Approval	Date of DNT	Amount of DNT	SOR Item Amount	SS Item Amount	Bid Submission Start Date	Bid Submission End Date	Number of Bidders Participated	Scheduled Start Date of Work	Scheduled Completion Date of Work	Date of Award of Work	Name of Work as per Agreement	Agreement No.	Date of Agreement	Amount of Agreement	Date of Actual Completion	Letter of Acceptance	Letter to proceed	Name of Contractor	GSTN of Contractor
1																															
2																															
3																															
4																															
5																															
6																															
7																															
8																															
9																															
10																															

2. Form 27 schedule of works expenditure revamped

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Name of Division	Month/Year	IFMS Code of Division	VLC Code of Division	Work ID	Tender ID	Head of Account	Name of Work as per Agreement	Agreement Amount	Name of Contractor	GSTN of Contractor	Date of Start of Work	Date of Completion of Work	Actual Date of Completion	Defect Liability Period (DLP)	Last date of DLP	SD No	Bill Status (Running/Final)	Total Charges upto Previous Financial Year	Total charges of the current month (current F.Y.)	Total charges upto previous month (current F.Y.)	Total charges of the year	Total Expenditure upto date	Remarks
1																							1. If the work is completed, say so. 2. If an excess over the agreement amount, if sanctioned by the Divisional Officer and the work is still in progress, the orders may be recorded here. 3. Any Other
2																							
3																							
4																							
5																							
6																							

3. Payments and Deductions

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Name of Division	IFMS Code of Division	Work ID	Tender ID	Name of Work	Head of Account	Name of Claimant	GSTN of Claimant	Unique Code of Payee (UCP) as per IFMS	Amount of Voucher	TDS/GST	TDS Income Tax	Labour Cess	Security Deposit	Amount withheld	Other deductions, if any	Other deductions, if any	Other deductions, if any	Net Amount
1																		
2																		
3																		
4																		
5																		
6																		

Annexure C

Implementation checklist

The table below brings out some additional audit enquiries possible which can be run if additional data like contractor wise GST, Measurement Book, Schedule Dockets, Schedule of Rates are available in electronic format.

Project cycle stage name	Sub-stage	Action	Risk flag	Validation	Findings
1. Preliminary estimate and administrative approval stage	1.1 application of correct and updated Schedule of Rates Dataset= works portal/ WAMIS and Schedule of Rates	1. Extract from estimated cost the item rate and map with relevant Schedule of Rates including date of revision 2. Identify query for cases where downward revision was not reflected in DNIT.	1. DNIT prepared on outdated higher Schedule of Rates 2. Payments made at higher rates despite rate reduction clause	1. Verify Schedule of Rates effective dates vs DNIT date 2. Examine agreement clause regarding applicability of revised Schedule of Rates up to last date of tender payment 3. Compare paid rates with revised Schedule of Rates	1. Excess payment due to non-application of revised lower Schedule of Rates 2. Failure of department to enforce contractual provisions
	1.2 Applicability of correct statutory provisions (GST, labour cess, Contractor profit and overhead charges, etc.) in estimation	1. Extract estimate/BILL OF QUALITY with item-wise cost components. 2. Identify provisions made for GST, labour cess, Contractor profit and overhead charges, and other statutory levies. 3. Map applicable rates of GST, labour cess, and overheads as per prevailing rules	1. Non-provision or incorrect provision of GST 2. Non-inclusion of labour cess/CPOH 3. Adoption of incorrect rates of statutory levies 4. Over/under loading of taxes and overheads 5. Double charge of GST e.g., quoted rates were inclusive	1. Verify applicable GST rates and notifications 2. Examine departmental instructions regarding CPOH/overheads 3. Compare estimate provisions with prevailing norms 4. Verify that GST has been applied on the final contract value/output, rather than on individual item	1. Underestimation leading to future cost escalation 2. Overestimation leading to inflated administrative approval 3. Non-compliance with statutory provisions 4. Financial implication due to incorrect levy application

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage name	Sub-stage	Action	Risk flag	Validation	Findings
		at time of estimate and nature of work. 4. Compare adopted provisions with applicable statutory rates for specific nature of work.	GST, but GST again applied	rates, in accordance with applicable provisions	
2. Execution stage	2.1 Material consumption vs procurement -GST led data analytics Dataset= Schedule Docket+Form27/ Monthly account	1. Identify works involving high-value material consumption and price adjustment using PWA Form 27 and monthly account. 2. Map contractor-wise work allocation across divisions using WAMIS/tender portal. 3. Extract GSTIN-wise procurement data (GSTR-2B, 3B). 4. Perform reconciliation of material consumption with GST procurement data (GSTR-2B), e-way bills, and vehicle registration details from mParivahan portal	1. Flag cases where any high value critical materials sourced from non-approved or unverified vendors 2. Flag cases wherein amount of price adjustment was significant 3. High material consumption without corresponding GST purchases 4. Flag cases where GSTIN was inactive/invalid/non-existent 5. Flag cases of mismatch of vehicle details from mParivahan portal data 6. Flag cases of e-way bill details from GSTIN portal data	1. Verify material receipt & consumption statements across works 2. Cross-check GST invoices with GSTR-2B/3B 3. Validate transportation through mParivahan data 4. Check e-way bill data from GST portal 5. Compare price adjustment calculations with contractual provisions 6. Verify Compare material consumption norms as per job mix formula	1. Consumption without corresponding GST purchases 2. Excess/short consumption 3. Invalid GSTIN / suspected fake invoices 4. Transport mismatch 5. Execution of sub-standard work

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage name	Sub-stage	Action	Risk flag	Validation	Findings
	2.2 Compliance with conditions/ remarks in technical sanction	1. Extract technical sanction (TS) documents and recorded conditions/remarks. 2. Map these conditions with estimate provisions, DNIT, and execution records. 3. Identify cases where stipulated conditions (e.g., design changes, cost restrictions, material specifications, site conditions) were not implemented.	1. Non-incorporation of TS conditions in estimate/DNIT 2. Ignoring specific remarks of sanctioning authority 3. Execution contrary to approved specifications	1. Verify TS document and annexures 2. Compare with BILL OF QUALITY, DNIT, and agreement provisions 3. Check execution records (MB, site records) for compliance	1. Risk of substandard or non-compliant work 2. Financial implications due to deviation from approved parameters
	2.3 Payment of GST arrears and eligibility (due to upward revision in GST rates post award of tender)	1. Extract payments made towards GST arrears/compensation . 2. Map nature of work (commercial/non-commercial) and contract provisions. 3. Extract GST rate revision history during contract period. 4. Identify contracts where GST rate increased after award.	1. Payment of GST arrears in non-eligible cases (e.g., commercial works) 2. Payment without contractual provision 3. Excess/irregular reimbursement of GST	1. Verify contract clauses regarding tax variation 2. Check eligibility based on nature of work 3. Examine GST notifications and applicability 4. Cross-check invoices and GST returns (GSTR-2B/3B)	1. Irregular payment of GST arrears 2. Undue benefit to contractor 3. Financial loss to government

SOP for Remote-Hybrid Audit of Public Works

Project cycle stage name	Sub-stage	Action	Risk flag	Validation	Findings
	2.4 Payment integrity and price adjustment compliance	1. Compare paid rates with contract provisions and Schedule of Rates revisions. 2. Analyse price adjustment vis-à-vis indices/material consumption.	1. Excess/ incorrect payment including for price adjustment 2. Non-application of revised rates 3. Payment beyond contractual provisions	Verify agreement clauses, escalation formula, and applicability of revised Schedule of Rates up to date of payment	Excess/incorrect payment to contractor, including for price adjustment
3. Operation, maintenance and post-completion stage	3.1 Post-completion expenditure tracking and contract compliance during the mandated Defects Liability Period	Extract completion dates and Defects Liability Period durations from contract databases (like WAMIS). Cross-reference work codes or work IDs/ Tender ID with new expenditure bookings in the financial system (like IFMS) for the same work within that specific Defects Liability Period timeframe.	Flag new repair estimates, routine maintenance billing, or special repair sanctions on works that are still actively under Defects Liability Period clause. Flag instances where contractors might be getting paid extra to fix their own defective work.	Verify the actual Date of Completion against the specific contract's Defects Liability Period clause (e.g., 1, 3, or 5 years). Ensure absolutely no departmental funds are being spent on defect rectification or repairs that are the legal and financial responsibility of the original contractor.	Irregular expenditure of departmental funds on routine maintenance or repairs during the mandated Defects Liability Period, including undue financial benefit to the contractor, loss to the public exchequer, and a potential cover-up of sub-standard original construction quality.

CAG AuditWise
(Prepared by the Office of AG (Audit),
Uttarakhand)

CAG AuditWise

AuditWise is an innovative, in-house audit analytics platform developed by the Office of Accountant General (Audit), Uttarakhand. It integrates diverse datasets like IFMS, e-Procurement, WAMIS, MIS of PWD (PWD MIS), Engineering Portals and Goods & Services Tax portals to transform raw data into actionable knowledge. The platform is created using 'vibe coding'—leveraging generative AI—to codify domain expertise into systemic risk parameters. This tool empowers auditors to identify risk flags including fake mining passes and invalid GST payments, while automating audit plans and enquiries.

The workflow stages of *dataset identification -> data integration -> data analysis -> field visit -> reporting -> feedback into the system* are automated in AuditWise for ease of implementation of Data Led Remote-Hybrid Audit of Public Works in States of Uttarakhand and Haryana and is being replicated in other Field Audit Offices. FAOs are encouraged to get in touch with the Office of Accountant General (Audit), Uttarakhand to facilitate tailoring of AuditWise to their local requirements.

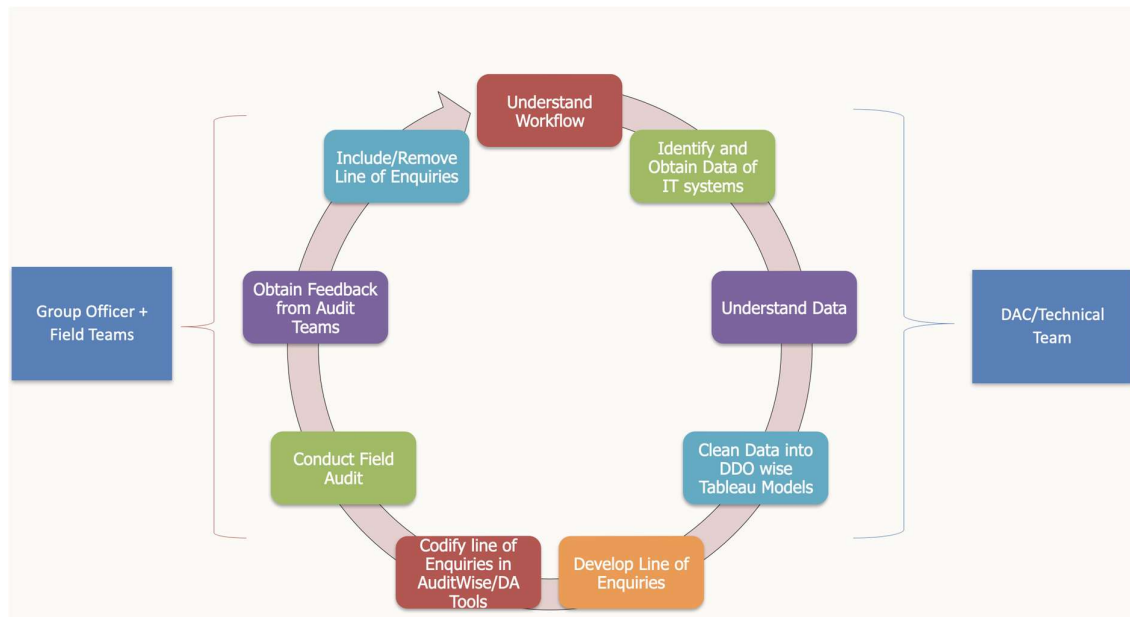


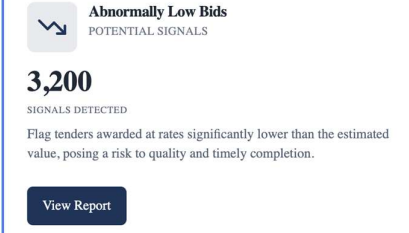
Figure 25: Operational and Development Workflow of AuditWise.

(DA- Data analytics)

(DAC- Data Analytics cell)

The Audit-Wise application enables, both generic as well as domain knowledge-based audit enquiries into electronic queries run on the relevant datasets. Some of the examples of such audit enquiries and their snapshots are given below:

The snapshots below show the results of running analysis on the line of enquiries arising out of domain knowledge of offices.

Line of enquiry	Datasets involved	Parameter	Output Screenshot
Suspected Collusion	eProcurement	Same IPs, PAN/GSTN used in bid submission	 Suspected Collusion POTENTIAL SIGNALS 3,244 SIGNALS DETECTED A synthesized analysis identifying tenders with high collusion risk based on shared credentials and bid progression. View Report
Short bid submission time	eProcurement	Bid Closing Date - Tender Publishing Date < 21 days	 Short Bid Submission Time POTENTIAL SIGNALS 8,067 SIGNALS DETECTED Find tenders, especially high-value ones, with a submission period less than the standard 14 days, potentially restricting competition. View Report
Abnormally Low Bids	eProcurement	Awarded Value is less than 15% of Tender Value	 Abnormally Low Bids POTENTIAL SIGNALS 3,200 SIGNALS DETECTED Flag tenders awarded at rates significantly lower than the estimated value, posing a risk to quality and timely completion. View Report
Retendered Works	eProcurement	Where cancelled work name is re-floated	 Re-tendered Works POTENTIAL SIGNALS 0 SIGNALS DETECTED Trace chains of works that have been cancelled and re-tendered, indicating potential issues in the procurement process. View Report

SOP for Remote-Hybrid Audit of Public Works

Line of enquiry	Datasets involved	Parameter	Output Screenshot
High Bid Rejection	eProcurement	Tenders where technical bid rejections are high, indicative of restrictive conditions	 High Bid Rejection POTENTIAL SIGNALS 10,885 SIGNALS DETECTED Identify tenders with unusually high bid rejection rates before the finance stage, which can indicate restrictive conditions. View Report (10885)
Cancelled Tenders	eProcurement	Tenders floated and cancelled after receipt of bids	 Cancelled Tenders POTENTIAL SIGNALS 602 SIGNALS DETECTED Tenders that were cancelled after receiving multiple bids, which may indicate manipulation of the tender process. View Report
Project Splitting	IFMS & PWD MIS	Same Project with multiple contracts	 Project Splitting POTENTIAL SIGNALS 1,587 SIGNALS DETECTED Projects with unusually high number of separate contracts. View Report
Fund Surrender Avoidance	IFMS	Excessive March Expenditure	 Fund Surrender Avoidance POTENTIAL SIGNALS 6,875 SIGNALS DETECTED Flags contracts with high March activity and significant deductions. View Report
Potential Diversion	PWD MIS + IFMS	Expenditure recorded under multiple Heads of Account	 Potential Diversion POTENTIAL SIGNALS 531 SIGNALS DETECTED Projects with expenditure across multiple major heads. View Report

Line of enquiry	Datasets involved	Parameter	Output Screenshot
Suspicious GST Payments	IFMS + GSTN Portal	Payments made to contractors whose GSTN is invalid or cancelled.	
Fake Mining Passes	PWD MIS + eRavanna	Mining Transit pass forms mismatch from PWD data to eRavanna Data	

Table 2: Shows the output for some lines of enquiries run on AuditWise.

Based on this analysis and then clubbing the risk flags, a **heatmap depicting the risk flags concentration** is displayed as below.



Figure 26: Heatmap of risk flags concentration across all DDOs.

Depending on manpower availability, statistically robust methods may be used to select DDOs for field validation. At the click of a button on any DDO cell, all risks related to that DDO will be readily displayed, also, under each project/work, all red flags will be listed which an Auditor needs to verify. The Field Validation page (Figure 27) allows for a project wise, flag wise verification.

PR0100423406191034	226 flags	213 contracts	226
PR0100423406231005	62 flags	51 contracts	62
Fund Surrender Avoidance ₹9,99,30,609 Pending Details Verify			
Project Splitting ₹9,99,30,609 Pending Details Verify			
CONTRACTS 51			
CON192211 M/S DEV CONSTRUCTION			
Security Deposit Issues ₹4,60,000 Pending Details Verify			
CON283827 M/S VIRENDRA KUMAR AND SONS			
Security Deposit Issues ₹2,35,350 Pending Details Verify			
Royalty Deductions ₹1,15,978 Pending Details Verify			
CON221327 M/S SAI CONSTRUCTION			
Security Deposit Issues ₹2,01,000 Pending Details Verify			
CON225968 M/S VIRENDRA KUMAR AND SONS			
Security Deposit Issues ₹1,95,000 Pending Details Verify			
Royalty Deductions ₹15,862 Pending Details Verify			
CON283867 Imran Ali Contractor			
Security Deposit Issues ₹1,52,000 Pending Details Verify			
Royalty Deductions ₹71,468 Pending Details Verify			

Figure 27: Details of risk flags to be examined by team. All flags are clubbed work wise so that once team selects a contract, all flags can be verified at once.

Field Validation on each targeted red flag should be done by the audit team. On this page, audit team is guided to collect relevant KDs and validate the flags as valid or cleared based on explanation.

Field Validation & Notes

Verifying: **Project Splitting** for CD DEHRADUN - Record: PR0100423406231005 [← Back to DART](#)

[Projects](#)
[Contracts](#)
[Tenders](#)

Add Note for Projects

Select a DDO and risk flag, enter the corresponding ID, and write your validation notes. Notes are saved to the cloud.

DDO Name

Risk Flag

Project Code / ID

Project Splitting

PR0100423406231005

Key Documents (KD)s to Collect

☐ Justification for splitting the work into multiple contracts
 ☐ Details of all contracts awarded for the composite work
 ☐ Note on whether the same contractor was awarded multiple split works
 ☐ Approvals from competent authority for each split work

Validation Note

Enter your field observations, validation results, or any other notes...

Verification Outcome

☒ Pending Not yet verified
 ☐ Cleared No issue found
 ☐ Violation Issue confirmed — raise observation

Figure 28: Each flag is validated by team and violation or otherwise is recorded with justification.

Real-time monitoring of flags: All these field validation notes will be monitored in real time through the Audit Progress tab to keep track of flags that have been cleared and those that have been converted into observation.

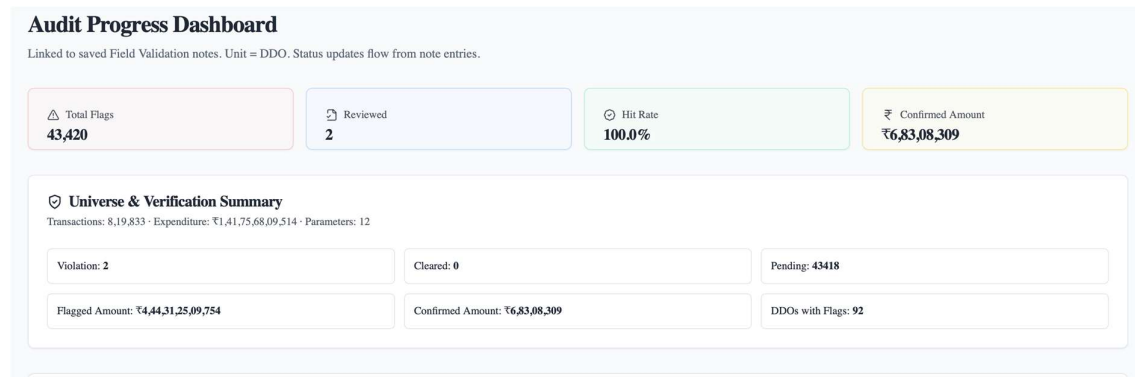


Figure 29: Audit progress dashboard indicating real-time validation status.

Irrigation Intelligent Data Management System
(IIDMS)
(Prepared by the Office of PAG (Audit-I),
Uttar Pradesh)

Irrigation Intelligent Data Management System (IIDMS)

1. Introduction

The Office of the Principal Accountant General (Audit-I), Uttar Pradesh has conceptualized and developed the **Irrigation Intelligent Data Management System (IIDMS)** as a modern, technology-driven platform aimed at transforming the management, monitoring, execution, and audit of irrigation projects in the State.

The portal has been designed as a **state-of-the-art integrated digital ecosystem** leveraging modern technologies including centralized databases, analytical engines, intelligent MIS reporting systems, real-time red-flagging mechanisms, and proposed integration with Large Language Models (LLMs) for intelligent querying and analysis. The core philosophy of IIDMS is that a single platform should simultaneously serve:

- The operational and monitoring requirements of the Government
- The oversight and audit requirements of the Comptroller and Auditor General ecosystem

Accordingly, the portal has been designed not merely as a data-entry system, but as a **comprehensive project lifecycle management and analytical platform**.

The portal seeks to replace fragmented and paper-based systems currently prevalent in the Irrigation Department and establish:

- Centralized data availability
- Real-time monitoring
- Intelligent analytics
- Improved governance
- Reduction of manual discretion
- Better accountability
- Enhanced project oversight
- Improved audit outcomes

The system is also designed to produce automated red flags and analytical insights which can help both the Government and Audit identify high-risk projects, deviations, delays, and financial risks in real time.

2. Need for Designing the Portal

Across multiple Performance Audits and Compliance Audits conducted by the Office of the Principal Accountant General (Audit-I), Uttar Pradesh, several systemic concerns relating to irrigation projects had repeatedly emerged like:

- Excessive project delays
- Significant cost overruns
- Weak governance mechanisms
- Inadequate monitoring systems
- Fragmented project oversight
- Weak documentation and control systems

A detailed review across audits indicated that one of the primary root causes behind these systemic issues was the **limited digitization and absence of centralized data architecture within the Irrigation Department**.

Compared to several other major Government departments in Uttar Pradesh, irrigation project management processes remained largely manual and decentralized.

Audit Challenges Due to Lack of Digitization

The absence of centralized digital datasets also significantly affected audit effectiveness.

Because project data was dispersed physically across divisions and offices:

- Intelligent risk analysis could not be conducted comprehensively
- High-risk projects/divisions could not be scientifically identified
- Audit sampling remained limited
- Data-driven project prioritization was difficult
- Comprehensive project-centric audit reporting became challenging

As a result, even large-scale irrigation projects involving substantial public expenditure could only be audited through limited samples.

Conceptualization of IIDMS

To address these systemic challenges, the concept of the **Irrigation Intelligent Data Management System (IIDMS)** was developed.

The objective was not merely digitization, but creation of a **technology-enabled governance and audit ecosystem** capable of:

- Centralized project management
- Real-time data availability
- Intelligent analytics
- Automated risk identification
- Improved project monitoring
- Data-driven audit planning
- Enhanced transparency and accountability

3. Guiding Philosophy and Design Methodology

The portal was designed based on a structured and domain-driven approach.

Core Guiding Principles

Principle 1 — Joint Utility for Government and Audit

The portal was conceptualized as a common platform usable by both:

- The Irrigation Department for operational governance
- Audit for analytical and oversight purposes

Principle 2 — Minimal Additional Burden on Department

The design philosophy emphasized collection of:

- Readily available operational data
- Existing workflow-based information
- Naturally generated project records

This ensured that the portal integrates with departmental processes rather than creating parallel reporting burdens.

4. Methodology Adopted for Designing the Portal

The design process involved extensive domain analysis and workflow mapping.

Step 1 — Study of Irrigation Project Lifecycle

Experienced officers and domain experts from the Audit Office studied:

- Complete irrigation project lifecycle
- Project execution workflows
- Historical audit observations

- Recurring deviations and irregularities

Step 2 — Mapping of Processes and Deviations

Based on audit experience, various project processes and deviations were mapped into structured flowcharts and process architectures.

Illustrative Conceptual Flow

Project Approval



DPR Preparation



Administrative & Technical Sanctions



Tendering & Agreements



Execution



Measurements & Quality Checks



Payments



Outcome Assessment

Simultaneously, audit deviations commonly observed at each stage were identified and embedded into the analytical logic of the portal.

Step 3 — Forward and Backward Linkage Analysis

A detailed role-based analysis was conducted across all levels of the Irrigation Department.

This included understanding:

- Responsibilities at each level
- Flow of approvals
- Monitoring mandates
- Information requirements
- Escalation mechanisms

The analysis covered roles from:

- Assistant Engineer
- Executive Engineer
- Superintending Engineer
- Chief Engineer
- Engineer-in-Chief
- Principal Secretary

Step 4 — Consultation with Irrigation Department

The proposed portal architecture and modules were discussed extensively with:

- Engineer-in-Chief
- Chief Engineers
- Senior Irrigation Officials

A centralized meeting was conducted wherein departmental inputs were incorporated regarding:

- Monitoring requirements
- Reporting structures
- Operational feasibility
- Administrative utility
- Required MIS systems

Based on joint consultations and audit expertise developed over years, the final structure of the portal and its data architecture were designed.

5. Design and Structure of the Portal

The portal has been broadly designed around the complete lifecycle of an irrigation project.

The system is divided into **seven major modules**, each covering a specific stage of project management.

6. Core Modules of IIDMS

Module 1 — Approval Module

Captures all approval-related information, including:

- Administrative sanctions
- Technical sanctions
- Financial approvals
- Government orders
- Approval timelines

Module 2 — DPR Module

Captures project DPR details including:

- Need of the project
- Feasibility and viability of project
- Original DPR
- DPR revisions
- Revised estimates

Module 3 — Contract Management Module

The largest and most detailed module.

Captures:

- Estimates
- Tender details
- Agreements
- Agreement deviations
- Contract revisions

Module 4 — Execution Module

Captures execution-related details including:

- Physical progress
- Work milestones
- Measurement records
- Execution timelines

Module 5 — Payments Module

Captures comprehensive payment trails including:

- Payment dates
- Payment amounts
- Contractor-wise payments
- Linked agreements
- Financial tracking

Module 6 — Quality Control Module

Captures quality and inspection-related data including:

- Inspection reports
- Laboratory testing
- Quality observations
- Compliance monitoring

Module 7 — Outcome Module

Captures outcome-based indicators such as:

- Irrigation potential created
- Irrigation potential utilized
- Beneficiary outcomes
- Functional performance
- Intended project objectives

7. Major Functional Features of the Portal

Apart from data entry modules, the portal contains several advanced functional capabilities.

(A) Centralized Data Input System

A structured digital system for capturing project lifecycle information across all levels.

(B) Real-Time MIS Reporting System

The portal generates dynamic MIS reports for multiple administrative layers.

MIS Reports Designed For

- Executive Engineers
- Superintending Engineers
- Chief Engineers

- Engineer-in-Chief
- Principal Secretary

The MIS architecture has been designed in consultation with the Government to ensure operational usability.

(C) Real-Time Analytical Red Flags

The portal includes analytical engines capable of generating automated red flags.

Illustrative Red Flags

- Cost overruns
- Project delays
- Splitting risks
- Agreement-estimate deviations
- Excess payments
- Abnormal revisions
- Execution anomalies

The analytical modules are designed to continuously evolve and strengthen as more data becomes available.

(D) LLM-Based Intelligent Querying

The portal is proposed to include integration with an open-source Large Language Model (LLM).

A dedicated prompt interface will allow users to ask questions in simple English such as:

- “Show projects with abnormal cost escalation.”
- “Identify delayed works beyond sanctioned timelines.”
- “List contractors with repeated agreement revisions.”
- “Show projects where expenditure exceeds physical progress.”

The LLM layer will significantly improve accessibility and analytical capabilities for both Government officials and Audit users.

8. Technical Stack and Architecture

The portal has been developed completely in-house by the Data Analytics Cell of the Office of the Principal Accountant General (Audit-I), Uttar Pradesh.

The development process involved close consultation with experienced officers having deep domain expertise in irrigation audits.

Technology Stack

COMPONENT	TECHNOLOGY USED
FRONTEND	React
BACKEND APIS	React-based architecture with server-side integration
DATABASE	PostgreSQL
UI DESIGN	HTML, CSS
CHARTS & ANALYTICS	Matplotlib and supporting analytical libraries
PDF & REPORT GENERATION	Report generation libraries
AUTHENTICATION	JWT-based authentication
ANALYTICS	SQL-based analytical engines
PROPOSED AI LAYER	Open-source LLM with GPU integration

Security Architecture

The portal incorporates multiple security mechanisms and validation layers.

Key Security Features

- Role-based access control
- Input validation checks
- Business logic validations
- Session management controls
- Secure authentication mechanisms
- Audit trail mechanisms

JWT Authentication

The portal uses **JWT (JSON Web Token)** based authentication for secure access management.

Under this mechanism:

- After successful login, a digitally signed secure token is generated for the user
- The token is verified during every request to authenticate and authorize access
- This enables secure session handling, scalable authentication, and protection against unauthorized access

The portal has also undergone multiple security and validation tests to ensure stability and robustness.

AI-Assisted Development

Modern AI-assisted development tools were utilized during development for:

- Query optimization
- Code generation assistance
- Validation logic enhancement
- Faster debugging and stabilization

This significantly improved development efficiency and robustness of the portal.

9. Hosting and Deployment Options

Multiple hosting architectures have been considered.

Option 1 — Government Hosting through NIC

The preferred model in Uttar Pradesh is to hand over the portal to the Government for hosting through NIC infrastructure.

Option 2 — Hosting within CAG Network

The portal may alternatively be hosted within CAG infrastructure with controlled access provided to Government users.

Option 3 — Cloud-Based Hosting

Private cloud operators such as AWS may also be explored where appropriate security and governance frameworks are ensured.

10. Deployment Strategy

The deployment strategy has been designed in a phased and practical manner.

Institutional Approval

The portal was initiated after in-principle discussions between:

- Principal Accountant General
- Principal Secretary, Irrigation Department

Following this, the portal received a formal go-ahead for development and deployment.

11. Data Governance and Accountability Framework

The deployment framework has two major components.

(A) Mandatory Data Entry Mechanism

The Engineer-in-Chief is expected to issue directions mandating:

- Usage of the portal
- Timely data uploads
- Accountability of Executive Engineers

Executive Engineers will be responsible for ensuring correctness and completeness of data uploaded on the portal.

(B) Monthly Data Freeze Mechanism

Since project data entry is continuous and long-duration in nature, the portal has been designed with a monthly freeze architecture.

Mechanism

At the end of every month:

- Uploaded data will be frozen
- Snapshot copies will be stored in CAG servers
- Historical integrity of records will be maintained

This ensures:

- Preservation of audit evidence
- Prevention of retrospective alterations
- Reliable audit trails

Alignment with Departmental Financial Cycles

The portal's reporting cycle is proposed to be aligned with the Irrigation Department's accounting and reporting cycles so that uploaded data reflects officially closed records.

12. Phased Rollout Strategy

The portal deployment has been planned in three phases.

Phase 1 — Design and Consultation

- Portal architecture created
- Modules designed
- Consultations conducted with Irrigation Department
- Feedback incorporated
- System strengthened

Phase 2 — Pilot Deployment

The portal is currently in this stage.

Activities

- Handover to NIC for deployment
- Shared access to Government and Audit
- Pilot implementation in a selected project

The objective is to obtain:

- Real field experience
- User feedback
- Operational insights
- Identification of technical gaps

Priority Project for Pilot

The **Sharda Project** has been prioritized for pilot deployment due to:

- Large operational scale
- Long-running project structure
- Presence of diverse categories of works

This makes it suitable for testing multiple modules comprehensively.

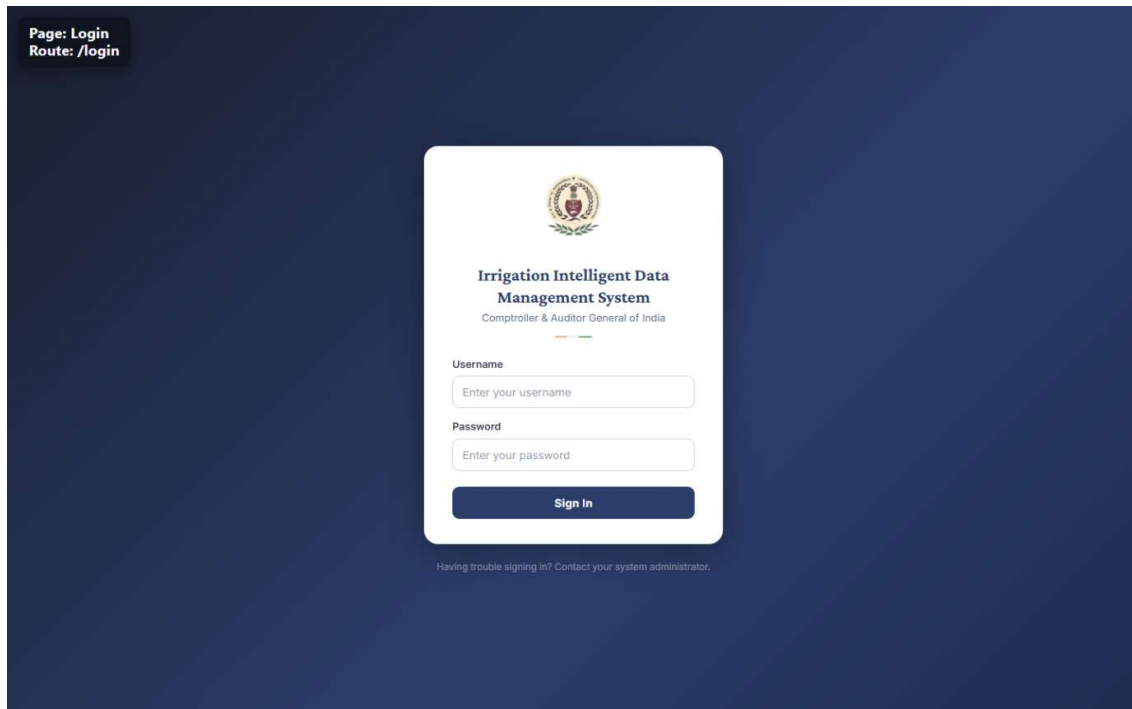
Phase 3 — Statewide Rollout

Based on pilot experience:

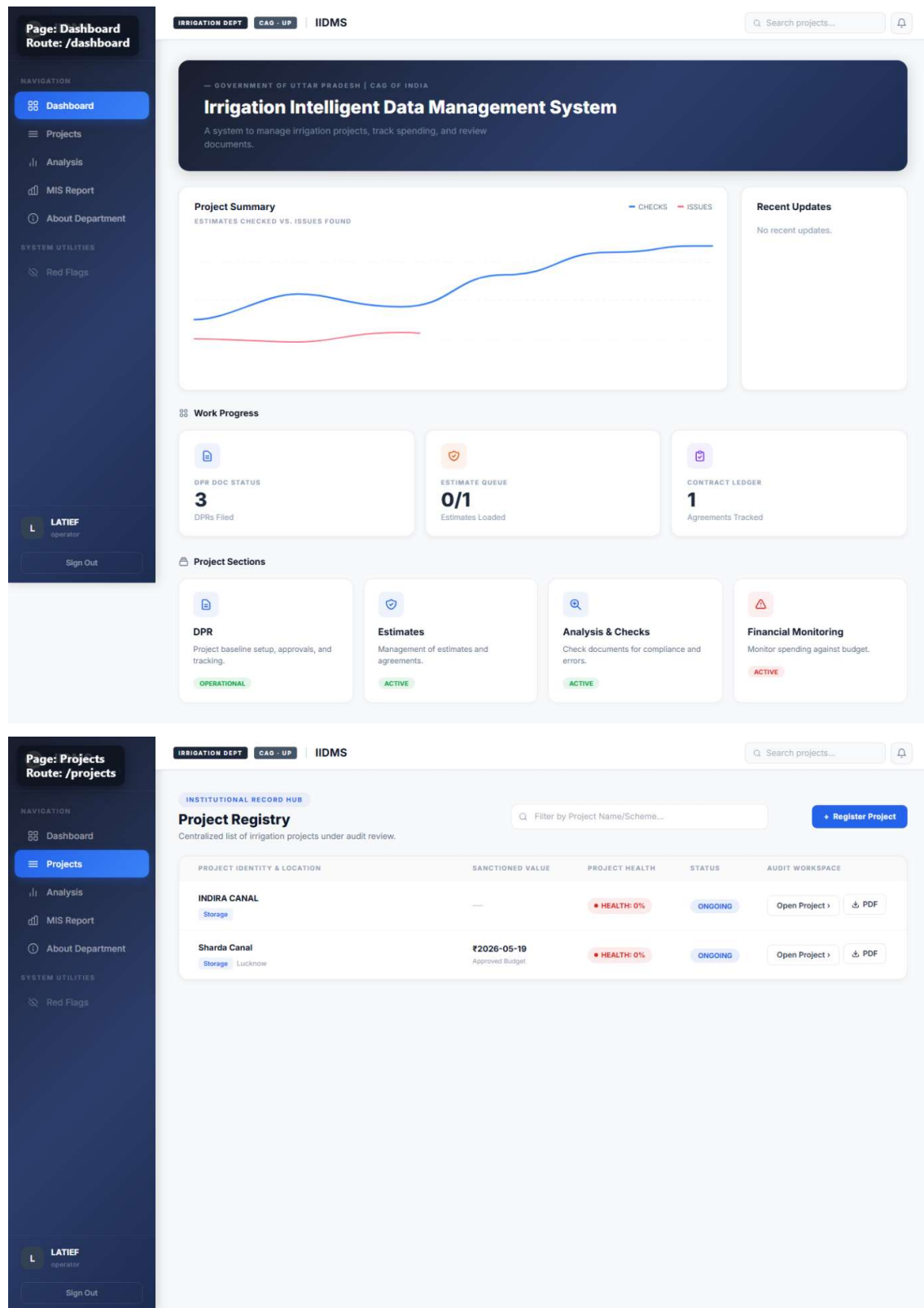
- Technical refinements will be made
- Additional modules may be incorporated
- Operational feedback will be integrated

Thereafter, the portal is proposed to be rolled out comprehensively across the Irrigation Department as a long-term replacement for existing paper-based systems.

Screenshots of the portal:



SOP for Remote-Hybrid Audit of Public Works



SOP for Remote-Hybrid Audit of Public Works

Page: New Project
Route: /projects/new

NAVIGATION

- Dashboard
- Projects
- Analysis
- MIS Report
- About Department

SYSTEM UTILITIES

- Red Flags

L LATIEF
operator
Sign Out

IRRIGATION DEPT | CAG - UP | IIDMS

Q Search projects...

Start New Project
Select an existing project or create a new one.

PROJECT NAME
Select or type a project name...

Cancel Select Project -->

Page: Project Detail - INDIRA CANAL
Route: /projects/INDIRA%20CANAL

NAVIGATION

- Dashboard
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SYSTEM UTILITIES

- Red Flags

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operator
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CAG - UP | IIDMS

Q Search projects...

PROJECTS / DETAIL

INDIRA CANAL
EXECUTING DIVISION: IRRIGATION

TOTAL ESTIMATES
0
Registered estimates

DPR STATUS
✓
On record

CONTRACTS
0
Total agreement entries

COMPLETED
0
Finished contracts

DPR Details Estimates (0) Contracts (0) Performance

✓ DPR on Record
Detailed Project Report has been filed for this project.

View DPR Update DPR

SOP for Remote-Hybrid Audit of Public Works

Page: DPR Form - INDIRA CANAL
Route: /projects/INDIRA%20CANAL/dpr/edit

INDIRA DEPT | CAD | UP | IDMS

Q Search projects...

🔔

NAVIGATION

Dashboard

Projects

Analysis

MIS Report

About Department

SYSTEM UTILITIES

Red Flags

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← DETAILED PROJECT REPORT Save DPR

INDIRA CANAL
Official project scope and approved parameters

ADMINISTRATIVE CLASSIFICATION

CATEGORY OF PROJECT
Multipurpose

TYPE OF PROJECT
Storage

LOCATION OF HEAD WORKS
e.g. Haridwar, Uttarakhand

STATUTORY CLEARANCES

INVESTMENT CLEARANCE (GOI)
27-05-2026

CWC CLEARANCE DATE
13-05-2026

EFC APPROVAL DATE
DD-MM-YYYY

DISTRICTS COVERED
Agra x Ambedkar Nagar x

TECHNICAL PARAMETERS & POTENTIAL

GROSS COMMAND AREA (HA)
Enter value

CCA (HA)
Enter value

IRRIGATION POTENTIAL – RABI (HA)
Enter value

IRRIGATION POTENTIAL – KHARIF (HA)
Enter value

WATER REQUIREMENT (MCM)
Enter value

AVAILABLE WATER (MCM)
Enter value

CROP PATTERNS

PRE-PROJECT RABI
e.g. Wheat 60%

POST-PROJECT RABI
e.g. Wheat 70%

KHARIF
e.g. Paddy 40%

KHARIF
e.g. Paddy 55%

DOCUMENT ATTACHMENTS

COMPLETE DPR DOCUMENT
Upload

INVESTMENT CLEARANCE (GOI)
Upload

CWC CLEARANCE
Download
Replace

EFC APPROVAL
Upload

SURVEY REPORTS
Upload

DPR REVISIONS

v1 v2 v3 v4 v5 v6

DATE OF APPROVAL (REVISED)
19-05-2026

AMOUNT OF REVISED DPR
Enter value

TARGET COMPLETION DATE
DD-MM-YYYY

REVISED REPORT DOCUMENT

📄 ✓ REVISED REPORT V1 — REPLACE ✕

Download v1

SOP for Remote-Hybrid Audit of Public Works

Page: Create Estimate - INDIRA CANAL
Route: /projects/INDIRA%20CANAL/estimates/new

CAG - UP

IIDMS

Q Search projects...

NAVIGATION

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operator

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ESTIMATE CREATION

New Estimate

Fill in the estimate details and [upload](#) the supporting document.

PROJECT
INDIRA CANAL

ESTIMATE NUMBER
e.g. EST/2024/001

YEAR OF ESTIMATE
2026-27

📎 ⬆️ UPLOAD ESTIMATE DOCUMENT (PDF) ⬆️

Create Estimate

Cancel

IIDMS

IRRIGATION DEPT

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IRRIGATION DEPT

CAG - UP

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Q Search projects...

PROJECTS / DETAIL

Sharda Canal

EXECUTING DIVISION: IRRIGATION

TOTAL ESTIMATES
1
Registered estimates

DPR STATUS
✓
On record

CONTRACTS
1
Total agreement entries

COMPLETED
0
Finished contracts

DPR Details

Estimates (1)

Contracts (1)

Performance

+ Add New Estimate

SR. NO.	ESTIMATE NO. (YEAR)	CONTRACTS	STATUS	LAST UPDATED
01	EST-8979-LKO-34928 (2023-24)	1	In Progress	19 May 2026, 04:03 pm

SOP for Remote-Hybrid Audit of Public Works

**IIDMS**
IRRIGATION DEPT

NAVIGATION

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operator

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IRRIGATION DEPT

CAG - UP

IIDMS

Q Search projects...

🔔

CONTRACT MANAGEMENT

Section 1 of 8 — Fill all fields and save before moving to the next section.

Sharda Canal

EST-8979-LKO-34928 | 2023-24

PROGRESS

0% 0 / 8 sections

Admin Financial Sanction

Technical Sanction

Tender Award Contract

Contract Master

Payments Recoveries

Budget Summary

Technical Inspection

Quality Test

How to fill this section: Fill all fields below then click **Save Section** at the bottom. You can edit any time before submitting.

ESTIMATE NUMBER

YEAR OF ESTIMATE

EST-8979-LKO-34928

2023-24

NAME OF PROJECT

DATE OF ADMIN FINANCIAL SANCTION

Sharda Canal

DD-MM-YYYY

AMOUNT ADMIN FINANCIAL SANCTION (INR)

TOTAL EXPENDITURE ON LAND (INR)

OTHER EXPENDITURE (INR)

REMARKS

ADMIN FINANCIAL NUMBER SANCTION

HEAD OF ACCOUNT

**IIDMS**
IRRIGATION DEPT

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IRRIGATION DEPT

CAG - UP

IIDMS

Q Search projects...

🔔

ESTIMATE

Contract for Estimate: **EST-8979-LKO-34928** (2023-24)

Review and manage contracts linked to this estimate.

ESTIMATE REFERENCE

EST-8979-LKO-34928 — 2023-24

+ Start New Contract for this Estimate

ESTIMATE FILE

No file uploaded yet

📄 UPLOAD ESTIMATE FILE

S.NO	AGREEMENT NUMBER	USER	DATE	STATUS	ACTION
01	67587873	latief	19 May 2026	DRAFT	Resume

**IIDMS**
IRRIGATION DEPT

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IIDMS

Q Search projects...

🔔

DPR Details

Estimates (0)

Contracts (0)

Performance

Back to Structure List

Download PDF

Save

ANNUAL MAINTENANCE

NAME OF DIVISION	DIVISION CODE	YEAR	TOTAL MAIN CANALS
CCA MAIN CANALS HECT	TOTAL BRANCH CANALS	CCA BRANCH CANALS HECT	TOTAL DISTRIBUTARY CANALS
CCA DYS HECT	TOTAL MINOR CANALS	CCA MINOR HECT	FUND REQUIREMENT LAKH
FUND RELEASED LAKH	REMARKS		

CREATION & UTILISATION OF CCA

NAME OF DIVISION	DIVISION CODE	NAME OF CANAL	CATEGORY OF CANAL
------------------	---------------	---------------	-------------------

74

SOP for Remote-Hybrid Audit of Public Works

Page: MIS Report
Route: /mis-report

NAVIGATION

- Dashboard
- Projects
- Analysis
- MIS Report**
- About Department

SYSTEM UTILITIES

- Red Flags

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operator

Sign Out

IRRIGATION DEPT | CAG - UP | IIDMS

Q Search projects...

REPORTS

MIS Report
Project-wise management information. Filter by officer designation and select fields.

Filter by Officer Designation: All **Generate Report**

Select Fields to Include in Report

☒ Name of Project
Admin Fin. Sanction

☒ Original Estimated Cost (Cr)
Budget Summary

☒ Revised Estimated Cost (Cr)
Budget Summary

☒ Head of Account
Admin Fin. Sanction

☒ Nature of Work (Capital/Revenue)
Admin Fin. Sanction

☒ Budget Provision (Cr)
Admin Fin. Sanction

☒ Allotment in Crore (Updated)
Admin Fin. Sanction

☒ Expenditure on Project (Updated)
Admin Fin. Sanction

☒ Budget Allotment Current FY
Admin Fin. Sanction

☒ Allotment in Current FY
Admin Fin. Sanction

☒ Expenditure in Current FY
Admin Fin. Sanction

☒ Villages Actually Provided Water
Canal Performance CCA

☒ CCA Utilised Released Water (Hect)
Canal Performance CCA

☒ Designation of Officer Executed Contract
Contract Master

☒ No. of Farmers Benefitted
Canal Performance CCA

☒ Revised Schedule of Completion
Contract Master

☒ Status of Completion
Contract Master

☒ Reason for Non Adherence to Schedule
Contract Master

☒ Original Scheduled Date of Completion
Contract Master

☒ Actual Date of Completion
Contract Master

☒ Date of Start of Project
DPR

Page: Analysis
Route: /analysis

NAVIGATION

- Dashboard
- Projects
- Analysis**
- MIS Report
- About Department

SYSTEM UTILITIES

- Red Flags

L LATIEF
operator

Sign Out

IRRIGATION DEPT | CAG - UP | IIDMS

Q Search projects...

PROJECT CHECKS

Project Analysis & Checks
Verify data and check for issues across the project list.

Project Query
Query across the entire project list using simple words. The system will check for errors between reports and estimates.

Compare DPR sanctioned cost vs actual agreement value for all projects...

ANALYZE

Compare DPR sanctioned cost vs actual agreement value for all Division IV projects.

Identify discrepancies between BOCW payments and scheduled labor components in Sharda Modernization.

Retrieve all revised technical sanctions where the increase exceeds 20% of A&F.

Cross-verify MB entries with site inspection reports for Upper Ganga project.

Project Compliance Checks

CHECKING PROJECTS

EXPENDITURE INTENSITY
Net Paid vs Sanctioned Budget

THRESHOLD
> 100%

Critical

AGREEMENT SPLITTING
Fragmented contracts in same ID

THRESHOLD
Detected

High

TS COMPLIANCE
Agreements > TS Value

THRESHOLD
> 5% Delta

Medium

STATUTORY VELOCITY
Delayed EFC/CWC clearances

THRESHOLD
> 24 Months

High

GEOMETRIC INTEGRITY
CCA / GCA Ratio Anomaly

THRESHOLD
> 0.95

Medium

REVISION VOLATILITY
Frequent baseline modifications

THRESHOLD
> 3 Revised

Low

EXECUTION SYNC
Civil vs Mech execution lag

THRESHOLD
> 40% Gap

Medium

LABOR CESS INTEGRITY
BOCW 1% mismatch in MB

THRESHOLD
Unverified

High

ADVANCE RECOVERY
Adv paid vs % Work Progress

THRESHOLD
> 6 Months

Critical

A&F CEILING BUFFER
Estimates load vs A&F

THRESHOLD
> 95% Area

Medium

The screenshot displays a web application interface for the Irrigation Department of the Government of Uttar Pradesh. The interface includes a dark blue sidebar on the left with navigation links: Dashboard, Projects, Analysis, MIS Report, and About Department (highlighted). Below these are system utilities like Red Flags. The top header shows the user's role as LATIEF, Supervisor, and a Sign Out button. The main content area features a search bar and a notification bell. The central focus is the 'Institutional Profile' section, which includes the department's name, a mission statement, and three key areas: Mandate, Network Scope, and Administrative Hierarchy.

Page: About
Route: /about

IRRIGATION DEPT | CAG - UP | IIDMS

Q Search projects...

INSTITUTIONAL PROFILE

Irrigation Department Government of Uttar Pradesh

Ensuring regional prosperity through the systematic management of water resources, extensive canal networks, and the implementation of state-of-the-art agricultural irrigation standards.

MANDATE
To maximize irrigation potential through major, medium, and minor irrigation projects while ensuring efficient operation and maintenance of existing networks.

NETWORK SCOPE
Supervising over 74,000 km of canal networks and 28,000+ state tube wells serving millions of hectares of agricultural land.

ADMINISTRATIVE HIERARCHY
Governed by the Principal Secretary, supported by Engineer-in-Chiefs and Chief Engineers across specialized zones and divisions.

LATIEF
Supervisor

Sign Out

A Ten Point Visual Executive Summary

SOP FRAMEWORK: STEPWISE AUDIT CYCLE

1

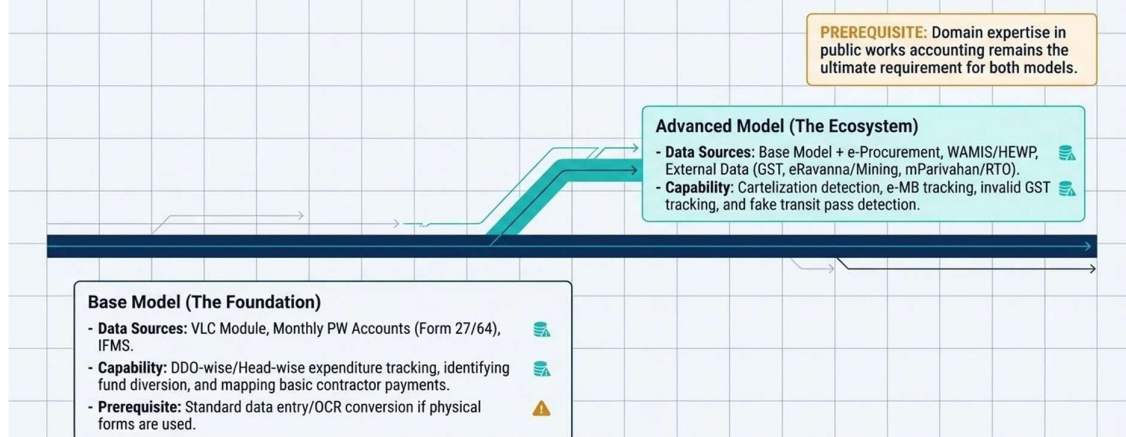
The 6-Step Data-Led Audit Lifecycle



PROPOSED FRAMEWORK

2

A Scalable, Dual-Track Implementation Architecture



BASE MODEL: THREE-STAGE DATA ANALYTICS

3

Stage 1 Aggregated Accounting Data (VLC)	Stage 2 Granular Monthly PW Accounts	Stage 3 Financial Data (IFMS)
- DDO-wise / Major Head expenditure distribution - Skewness & deviation analysis across divisions - Cross-check: VLC vs Form 27/64 for fund diversion detection - Tableau dashboards for DDO-wise trend charts	- Work-wise expenditure from Form 27/64 - Identification of abandoned works, cost overruns, payment peaks - Time-series trend analysis per work across months for identifying high value works - Deduction compliance: TDS, GST, Labour Cess (Form 37/39)	- Head-wise payment booking validation - Contractor-wise DDO payment profiling - Detection of contractor concentration patterns - Cross-linking IFMS payee codes with Form 27 works data
Tools used: Tableau, Microsoft Excel, IDEA OCR conversion available for non -digital Form 27/64 records		

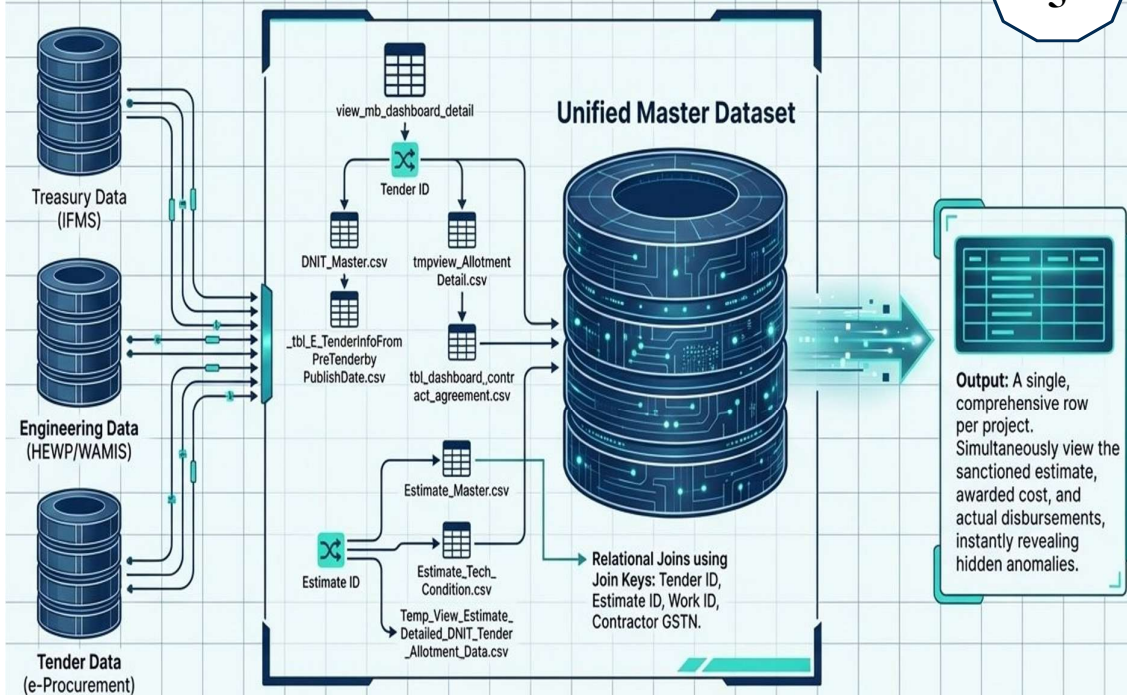
ADVANCED MODEL & CAG AUDITWISE PLATFORM

4

ADDITIONAL DATA SOURCES	CAG AUDITWISE PLATFORM
e-Procurement Portal <i>NIT, Tender Documents, Award of Contract data</i>	<i>Developed by O/o AG (Audit), Uttarakhand using generative AI ('vibe coding') — domain expertise codified into systemic risk parameters.</i>
WAMIS / HEWP <i>Estimates, Technical Sanctions, e-Measurement Books, billing</i>	Automated Detection <i>Bid irregularities, project splitting, fund diversion, invalid GSTNs</i>
GST Portal <i>Contractor GSTIN validation, GSTR-2B/3B reconciliation</i>	Heatmap Dashboard <i>DDO-wise risk flag concentration at a glance</i>
eRavanna <i>Mining transit passes cross-checked with PWD consumption</i>	Field Validation <i>Work-wise, flag-wise verification with KD collection</i>
Parivahan/RTO <i>Vehicle registration data for transport verification</i>	Audit Progress <i>Real-time monitoring: Resolved / Upheld</i>
	Scalable Adoption <i>Active in: Uttarakhand, Haryana, AP, Odisha, UP, Telangana</i>

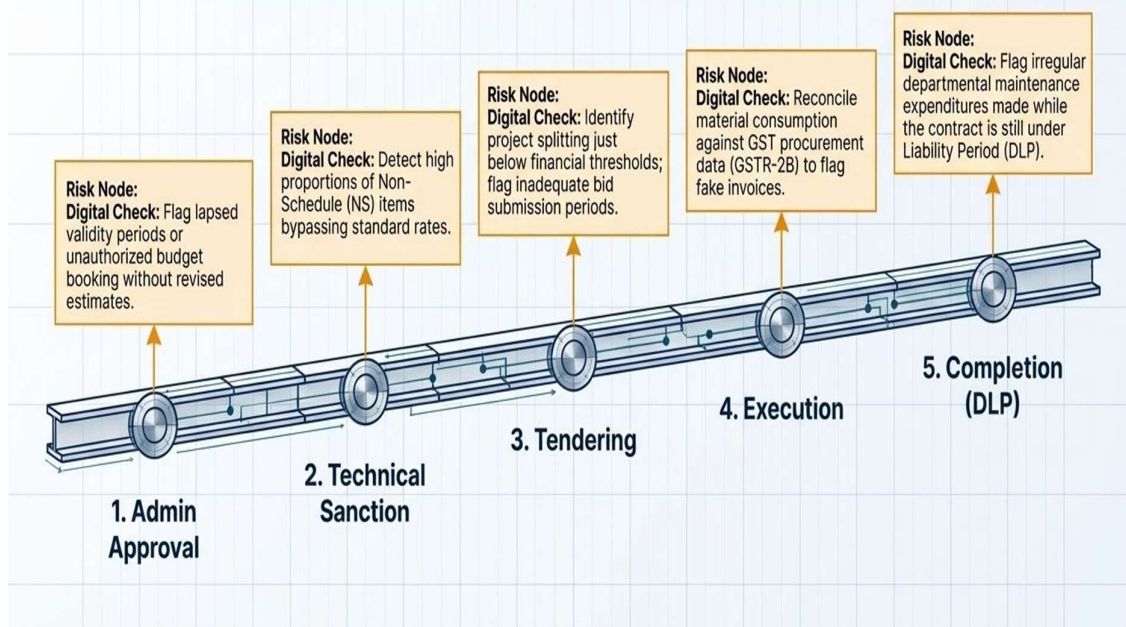
ADVANCED MODEL: Eliminating Silos through a Unified Master Dataset

5



ADVANCED MODEL: Mapping Risk Across the Project Life Cycle

6



DOMAIN-KNOWLEDGE CHECKLIST: PROJECT LIFECYCLE

7

1. Preliminary Estimate & Admin Approval

- Validity of administrative approvals
- Correct head of account booking
- Reduced estimate for savings cases

2. Detailed Estimate & Technical Sanction

- TS obtained before Award of Contract
- Non-Schedule (NS) items analysis
- Correct SoR rates applied

3. Tendering & Contract Award

- Adequate publicity & bid time
- Bid rigging / cartelisation detection
- Blacklisted contractor check
- Performance security adequacy

4. Execution

- Cost overrun / deviation analysis
- Material consumption vs GST purchases
- Compliance with TS conditions

5. Payment & Financial Control

- Delayed payment / interest liability
- Correct TDS, GST, Labour Cess
- Excess / irregular payments

6. Completion & Closure

- Final bill vs completion certificate
- DLP compliance

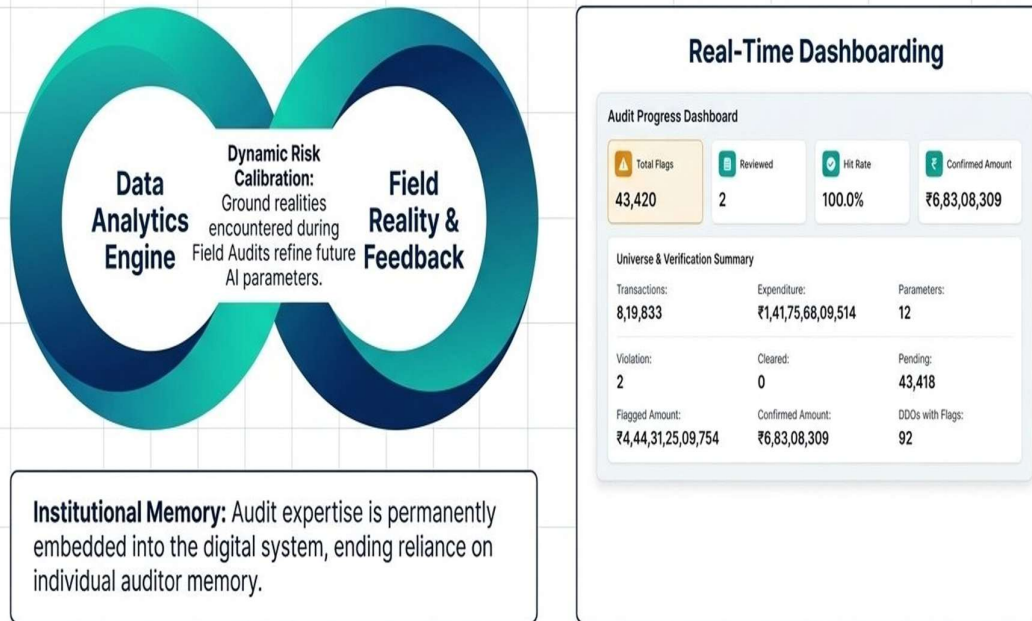
Automation through AuditWise

8



CONTINUOUS FEEDBACK AND LEARNING

9



Summing Up And Road Ahead

10

PHASED IMPLEMENTATION ROADMAP

Phase 1	Data Foundation	Establish access to VLC, IFMS, Form 27/64; OCR conversion for legacy records
Phase 2	Integration	Build unified master dataset; standardise join keys (Work ID, GSTN, Tender ID)
Phase 3	Analytics Deployment	Deploy Base Model; generate initial risk flags; train field audit teams
Phase 4	Advanced & AuditWise	Integrate e-procurement/WAMIS; onboard AuditWise; scale across FAOs

Continuous Optimization

Targeted and confirmatory field audit / Reporting

Under the Remote-Hybrid model, the field audit team is deployed selectively, guided by prior risk analysis from the Base and Advanced data analytics model. Rather than conducting broad, exploratory checks, field teams will focus on identifying high-risk contracts/DDOs, depending on the availability of datasets.

In standard data-led audits, the focus of audit is on identifying high-risk individual outlier/non-conformant transactions, which are further verified substantially or through a sampling methodology depending on the availability of resources. However, in activities which are intrinsically cross-linked at process/structure levels and are heavily domain knowledge centric, transactions are to be read, both in the given context and correlated with other associated variables. This enables transactions to be coalesced at the level of the auditable entity, which in case of Public Works is either a Contract or a Division.

Implementation and Deployment of Risk-Based field teams:

The deployment would be focused at two levels, contract and DDO respectively, depending upon the availability of datasets and institutional capacity of the Field Audit Office.

1. **Identifying high risk contracts** would require availability of data in electronic form of Form 27/64 of the Monthly Accounts (as already illustrated in the Base Model), Besides data in excel sheet (annexure B) can be obtained from Divisions for use in conjunction with the information in the Divisional Accounts. Further, in States where Monthly Accounts is not in practice, the excel sheet (Annexure B) may be obtained from the Divisions. Further, in the Advanced Model, datasets such as eProcurement, WAMIS/EWP, IFMS can expand the examination of risk prone contracts. Some of the red flags for contracts have already been elaborated under Advanced Model and described in Annexure C; illustrations are:
 - i. Tendering stage time series analysis
 - ii. Sanctioned estimates versus actual expenditures

- iii. Physical progress versus financial progress
- iv. Statutory deduction discrepancies
- v. Contractor wise GSTN validations
- vi. Contractor profiling etc.

Those contracts with an overlap of multiple audit risk flags should be completely audited in the respective Audit unit(s) across all stages of the project cycle, including planning, tendering, execution, and payment, while the highlighted risk flags in an identified contract will compulsorily require point-wise compliance. The Offices will have to decide on the materiality of contracts to be subjected to detailed audit scrutiny based on manpower resources.

Additionally, in the Base Model, using the IFMS, the dominance of contractors in a Division and across Divisions can be mapped as already given in illustration 8, 9 and 14. This information is also a useful input to identify contracts by such contractors through the analysis of eProcurement data.

2. Moreover, using AuditWise as already elaborated previously enables generation of a risk-based heat map can be generated for DDOs by adding other datasets such as GSTN, eRavanna, mParivahan etc. The risk-based heat map (Figure 26) compounds the quantum of flags raised against individual transaction, grouped contract-wise against their respective transaction amounts so as to have a composite risk assessment for works. Accordingly, the **DDOs with deeper heat gradient** may be selected for examination of the identified red flags.

In case of unavailability of the above datasets, the base model would be able to generate leads at Contractor and DDO level, which will eventually require verification at the level of Divisions. It is expected that the field offices would move from the Base Model to the Advanced Model by obtaining/accessing the required datasets in the first year of operation of this SOP.

All identified risk flags should be included for detailed scrutiny / field verification (if required). Accordingly, a Quarterly Risk-Based Audit Plan (QRBAP) shall be drawn, and audit resources deployed.

➤ **Confirmatory evidence collection**

Field teams wherever necessary may collect geotagged photographs, material test reports, receipt and consumption statement of material along with invoices, site register copies etc. to serve as primary evidence. This data is cross checked with the schedule dockets and register of works to strengthen the audit findings.

➤ **Insights generated at field**

While the Remote-Hybrid approach will lead the parties to confirmatory field verification of identified risk flags, there is possibility that new insights gathered by Local Audit Party (LAP) at field during the audit process including examination of related records can also lead to significant auditable areas, especially verifying related transactions of already flagged risk area. In such scenarios, the Field Audit officials should document the insight with valid reasons for expanding the audit scope only after approval of Group Officer through OIOS. After approval by the Group Officer, such new areas may be documented as a risk flag with mandatory verification and reporting. All such experiences of scope are to be reported to Head of Department monthly by the Group Officer and by the Head of Department quarterly to the Functional Wing and Strategic Management Unit.

Reporting, Entry/Exit conference:

In compliance with the strategic direction issued vide SMU letter no. 489/88-SMU/2025 dated 31.12.2025, which necessitates a transition from “unit-centric compliance” to “systemic risk assurance”, the findings from audit memos/observations should be consolidated into a single Departmental Inspection Report (DIR).

However, in case of specific local administrative structures/processes, the HoD with the prior approval of SMU formation of headquarters may consider issuing inspection reports at the level below the Administrative Head of the Department in the State Government. At the same time in such cases the administrative head in the State Department may be kept apprised of the findings through Departmental Appreciation Note/Management Letter.

Formal Entry and Exit Conferences shall be conducted to discuss the scope of audit, methodology, and preliminary findings. These forums serve as the official channel for

the "Remote-Hybrid" model, and audit observations to be explained to the Auditee and for their initial responses to be recorded.

➤ **Closure of Audit Loop**

The defining feature of this SOP is the guaranteed closure of the audit cycle. This mechanism ensures that every "Red Flag" identified during the Initial Identification and Data Analytics is brought to a logical conclusion. Resolution through Explanation occurs if the Departmental Officer provides valid documentary evidence or a technical justification that satisfies the query, leading to the flag being "cleared". For such cases full justification with documentary evidence should be invariably submitted to the Group Officer for review. Conversely, a matter is converted into an Observation where the explanation is absent, unsatisfactory or untenable, inadequate, or contradicted by field evidence. In such cases, the issue is escalated from a "Red Flag" to a formal Audit Observation for inclusion in the final report.

Continuous feedback and adaptive learning

The final component of the Remote-Hybrid model is a continuous feedback loop that integrates field-level findings back into the digital analytical framework. By treating each audit cycle as a learning opportunity, the system transitions from a static annual exercise into a dynamic mechanism where the risk flagged lines of audit queries are verified in field audit, the results of which help in further optimizing the framework.

Key Strategic Outcomes:

- **Dynamic Risk Calibration**

Data-driven risk parameters, thresholds, and business rules are systematically refined based on ground realities encountered during the Targeted Field Audits. This allows the system to adapt to emerging governance risks and evolving patterns of financial irregularity.

- **Institutionalization of Knowledge**

By embedding audit insights into the analytical engine (AuditWise), the organization institutionalize audit knowledge and strengthens continuity in audit process. This enables valuable audit expertise and experience to be systematically retained within

the system, thereby enhancing consistency, efficiency and organizational learning across offices.

- **Adaptive Oversight**

The feedback loop ensures that the audit process improves with every use, leading to higher precision in anomaly detection and more effective resource allocation in future cycles.
