Elevating Decision-Making in Missoula's Budget Adoption Process

A Capstone Project at the University of Montana

Submitted for inclusion on the City of Missoula's Budget Website
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2025 MSBA Program

Executive Summary

The City of Missoula has long prioritized transparent governance, yet key budget documents often fall short in clearly illustrating how public dollars support strategic goals. This project bridges that gap by cleaning, unifying, and visualizing program-level budget data to enable clearer, more contextualized decision-making. Partnering with the City's Finance Department, I developed a repeatable pipeline to connect raw financial data from Tyler Edens with narrative program inventory housed in Workiva. Using Python and Power BI, I produced a structured dataset and interactive dashboard that empowers decision-makers and the public with accessible insights into how resources are allocated and why.

The dashboard brings static budget data to life by highlighting which programs are mandated, aligned with strategic goals, or carry operational risks. By grounding financial data in context, this project supports a shift toward narrative budgeting, equipping stakeholders with tools that reduce decision fatigue and increase trust. While the current version focuses on a single fiscal year, it lays the foundation for future improvements, including historical analysis, automated reporting, and program performance tracking. This work not only enhances internal workflows but also deepens public engagement and understanding around budget choices, advancing Missoula's commitment to equitable and transparent governance.

Introduction

In local government, few responsibilities are more important than the transparent and effective management of public resources. For the City of Missoula, transparency, accountability, and alignment with strategic goals such as equity, housing, and climate resilience are not just tasks that need to be completed or goals that are “hoped” for; they are foundational to good governance and essential components of public trust.

Missoula has a long-standing commitment to open government, demonstrated through its accessible budget, financial reporting, and community engagement platforms such as Engage Missoula. However, even with these tools in place, the bridge between line-item budget details and the strategic impact of city programs remains difficult to both communicate effectively and comprehend. Financial documents often tell *what* is being spent, but not *why*, *to what end* or what would be affected if funding was *ceased*.

To help address this gap, I partnered with the City of Missoula’s Finance Department on a project to clean, unify, and visualize data from across the City’s budgeting and program inventory systems. This project directly supports the City’s broader efforts to provide more accessible, centralized tools for understanding what programs are being funded, what strategic goals they support, and how those investments evolve over time.

By creating a clean, well-structured dataset and a dynamic dashboard interface, the project empowers both internal decision-makers and the public with clearer, more actionable insights. It marks a shift toward *narrative budgeting* where the City doesn’t just present numbers but also tells the story of public investments.

This paper details that process: what problems were addressed, how the work was executed, what insights were uncovered, and how it will serve the City’s leadership and constituents moving forward. This work is being submitted for inclusion on Missoula’s public-facing Financial Budget Website, where it will support long-term transparency, strategic alignment, and public engagement around resource allocation.

Context and Motivation

Each year, the City of Missoula produces a comprehensive annual budget that spans hundreds of pages. These numerous documents are widely available on the

City's budget portal. Other documents include legally required disclosures, financial summaries and department-by-department narratives. While detailed and transparent, these static reports are not necessarily designed with interactivity or program-level exploration in mind.

For city staff, council members and residents; answering simple questions such as *"Which programs support housing initiatives?"* or *"How many FTEs (Full-time Equivalent Staff) are allocated to climate-related services?"* often requires flipping between multiple reports or manually merging data from different formats. This fragmented system makes it difficult to fully assess how financial investments connect to city priorities. It also makes clear and sound analysis of this process ultimately impossible.

Recognizing this, Mayor Andrea Davis and the Finance Department have called for more programmatic clarity. There is growing interest in being able to view city programs not only as budget line items, but as strategic instruments for delivering outcomes that matter to Missoula's community. These programs span from sustainability to safety and innovation to inclusion.

The Program Inventory initiative was born from that vision. It captures narrative, staffing, mandate, and strategic alignment information for each city-funded program. However, that information as a whole lived separately from the City's financial systems until now. The data existed. Bits and pieces of it here and there, but it wasn't joined up in a way that could support dashboards, comparisons, or deep analysis.

My capstone project set out to close that gap by programmatically cleaning and connecting the City's expenditure data with its program inventory. The result is a harmonized dataset that supports operational clarity, performance insights, and supports both long-term planning and immediate decision-making.

Project Objectives

This project was designed to:

- **Centralize key data sources** related to expenditures and program structure.
- **Clean and normalize** raw Excel files for downstream analysis and dashboard integration.
- **Enable program-level insights** by aligning budget and narrative data.

- **Design a Power BI (*interactive data visualization software*) dashboard** that supports decision-making, long-term planning and visual comprehension through data storytelling.
- **Prepare a written product (*this document*) that details the process from start to finish for public release** on City of Missoula's Budget Website, and referenced on the **GitHub Repository**, and various social media platforms.
- Prepare a **digital product, internal training tool,** for use within the City of Missoula to train individuals on their understanding of budget expenditures from a priority-based budget process. This tool is a great resource for staff members, City and State decision-makers, City Council and the Mayor.
- Ensure this process is as **automated** as City limitations allow and provide a final **step-by-step procedure documentation** for carrying out the annual update of the dashboard for the budget season in **five simple stages**.

Data Sources

Two primary files served as the foundation for this work:

1. **FY24 Expenditure Status**
    - Provided "raw" (or unedited) account data from the financial software, **Tyler Edens**, including; Fund #, Dept #, Object Codes, and detailed line items. This data had a few redacted columns when originally provided (**"Expenditures", "Year-to-date Expenditures", "Year-to-date Encumbrances", "Balance", "Prct Used"**), but aside from this no other manipulation in handoff. The code accommodates the manual process of removing the mentioned columns from the downloaded file for future dashboard updaters.
2. **Program Inventory Internal Data Collection**
    - A survey-based workbook containing program names, descriptions, risk factors, mandates, and other strategic attributes. This data is downloaded from a specific workspace within the **Workiva platform**, in a completely raw format.

Each file was structured differently and required significant cleaning to standardize formats, harmonize identifiers, and create joins across tables. Creating joins across

tables means that we are combining the information into a unified dataset while ensuring the integrity and accuracy of both data pieces remain physically separate.

The purpose of joining each of these data pieces allows us to cross examine the data and link them together. Since each table or spreadsheet provides information about specific programs, we will be able to pull all of that information as a whole as long as their unique identification keys match. This process is done in the Power BI platform.

Methodology and Tools

All work was conducted in Python Programming Language using the following libraries and platforms:

- **Python Libraries**
    - **pandas, numpy** for data wrangling and exploration
    - **openpyxl** for reading complex Excel structures
    - **pyjanitor** for column cleaning and name normalization
    - **re, tqdm, os, chardet** for regex parsing, file handling, and character encoding checks
    - **matplotlib.pyplot, missingno** for EDA and visual inspection
- **Git** for version control and documentation
- **GitHub Repository** for cloud based project storage, access and review
- **Visual Studio Code** for coding editing interface and iteration management
- **Google Colab Environment** for hosting executable python cleaning process
- **Microsoft 365 SharePoint Library** for hosting live dashboard and final cleaned code. *Credentials Provided for approved city staff and analyst contractors.*
- **Streamlit.io** for hosting the interactive training tool. *While the direct link is referenced in the GitHub Project Repository, this is an internal tool and not meant for public use and consumption.*
- **Microsoft Power BI** for public dashboarding experience

The project is fully programmatic. All code is well-narrated and commented in Jupyter Notebook files **(.ipynb)** located in the GitHub Repository, following all **PEP 8 Style** standards for Python Code. Code was modularized with helper functions for repeatable cleaning steps, and output was version-controlled to maintain reproducibility.

Cleaning and Integration Process

The entire cleaning process takes both files through a series of cleaning techniques and procedures at the same time. By the end of this process, there should be two clean and usable files in **.csv** format.

Structurally, the code begins with importing the required libraries needed to carry out the required defined cleaning functions that directly follow. Defining these early on is helpful to reference later on in the pipeline. Once our functions are defined, I load the raw files into the environment for processing. Steps 4 through 10 carry out the unique tasks that each file required for a usable output, and provide us with data validations. Data validations ensure that we did not lose or improperly encode any of the data in the cleaning and standardization process. As I can see, we are not missing any data. Step 10 brings the entire process to enclose with the creation of the cleaned, usable .csv files.

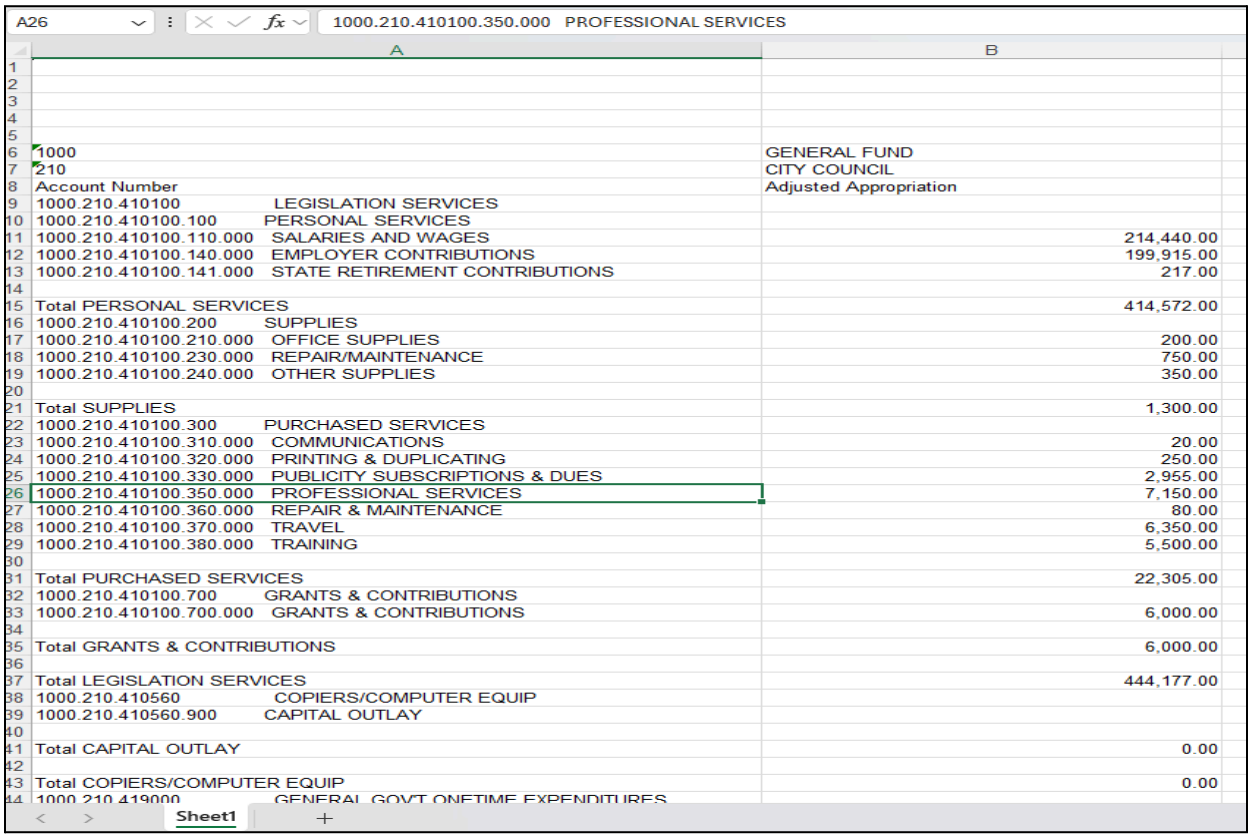
The next two sections outline the unique and similar cleaning strategies used for each Excel file. You can also follow along in the **Cleaning Repository Notebook**, which contains the entire data cleaning pipeline in detail. Following along in this format, will also provide you checkpoint views where you can see various before and after outcomes as they are called into view. Most of these are designated with code that reads **preview** in the comments, or **print** / **display** in the written code.

The appendix contains two sections of data definitions for each dataset based on the final cleaned outputs that extend some of our basic definitions, already defined.

Expenditure Status

The Expenditure file was provided with multiple non-data header rows and used a compound column structure, requiring careful parsing. As you can see below in *Figure 1.1*, we have a confusing and unusable structure for the data in this excel file. While the view provides the financial information in great detail, it's not very

digestible and can be confusing to the viewer. There is no easily seen called out data, and I can't understand how this relates to our other data file which contains program inventory information. I want to be able to interact with this data and use this file for data visualization, but in order to do so additional cleaning procedures must take place.



A26 | 1000.210.410100.350.000 PROFESSIONAL SERVICES

	A	B
1		
2		
3		
4		
5		
6	1000	GENERAL FUND
7	210	CITY COUNCIL
8	Account Number	Adjusted Appropriation
9	1000.210.410100 LEGISLATION SERVICES	
10	1000.210.410100.100 PERSONAL SERVICES	
11	1000.210.410100.110.000 SALARIES AND WAGES	214,440.00
12	1000.210.410100.140.000 EMPLOYER CONTRIBUTIONS	199,915.00
13	1000.210.410100.141.000 STATE RETIREMENT CONTRIBUTIONS	217.00
14		
15	Total PERSONAL SERVICES	414,572.00
16	1000.210.410100.200 SUPPLIES	
17	1000.210.410100.210.000 OFFICE SUPPLIES	200.00
18	1000.210.410100.230.000 REPAIR/MAINTENANCE	750.00
19	1000.210.410100.240.000 OTHER SUPPLIES	350.00
20		
21	Total SUPPLIES	1,300.00
22	1000.210.410100.300 PURCHASED SERVICES	
23	1000.210.410100.310.000 COMMUNICATIONS	20.00
24	1000.210.410100.320.000 PRINTING & DUPLICATING	250.00
25	1000.210.410100.330.000 PUBLICITY SUBSCRIPTIONS & DUES	2,955.00
26	1000.210.410100.350.000 PROFESSIONAL SERVICES	7,150.00
27	1000.210.410100.360.000 REPAIR & MAINTENANCE	80.00
28	1000.210.410100.370.000 TRAVEL	6,350.00
29	1000.210.410100.380.000 TRAINING	5,500.00
30		
31	Total PURCHASED SERVICES	22,305.00
32	1000.210.410100.700 GRANTS & CONTRIBUTIONS	
33	1000.210.410100.700.000 GRANTS & CONTRIBUTIONS	6,000.00
34		
35	Total GRANTS & CONTRIBUTIONS	6,000.00
36		
37	Total LEGISLATION SERVICES	444,177.00
38	1000.210.410560 COPIERS/COMPUTER EQUIP	
39	1000.210.410560.900 CAPITAL OUTLAY	
40		
41	Total CAPITAL OUTLAY	0.00
42		
43	Total COPIERS/COMPUTER EQUIP	0.00
44	1000.210.419000 GENERAL GOVT ONETIME EXPENDITURES	

Sheet1

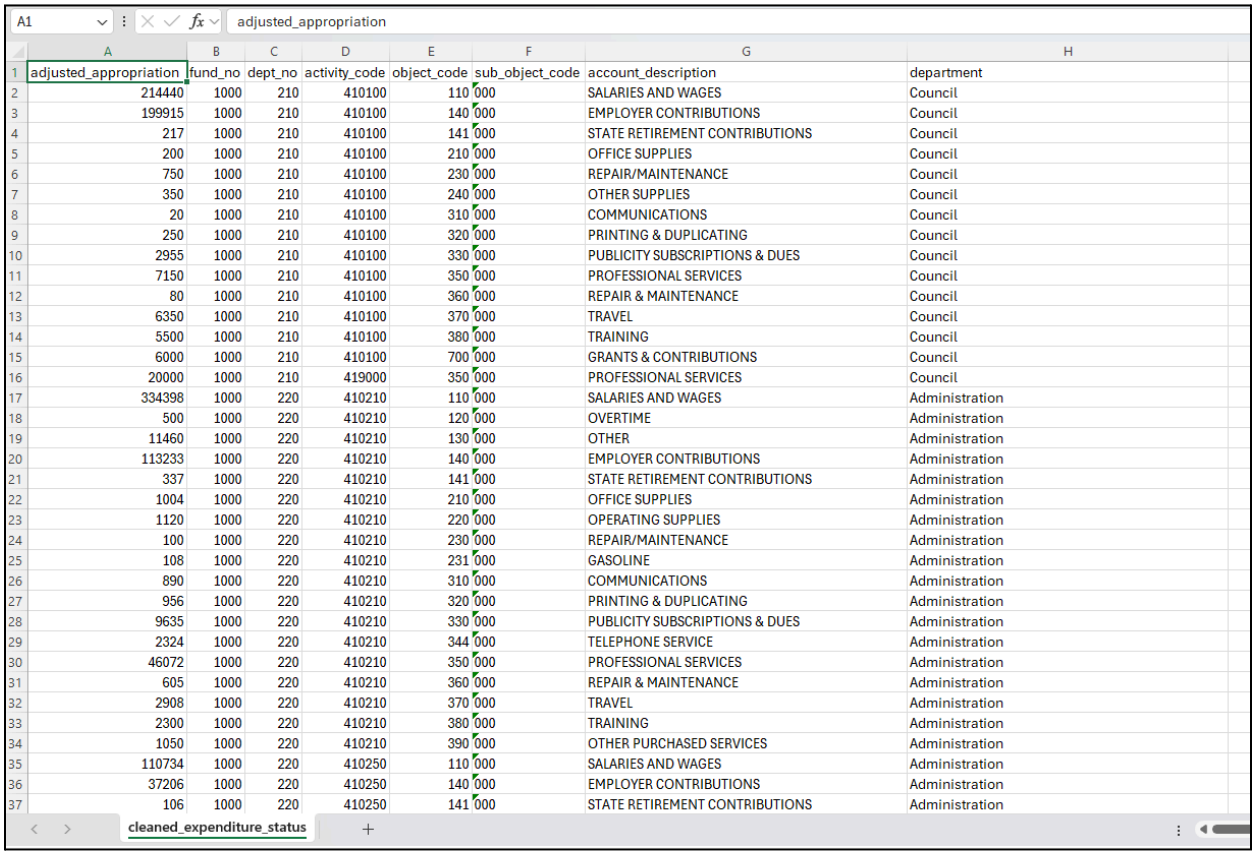
Figure 1.1: View of Raw Expenditure Excel file before cleaning process takes place.

Key steps to clean and normalize the data included:

- **Use logical conditions** to remove
    - "Unnamed" and empty columns
    - rows that align with specific combinations of columns
    - Subset filtered data and apply to the current working dataframe
- **Restructuring** the data to **Split the Account Number** column into six usable columns that contain fund_no, dept_no, activity_code, object_code, sub-object_code, and account_description.

- **Forward-filling missing values and departments**. This is also known as the last valid value is carried forward to fill the missing value that is present, highly useful for the sub_object_code column in particular as this value was often not present, and needed to replace the missing data with accurate information. For example, the data should read 000 to express no data or no sub_object_code data. This value is safe to use because there are no account object codes associated with these values.

Finally, arriving at a rather clean, structured and malleable dataset shown in *Figure 1.2*. Our cleaned expenditure file has all of the appropriate headers, updated department columns and instead of only two columns contains 8 columns.



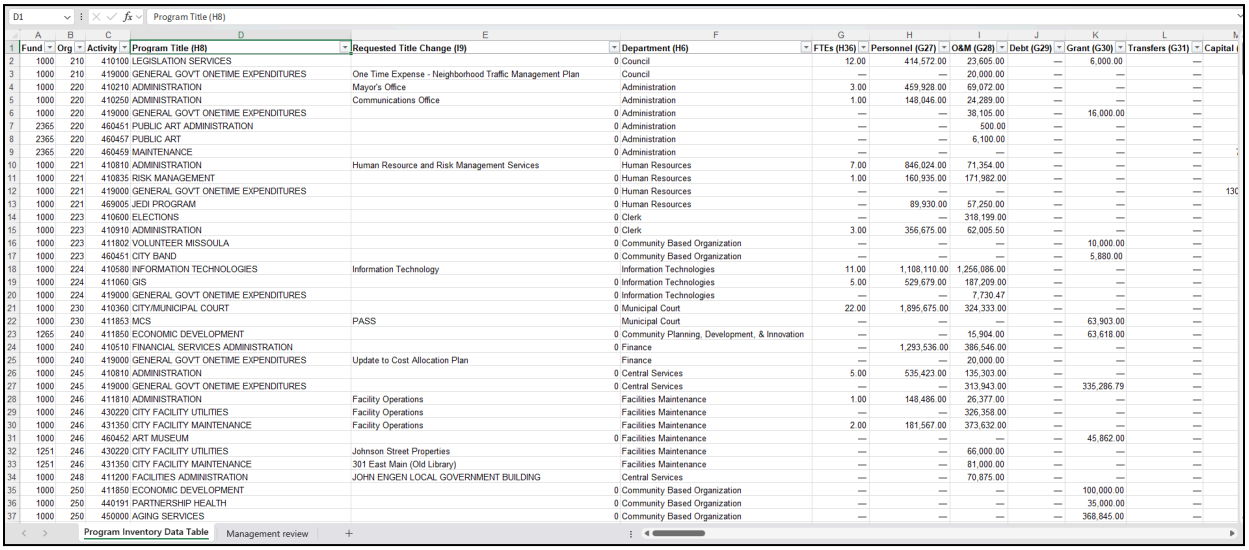
adjusted_appropriation	fund_no	dept_no	activity_code	object_code	sub_object_code	account_description	department
214440	1000	210	410100	110	000	SALARIES AND WAGES	Council
199915	1000	210	410100	140	000	EMPLOYER CONTRIBUTIONS	Council
217	1000	210	410100	141	000	STATE RETIREMENT CONTRIBUTIONS	Council
200	1000	210	410100	210	000	OFFICE SUPPLIES	Council
750	1000	210	410100	230	000	REPAIR/MAINTENANCE	Council
350	1000	210	410100	240	000	OTHER SUPPLIES	Council
20	1000	210	410100	310	000	COMMUNICATIONS	Council
250	1000	210	410100	320	000	PRINTING & DUPLICATING	Council
2955	1000	210	410100	330	000	PUBLICITY SUBSCRIPTIONS & DUES	Council
7150	1000	210	410100	350	000	PROFESSIONAL SERVICES	Council
80	1000	210	410100	360	000	REPAIR & MAINTENANCE	Council
6350	1000	210	410100	370	000	TRAVEL	Council
5500	1000	210	410100	380	000	TRAINING	Council
6000	1000	210	410100	700	000	GRANTS & CONTRIBUTIONS	Council
20000	1000	210	419000	350	000	PROFESSIONAL SERVICES	Council
334398	1000	220	410210	110	000	SALARIES AND WAGES	Administration
500	1000	220	410210	120	000	OVERTIME	Administration
11460	1000	220	410210	130	000	OTHER	Administration
113233	1000	220	410210	140	000	EMPLOYER CONTRIBUTIONS	Administration
337	1000	220	410210	141	000	STATE RETIREMENT CONTRIBUTIONS	Administration
1004	1000	220	410210	210	000	OFFICE SUPPLIES	Administration
1120	1000	220	410210	220	000	OPERATING SUPPLIES	Administration
100	1000	220	410210	230	000	REPAIR/MAINTENANCE	Administration
108	1000	220	410210	231	000	GASOLINE	Administration
890	1000	220	410210	310	000	COMMUNICATIONS	Administration
956	1000	220	410210	320	000	PRINTING & DUPLICATING	Administration
9635	1000	220	410210	330	000	PUBLICITY SUBSCRIPTIONS & DUES	Administration
2324	1000	220	410210	344	000	TELEPHONE SERVICE	Administration
46072	1000	220	410210	350	000	PROFESSIONAL SERVICES	Administration
605	1000	220	410210	360	000	REPAIR & MAINTENANCE	Administration
2908	1000	220	410210	370	000	TRAVEL	Administration
2300	1000	220	410210	380	000	TRAINING	Administration
1050	1000	220	410210	390	000	OTHER PURCHASED SERVICES	Administration
110734	1000	220	410250	110	000	SALARIES AND WAGES	Administration
37206	1000	220	410250	140	000	EMPLOYER CONTRIBUTIONS	Administration
106	1000	220	410250	141	000	STATE RETIREMENT CONTRIBUTIONS	Administration

Figure 1.2: View of the Cleaned Expenditure Excel file, ready for dashboarding

Program Inventory

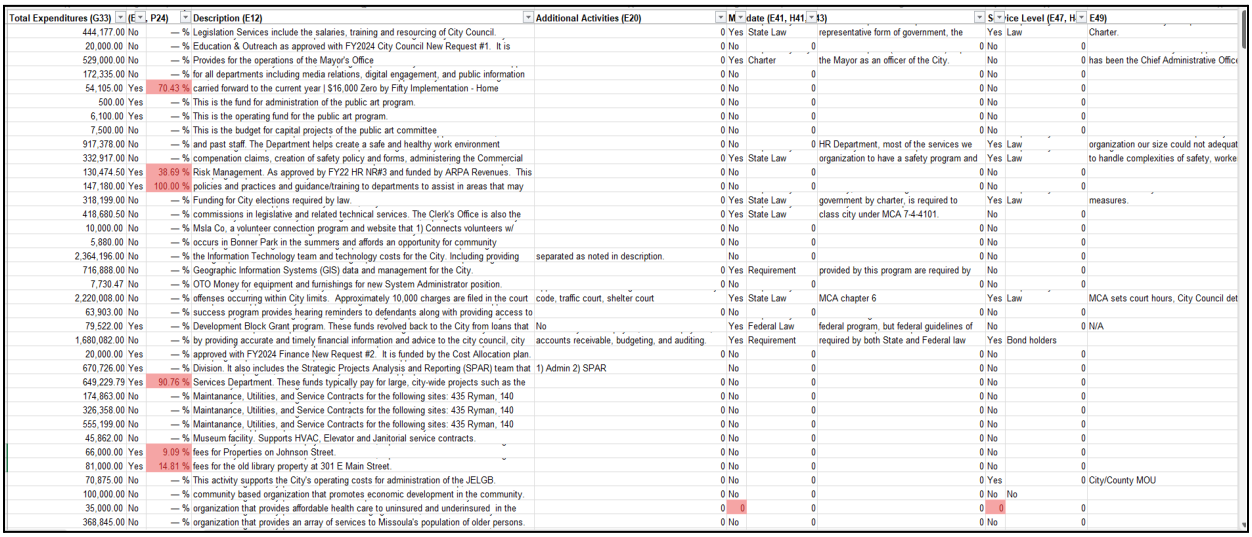
The Program Inventory Survey file was provided from the Workiva Workspace and contained combined column headers that needed to be expanded to individual columns and retain the correct information. While this file was a bit easier to clean

once our original functions were created, the headers were one of the largest obstacles to getting usable and clean data. You preview the raw Excel file, in *Figures 2.1 and 2.2*. Both of these figures provide insight before the raw data was cleaned.



Fund	Org	Activity	Program Title (H8)	Requested Title Change (I9)	Department (H6)	FTEs (H36)	Personnel (G27)	O&M (G28)	Debt (G29)	Grant (G30)	Transfers (G31)	Capital
1000	210	410100	LEGISLATION SERVICES		0 Council	12.00	414,572.00	23,605.00	—	6,000.00	—	
1000	210	419000	GENERAL GOVT ONETIME EXPENDITURES	One Time Expense - Neighborhood Traffic Management Plan	Council	—	—	20,000.00	—	—	—	
1000	220	410210	ADMINISTRATION	Mayor's Office	Administration	3.00	459,928.00	69,072.00	—	—	—	
1000	220	410250	ADMINISTRATION	Communications Office	Administration	1.00	148,046.00	24,289.00	—	—	—	
1000	220	419000	GENERAL GOVT ONETIME EXPENDITURES		0 Administration	—	—	38,105.00	—	16,000.00	—	
2365	220	460451	PUBLIC ART ADMINISTRATION		0 Administration	—	—	500.00	—	—	—	
2365	220	460457	PUBLIC ART		0 Administration	—	—	6,100.00	—	—	—	
2365	220	460459	MAINTENANCE		0 Administration	—	—	—	—	—	—	
1000	221	410810	ADMINISTRATION	Human Resource and Risk Management Services	Human Resources	7.00	846,024.00	71,354.00	—	—	—	
1000	221	410835	RISK MANAGEMENT		0 Human Resources	1.00	160,935.00	171,982.00	—	—	—	
1000	221	419000	GENERAL GOVT ONETIME EXPENDITURES		0 Human Resources	—	—	—	—	—	—	130
1000	221	469005	JEDI PROGRAM		0 Human Resources	—	89,930.00	57,250.00	—	—	—	
1000	223	410600	ELECTIONS		0 Clerk	—	—	318,199.00	—	—	—	
1000	223	410910	ADMINISTRATION		0 Clerk	3.00	356,675.00	62,005.50	—	—	—	
1000	223	411802	VOLUNTEER MISSOULA		0 Community Based Organization	—	—	—	—	10,000.00	—	
1000	223	460451	CITY BAND		0 Community Based Organization	—	—	—	—	5,880.00	—	
1000	224	410580	INFORMATION TECHNOLOGIES	Information Technology	Information Technologies	11.00	1,108,110.00	1,256,086.00	—	—	—	
1000	224	411060	GIS		0 Information Technologies	5.00	529,679.00	187,209.00	—	—	—	
1000	224	419000	GENERAL GOVT ONETIME EXPENDITURES		0 Information Technologies	—	—	7,730.47	—	—	—	
1000	230	410360	CITY/MUNICIPAL COURT		0 Municipal Court	22.00	1,895,675.00	324,333.00	—	—	—	
1000	230	411853	MCS	PASS	Municipal Court	—	—	—	—	63,903.00	—	
1265	240	411850	ECONOMIC DEVELOPMENT		0 Community Planning, Development, & Innovation	—	—	15,904.00	—	63,618.00	—	
1000	240	410510	FINANCIAL SERVICES ADMINISTRATION		0 Finance	—	1,293,536.00	386,546.00	—	—	—	
1000	240	419000	GENERAL GOVT ONETIME EXPENDITURES	Update to Cost Allocation Plan	Finance	—	—	20,000.00	—	—	—	
1000	245	410810	ADMINISTRATION		0 Central Services	5.00	535,423.00	135,303.00	—	—	—	
1000	245	419000	GENERAL GOVT ONETIME EXPENDITURES		0 Central Services	—	—	313,943.00	—	335,286.79	—	
1000	246	411810	ADMINISTRATION	Facility Operations	Facilities Maintenance	1.00	148,486.00	26,377.00	—	—	—	
1000	246	430220	CITY FACILITY UTILITIES	Facility Operations	Facilities Maintenance	—	—	326,358.00	—	—	—	
1000	246	431350	CITY FACILITY MAINTENANCE	Facility Operations	Facilities Maintenance	2.00	181,567.00	373,632.00	—	—	—	
1000	246	460452	ART MUSEUM		0 Facilities Maintenance	—	—	—	—	45,862.00	—	
1251	246	430220	CITY FACILITY UTILITIES	Johnson Street Properties	Facilities Maintenance	—	—	66,000.00	—	—	—	
1251	246	431350	CITY FACILITY MAINTENANCE	301 East Main (Old Library)	Facilities Maintenance	—	—	81,000.00	—	—	—	
1000	248	411200	FACILITIES ADMINISTRATION	JOHN ENGEN LOCAL GOVERNMENT BUILDING	Central Services	—	—	70,875.00	—	—	—	
1000	250	411850	ECONOMIC DEVELOPMENT		0 Community Based Organization	—	—	—	—	100,000.00	—	
1000	250	440191	PARTNERSHIP HEALTH		0 Community Based Organization	—	—	—	—	35,000.00	—	
1000	250	450000	AGING SERVICES		0 Community Based Organization	—	—	—	—	368,845.00	—	

Figure 2.1: Program Inventory Preview, prior to data cleaning, Part A



Total Expenditures (G33)	(E	P24)	Description (E12)	Additional Activities (E20)	M	date (E41, H41	I3)	S	ice Level (E47, H	E49)
444,177.00	No	—	% Legislation Services include the salaries, training and resourcing of City Council.	0	Yes	State Law	representative form of government, the	Yes	Law	Charter.
20,000.00	No	—	% Education & Outreach as approved with FY2024 City Council New Request #1. It is	0	No		0	0	No	0
529,000.00	No	—	% Provides for the operations of the Mayor's Office	0	Yes	Charter	the Mayor as an officer of the City.	0	No	0 has been the Chief Administrative Offic
172,335.00	No	—	% for all departments including media relations, digital engagement, and public information	0	No		0	0	No	0
54,105.00	Yes	70.43 %	carried forward to the current year	$16,000 Zero by Fifty Implementation - Home	0	No		0	No	0
500.00	Yes	—	% This is the fund for administration of the public art program.		0	No		0	No	0
6,100.00	Yes	—	% This is the operating fund for the public art program.		0	No		0	No	0
7,500.00	No	—	% This is the budget for capital projects of the public art committee.		0	No		0	No	0
917,378.00	No	—	% and past staff. The Department helps create a safe and healthy work environment		0	No		0	HR Department, most of the services we	Yes Law organization our size could not adequat
332,917.00	No	—	% compensation claims, creation of safety policy and forms, administering the Commercial		0	Yes	State Law	organization to have a safety program and	Yes Law to handle complexities of safety, worke
130,474.50	Yes	38.69 %	Risk Management. As approved by FY22 HR NR#3 and funded by ARPA Revenues. This		0	No		0	No	0
147,180.00	Yes	100.00 %	policies and practices and guidance/training to departments to assist in areas that may		0	No		0	No	0
318,199.00	No	—	% Funding for City elections required by law.		0	Yes	State Law	government by charter, is required to	Yes Law measures.	
418,680.50	No	—	% commissions in legislative and related technical services. The Clerk's Office is also the		0	Yes	State Law	class city under MCA 7-4-4101.	No	0
10,000.00	No	—	% Msla Co, a volunteer connection program and website that 1) Connects volunteers w/		0	No		0	No	0
5,880.00	No	—	% occurs in Bonner Park in the summers and affords an opportunity for community		0	No		0	No	0
2,364,196.00	No	—	% the Information Technology team and technology costs for the City. Including providing	separated as noted in description.	No		0	No	0	
716,888.00	No	—	% Geographic Information Systems (GIS) data and management for the City.		0	Yes	Requirement	provided by this program are required by	No	0
7,730.47	No	—	% OTO Money for equipment and furnishings for new System Administrator position.		0	No		0	No	0
2,220,008.00	No	—	% offenses occurring within City limits. Approximately 10,000 charges are filed in the court	code, traffic court, shelter court	Yes	State Law	MCA chapter 6	Yes	Law	MCA sets court hours, City Council det
63,903.00	No	—	% success program provides hearing reminders to defendants along with providing access to		0	No		0	No	0
79,522.00	Yes	—	% Development Block Grant program. These funds revolved back to the City from loans that	No	Yes	Federal Law	federal program, but federal guidelines of	No	0	N/A
1,680,082.00	No	—	% by providing accurate and timely financial information and advice to the city council, city	accounts receivable, budgeting, and auditing.	Yes	Requirement	required by both State and Federal law	Yes	Bond holders	
20,000.00	Yes	—	% approved with FY2024 Finance New Request #2. It is funded by the Cost Allocation plan.		0	No		0	No	0
670,726.00	Yes	—	% Division. It also includes the Strategic Projects Analysis and Reporting (SPAR) team that	1) Admin 2) SPAR	No		0	0	No	0
649,229.79	Yes	90.76 %	Services Department. These funds typically pay for large, city-wide projects such as the		0	No		0	No	0
174,863.00	No	—	% Maintanance, Utilities, and Service Contracts for the following sites: 435 Ryman, 140		0	No		0	No	0
326,358.00	No	—	% Maintanance, Utilities, and Service Contracts for the following sites: 435 Ryman, 140		0	No		0	No	0
555,199.00	No	—	% Maintanance, Utilities, and Service Contracts for the following sites: 435 Ryman, 140		0	No		0	No	0
45,862.00	No	—	% Museum facility. Supports HVAC, Elevator and Janitorial service contracts.		0	No		0	No	0
66,000.00	Yes	9.09 %	fees for Properties on Johnson Street.		0	No		0	No	0
81,000.00	Yes	14.81 %	fees for the old library property at 301 E Main Street.		0	No		0	No	0
70,875.00	No	—	% This activity supports the City's operating costs for administration of the JELGB.		0	No		0	Yes	0 City/County MOU
100,000.00	No	—	% community based organization that promotes economic development in the community.		0	No		0	No	No
35,000.00	No	—	% organization that provides affordable health care to uninsured and underinsured, in the		0	0		0	0	0
368,845.00	No	—	% organization that provides an array of services to Missoula's population of older persons.		0	No		0	No	0

Figure 2.2: Program Inventory Preview, Part B

The Program Inventory survey is sent out annually at the commencement of budget season (normally in March or April). You can preview a version of both of the instructions and an example of what the survey looks like in pdf form, located in the **assets** folder in the GitHub Repository.

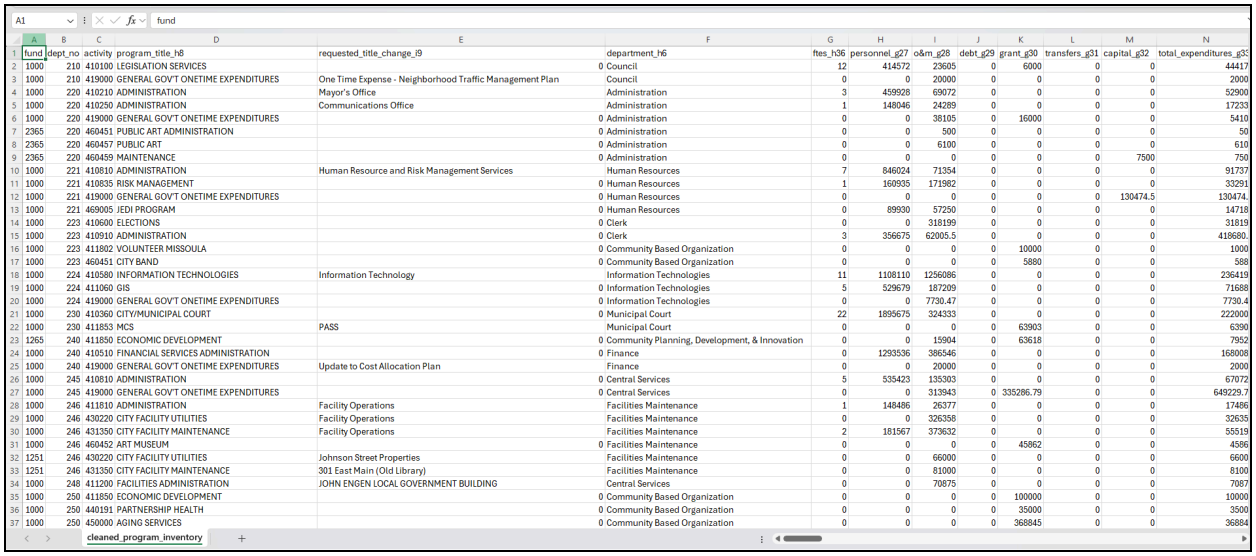
The headers that required this treatment were expanded as follows:

- Cost Recovery (E58, P24) → expanded to cost_recovery_e58_yn, cost_recovery_p24_percent
- Mandate (E41, H41, E43) → expanded to mandate_e41_yn, mandate_h41_entity, mandate_e43_descript
- Service Level (E47, H47, E49) → expanded to service_level_e47_yn, service_level_h47_entity, service_level_e49_descript
- Reliance (E53, E55) → expanded to reliance_e53_level, reliance_e55_high_descript
- Strategic Goal (E64, E66, E68, E74, E80) → expanded to five unique column names; strategic_goal_e64_yn, strategic_goal_e66_name, strategic_goal_e68_action_descript, strategic_goal_e74_additional_actions, strategic_goal_e80_2nd_additional_actions
- Trend (Demand) (E87, E89) → expanded to two unique column names; trend_demand_e87_level, trend_demand_e89_descript
- Risk (E93, E95) → expanded to two unique column names; risk_e93_type, risk_e95_descript

Using a **custom function**, I programmatically expanded these merged fields, standardized names with clean_names(), and removed whitespace or artifacts from the Excel export.

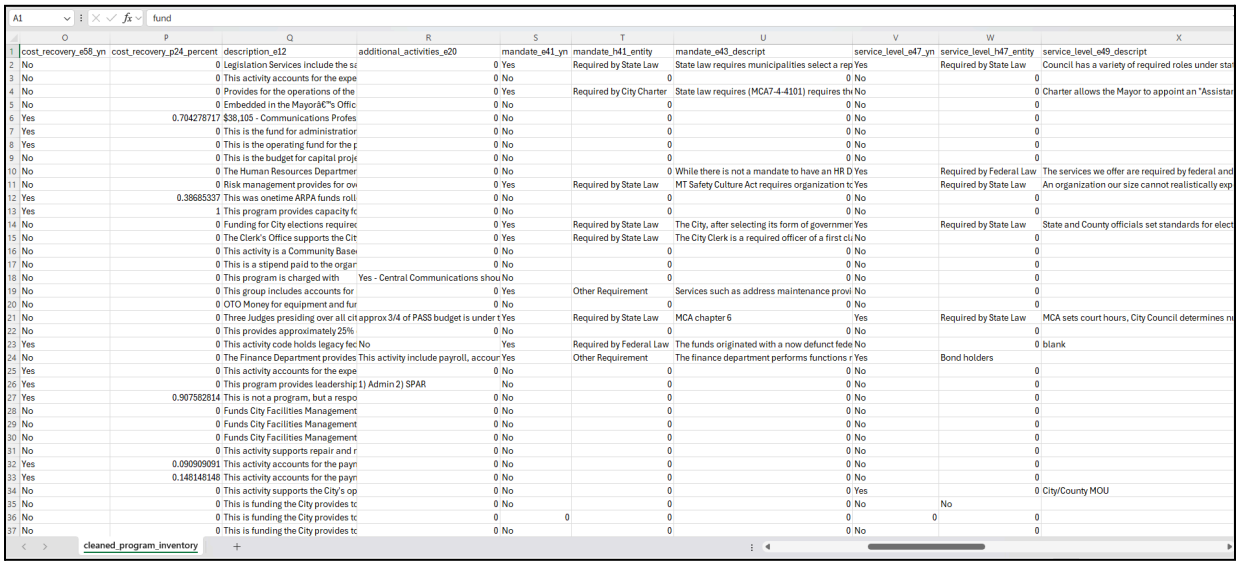
I also remapped column **Org** to **dept_no** to align with the Expenditure dataset ensuring consistent formatting across certain key identifiers, like department.

In *Figures 2.3 and 2.4*, you can see how these two unique strategies helped to shape and normalize the data for greater usability in the final dashboard, and the exploratory analysis.



fund	dept_no	activity	program_title_h8	requested_title_change_i9	department_h6	ftes_h36	personnel_g27	o&m_g28	debt_g29	grant_g30	transfers_g31	capital_g32	total_expenditures_g3
1000	210	410100	LEGISLATION SERVICES		0 Council	12	414572	23605	0	6000	0	0	44417
1000	210	419000	GENERAL GOV'T ONETIME EXPENDITURES	One Time Expense - Neighborhood Traffic Management Plan	Council	0	0	20000	0	0	0	0	2000
1000	220	410210	ADMINISTRATION	Mayor's Office	Administration	3	459928	69072	0	0	0	0	52900
1000	220	410250	ADMINISTRATION	Communications Office	Administration	1	148046	24289	0	0	0	0	17233
1000	220	419000	GENERAL GOV'T ONETIME EXPENDITURES		0 Administration	0	0	38105	0	16000	0	0	5410
2365	220	460451	PUBLIC ART ADMINISTRATION		0 Administration	0	0	500	0	0	0	0	50
2365	220	460457	PUBLIC ART		0 Administration	0	0	6100	0	0	0	0	610
2365	220	460459	MAINTENANCE		0 Administration	0	0	0	0	0	0	7500	750
1000	221	410810	ADMINISTRATION	Human Resource and Risk Management Services	Human Resources	7	846024	71354	0	0	0	0	91737
1000	221	410835	RISK MANAGEMENT		0 Human Resources	1	160935	171982	0	0	0	0	33291
1000	221	419000	GENERAL GOV'T ONETIME EXPENDITURES		0 Human Resources	0	0	0	0	0	0	130474.5	130474.
1000	221	469005	JEDI PROGRAM		0 Human Resources	0	89930	57250	0	0	0	0	14718
1000	223	410600	ELECTIONS		0 Clerk	0	0	318199	0	0	0	0	31819
1000	223	410910	ADMINISTRATION		0 Clerk	3	356675	62005.5	0	0	0	0	418680.
1000	223	411802	VOLUNTEER MISSOULA		0 Community Based Organization	0	0	0	0	10000	0	0	1000
1000	223	460451	CITY BAND		0 Community Based Organization	0	0	0	0	5880	0	0	588
1000	224	410580	INFORMATION TECHNOLOGIES	Information Technology	Information Technologies	11	1108110	1256086	0	0	0	0	236419
1000	224	411060	GIS		0 Information Technologies	5	529679	187209	0	0	0	0	71688
1000	224	419000	GENERAL GOV'T ONETIME EXPENDITURES		0 Information Technologies	0	0	7730.47	0	0	0	0	7730.4
1000	230	410360	CITY/MUNICIPAL COURT		0 Municipal Court	22	1895675	324333	0	0	0	0	222000
1000	230	411853	MCS	PASS	Municipal Court	0	0	0	0	63903	0	0	6390
1265	240	411850	ECONOMIC DEVELOPMENT		0 Community Planning, Development, & Innovation	0	0	15904	0	63618	0	0	7952
1000	240	410510	FINANCIAL SERVICES ADMINISTRATION		0 Finance	0	1293536	386546	0	0	0	0	168008
1000	240	419000	GENERAL GOV'T ONETIME EXPENDITURES	Update to Cost Allocation Plan	Finance	0	0	20000	0	0	0	0	2000
1000	245	410810	ADMINISTRATION		0 Central Services	5	535423	135303	0	0	0	0	67072
1000	245	419000	GENERAL GOV'T ONETIME EXPENDITURES		0 Central Services	0	0	313943	0	335286.79	0	0	649229.7
1000	246	411810	ADMINISTRATION	Facility Operations	Facilities Maintenance	1	148486	26377	0	0	0	0	17486
1000	246	430220	CITY FACILITY UTILITIES	Facility Operations	Facilities Maintenance	0	0	326358	0	0	0	0	32635
1000	246	431350	CITY FACILITY MAINTENANCE	Facility Operations	Facilities Maintenance	2	181567	373632	0	0	0	0	55519
1000	246	460452	ART MUSEUM		0 Facilities Maintenance	0	0	0	0	45862	0	0	4586
1251	246	430220	CITY FACILITY UTILITIES	Johnson Street Properties	Facilities Maintenance	0	0	66000	0	0	0	0	6600
1251	246	431350	CITY FACILITY MAINTENANCE	301 East Main (Old Library)	Facilities Maintenance	0	0	81000	0	0	0	0	8100
1000	248	411200	FACILITIES ADMINISTRATION	JOHN ENGEN LOCAL GOVERNMENT BUILDING	Central Services	0	0	70875	0	0	0	0	7087
1000	250	411850	ECONOMIC DEVELOPMENT		0 Community Based Organization	0	0	0	0	100000	0	0	10000
1000	250	440191	PARTNERSHIP HEALTH		0 Community Based Organization	0	0	0	0	35000	0	0	3500
1000	250	450000	AGING SERVICES		0 Community Based Organization	0	0	0	0	368845	0	0	36884

Figure 2.3: Cleaned Program Inventory, Part A



cost_recovery_e58_yn	cost_recovery_p24_percent	description_e12	additional_activities_e20	mandate_e41_yn	mandate_h41_entity	mandate_e43_descript	service_level_e47_yn	service_level_h47_entity	service_level_e49_descript
No	0	Legislation Services include the sa	0	Yes	Required by State Law	State law requires municipalities select a rep	Yes	Required by State Law	Council has a variety of required roles under sta
No	0	This activity accounts for the expe	0	No	0	0	No	0	
No	0	Provides for the operations of the	0	Yes	Required by City Charter	State law requires (MCA7-4-4101) requires th	No	0	Charter allows the Mayor to appoint an "Assistar
No	0	Embedded in the Mayorâ€™s Offic	0	No	0	0	No	0	
Yes	0.704278717	$38,105 - Communications Profes	0	No	0	0	No	0	
Yes	0	This is the fund for administration	0	No	0	0	No	0	
Yes	0	This is the operating fund for the p	0	No	0	0	No	0	
No	0	This is the budget for capital proje	0	No	0	0	No	0	
No	0	The Human Resources Departmer	0	No	0	While there is not a mandate to have an HR D	Yes	Required by Federal Law	The services we offer are required by federal and
No	0	Risk management provides for ov	0	Yes	Required by State Law	MT Safety Culture Act requires organization to	Yes	Required by State Law	An organization our size cannot realistically exp
Yes	0.38685337	This was onetime ARPA funds roll	0	No	0	0	No	0	
Yes	1	This program provides capacity fo	0	No	0	0	No	0	
No	0	Funding for City elections require	0	Yes	Required by State Law	The City, after selecting its form of governmer	Yes	Required by State Law	State and County officials set standards for elect
No	0	The Clerk's Office supports the Cit	0	Yes	Required by State Law	The City Clerk is a required officer of a first cl	No	0	
No	0	This activity is a Community Base	0	No	0	0	No	0	
No	0	This is a stipend paid to the organ	0	No	0	0	No	0	
No	0	This program is charged with	Yes - Central Communications shou	No	0	0	No	0	
No	0	This group includes accounts for	0	Yes	Other Requirement	Services such as address maintenance provi	No	0	
No	0	OTO Money for equipment and fur	0	No	0	0	No	0	
No	0	Three Judges presiding over all cit	approx 3/4 of PASS budget is under t	Yes	Required by State Law	MCA chapter 6	Yes	Required by State Law	MCA sets court hours, City Council determines nu
No	0	This provides approximately 25%	0	No	0	0	No	0	
Yes	0	This activity code holds legacy fec	No	Yes	Required by Federal Law	The funds originated with a now defunct fede	No	0	blank
No	0	The Finance Department provides	This activity include payroll, accour	Yes	Other Requirement	The finance department performs functions r	Yes	Bond holders	
Yes	0	This activity accounts for the expe	0	No	0	0	No	0	
Yes	0	This program provides leadership	1) Admin 2) SPAR	No	0	0	No	0	
Yes	0.907582814	This is not a program, but a respo	0	No	0	0	No	0	
No	0	Funds City Facilities Management	0	No	0	0	No	0	
No	0	Funds City Facilities Management	0	No	0	0	No	0	
No	0	Funds City Facilities Management	0	No	0	0	No	0	
No	0	This activity supports repair and r	0	No	0	0	No	0	
Yes	0.090909091	This activity accounts for the payr	0	No	0	0	No	0	
Yes	0.148148148	This activity accounts for the payr	0	No	0	0	No	0	
No	0	This activity supports the City's op	0	No	0	0	Yes	0	City/County MOU
No	0	This is funding the City provides tc	0	No	0	0	No	No	
No	0	This is funding the City provides tc	0	0	0	0	0	0	
No	0	This is funding the City provides tc	0	No	0	0	No	0	

Figure 2.4: Cleaned Program Inventory, Part B

This data contains a significant number of columns, so while these two views do not encompass the entire view (and are difficult to see) of the data in program inventory these figures represent the work that was completed, especially pertaining to the combined columns that needed unique names and separation.

Final Data Outputs

Two key dataframes were produced:

- cleaned_expenditure_status.csv
- cleaned_program_inventory.csv

Exploratory Analysis

Once the data was in a clean and usable format, I was able to perform some exploratory analysis on the data to see if there was anything important to take a look at. It should be noted that while some of the bits of data, such as FTE counts may have been inaccurately taken when the data intake process was completed there are other pieces of the analysis that are worth a review. If at any time you'd like to follow along, you can **review the Exploratory Analysis** within the GitHub Repository for the FY24 data. This file also contains deeper key insights than listed in this paper.

This project does not allow for further exploratory analysis in the annual update, but in future iterations of refining this project that could be something to strive for to further get into the details of how the data is currently. While dashboard visualization is useful, statistical review of the data is important to catch outliers, highlight more detailed trends and explore the landscape that is data. The graphics in this portion of the report are a bit more rough than the visualized dashboard. These graphs were created using Python programming, while the dashboard takes the cleaned code in a user friendly environment designed for reporting.

The exploratory approach I took contains:

- Validating clean data by previewing the **shape of the data**, and looking at **column structure**, counting and **visualizing missing values**, and remaining nulls.
- **Statistical summary** information such as mean, median, max, the quartiles and standard deviation.
- **Department-level budget analysis** provides an aggregated view of program and expenditure data by department.
- Program-level analysis of **how resources are spread across programs**, helpful in identifying high cost or underfunded programs.

- Budget breakdown across **capital, personnel, O&M, debt and grant data**, and the **distributions of mandate status, risk type and demand (trend)**.
- **Combining Risk and Mandates in a matrix** provides a view that may identify the spread of both risky and legally required programs.

Exploratory Key Findings

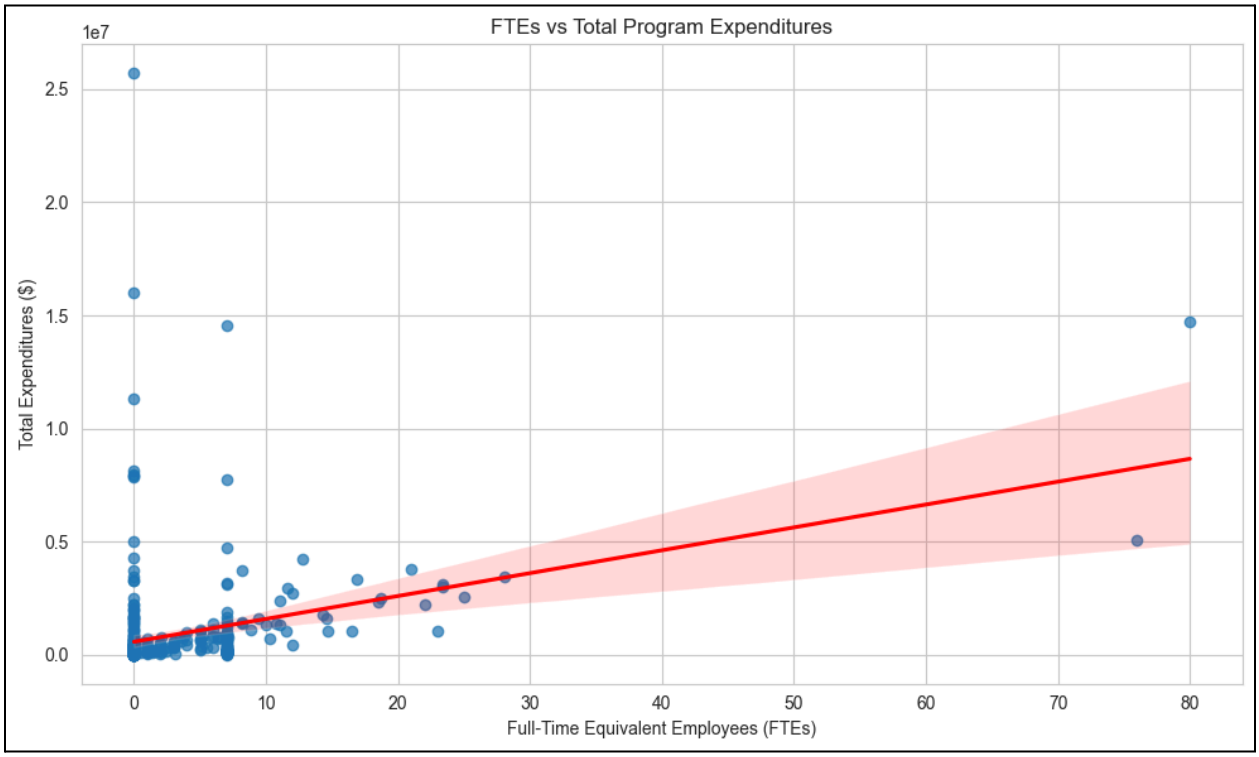


Figure 3.1: FTE's vs Total Program Expenditures

These were more of the broad analysis conducted, but there were also some other identifying graphs worth bringing into the spotlight. While FTE data is currently slightly skewed due to reporting intake, the trends still align with what is to be expected.

In *Figure 3.1*, we can see the FY24 data provides a positive correlation. Meaning most of the programs that do fall along a reasonable upward slope, revealing that as FTEs increase, so does the total cost (especially surrounding personnel). Some outliers do exist here, some of them have high budgets and low staff or vice versa.

This may just be showcasing the grant-funded or capital-intensive, possibly even outsourced programs.

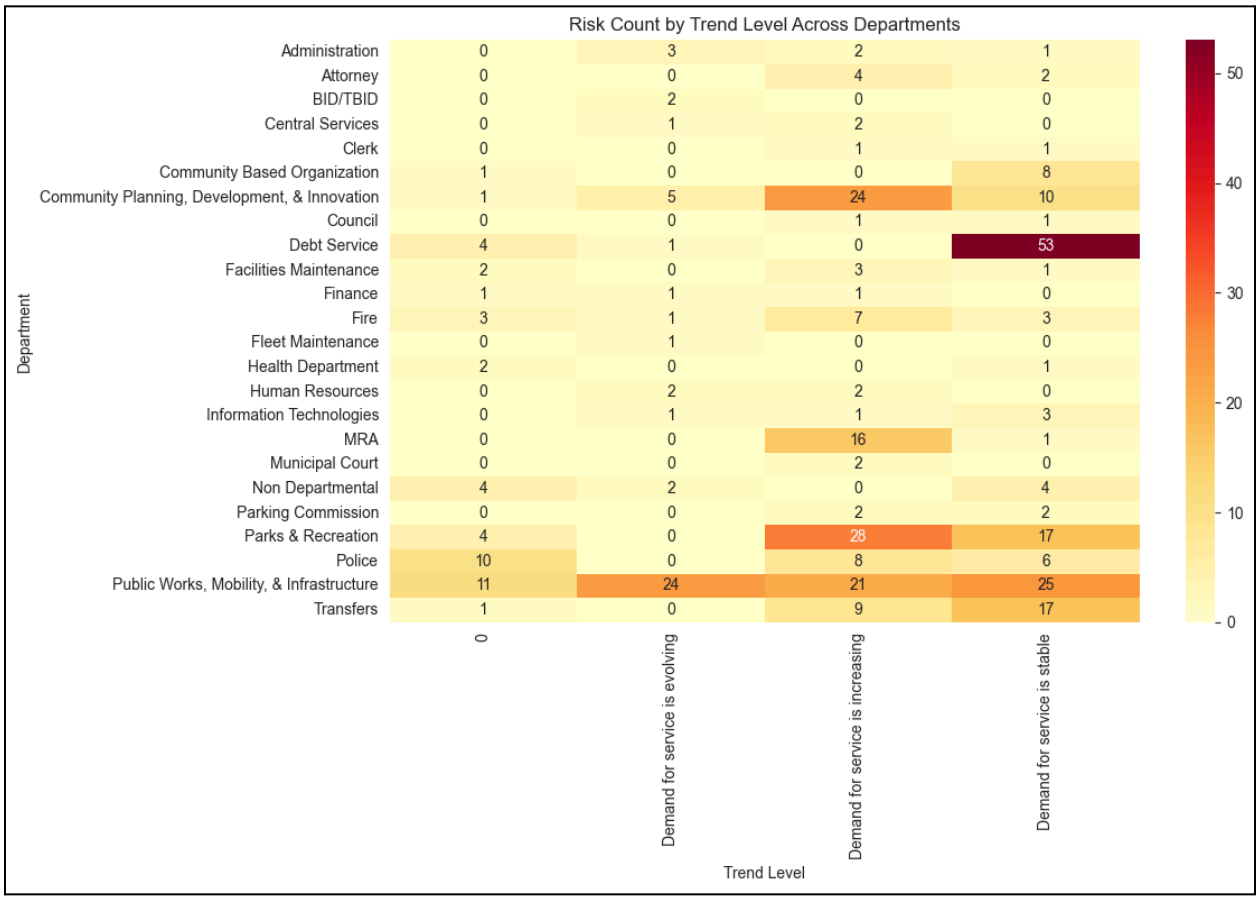


Figure 3.2: Department Risk and Trend (Demand) Heat Map

Creating a Heatmap of the Risk count by trend counts can identify certain *hotspots* that should be monitored or reviewed in greater detail. As we can see in *Figure 3.2*, there are definitely some areas of consideration within the Debt Service, Community Planning, Parking Commission and Public Works departments across all programs.

🚨 High-Investment + High-Risk Programs:

	program_title_h8	activity	department_h6	total_expenditures_g33	risk_e93_type
8	ADMINISTRATION	410810	Human Resources	917,378.00	Low/No Risk
16	INFORMATION TECHNOLOGIES	410580	Information Technologies	2,364,196.00	Changes in Program Requirements
19	CITY/MUNICIPAL COURT	410360	Municipal Court	2,220,008.00	Changes in Program Requirements
22	FINANCIAL SERVICES ADMINISTRATION	410510	Finance	1,680,082.00	Low/No Risk
42	ADMINISTRATION	411010	Community Planning, Development, & Innovation	769,228.00	Low/No Risk
...	...	...	...	...	...
352	PUBLIC SAFETY OPERATING/LIGHT VEHICLES	420001	Public Works, Mobility, & Infrastructure	1,500,000.00	Low/No Risk
354	CIP STREET SWEEPER	430002	Public Works, Mobility, & Infrastructure	1,405,000.00	Low/No Risk
355	TRANSFER TO CIP	521001	Transfers	2,503,934.00	Low/No Risk
357	INTERFUND OPERATING TRANSFERS	521000	Transfers	8,112,803.00	Changes in the Operating Environment
362	PARKING DIVISION	430266	Parking Commission	4,216,324.00	Low/No Risk

95 rows × 5 columns

Figure 3.3: Flagging High Investment and High Risk Programs

Finally, flagging high-investment, high-risk programs creates a prioritization visual tool that combines spending with risk into a single table. In *Figure 3.3,* we see a Visual Studio Code output a table created with 95 rows that should be reviewed based on the current city strategic goals. Further refining of the risk types should reveal more information about which programs need to be reviewed immediately and which can be reviewed more leisurely.

Dashboard and Design Decisions

Using Power BI, I built an **interactive dashboard** designed around key questions stakeholders such as the Mayor or City Councilmembers may ask during the budget review process:

- What programs are we funding?
- Which departments manage them?
- How much do they cost?
- Are they legally mandated?
- What strategic goals do they support?

Some of the features that I built into this dashboard include:

- **Slicers that incorporate all of the key attributes** from the Program Inventory survey such as; Mandate, Service Level Requirement, Reliance Level, Cost Recovery, Trend Demand and Risk Types.

- Additional slicers that allow for further dives using **Fund, Department and Strategic Goals**
- Tooltips that highlight additional information based on current slicer settings such as **Unique Program Count by Strategic Goal, Total Budget (excluding Transfers), and Adjusted Appropriation by Department or Strategic Goals**.

Broken out into two main views, this dashboard complements Missoula's existing static budget documents by providing a dynamic, filterable view. Visualizing program inventory with expenditure status data provides an edge to any data-driven decision-making process.

The pages are named **Budget Overview** and **Budget & Program Breakdown**. In the next two sections, I will break down each of the views.

Budget Overview

The Budget Overview page provides a preview of the most essential and overarching elements of the data. At a glance, decision-makers can understand the landscape of the budget.

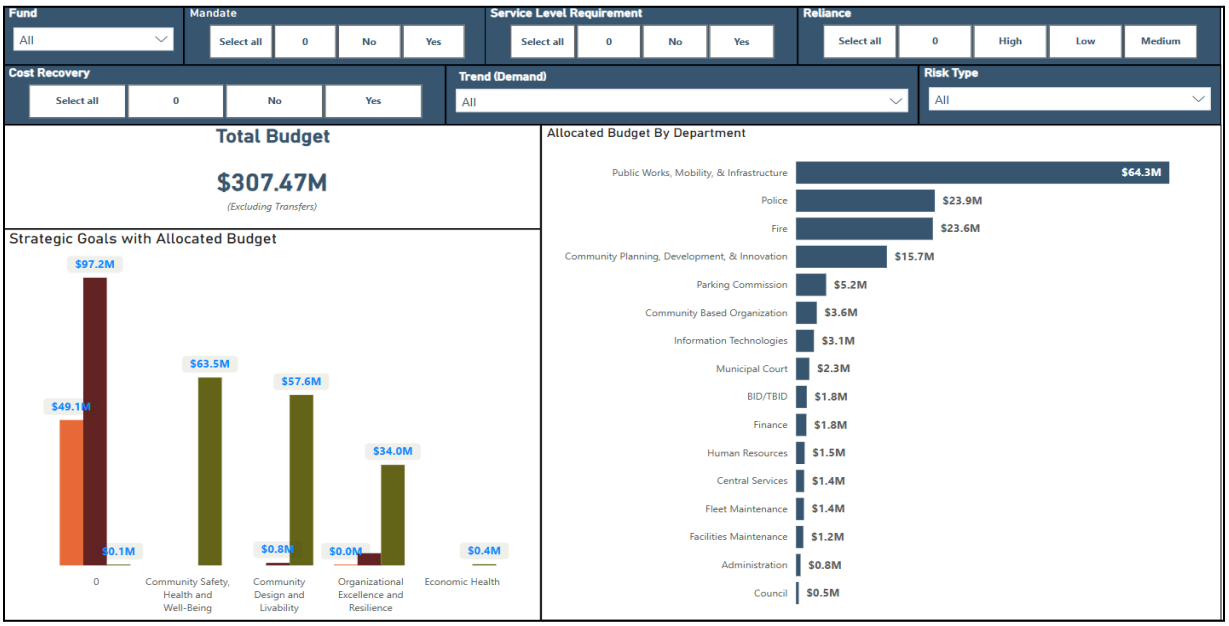
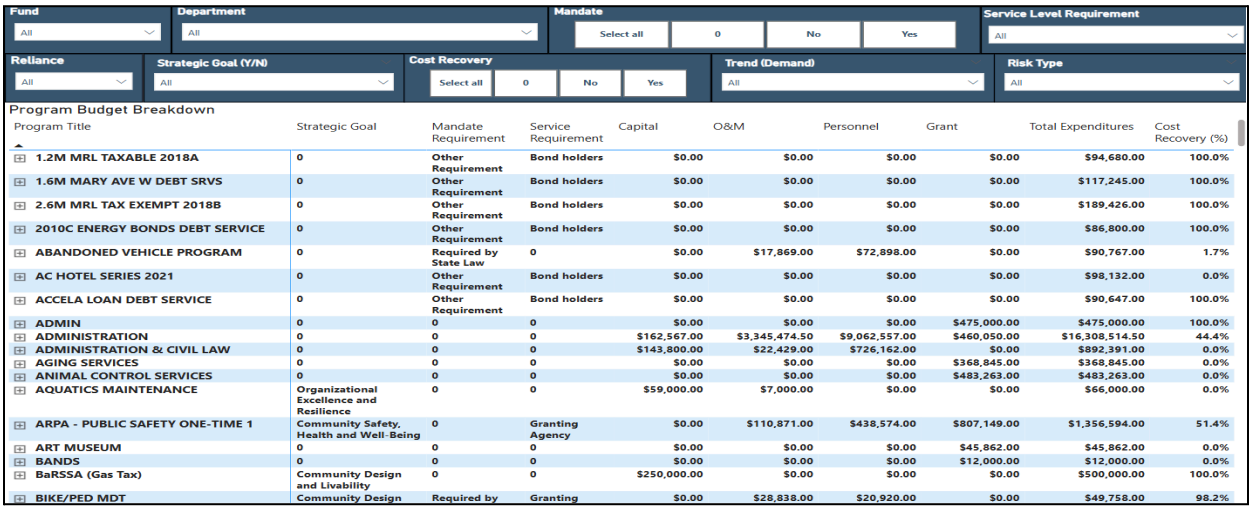


Figure 4.1: Budget Overview Tab

The total budget and granular slicers allow for deeper insight into what programs are in which departments, how much they cost and how they align with strategic goals for the City of Missoula. Hovering over one of the bars in either barchart will reveal additional insights about each section as they pertain to the filters currently in place. *Figure 4.1* portrays a view of this dashboard upon completion of this project, without any of the slicers selected.

Budget & Program Breakdown

The Budget & Program Breakdown view provides a high level view of the specific pieces of the financial information that surrounds programs and activities. This view is filterable by all of the same slicers located within the first dashboard page, with the addition of a more **prominent department and strategic goal slicer** for a more clarified view of the different programs by their title and unique activity code. Unique activity codes may have the same program titles as others across different departments. Since this is common, each main program title expands to provide a breakdown of the unique activity codes for each of the columns to the right. *Figure 4.2* provides an unfiltered view of this dashboard view.



Program Title	Strategic Goal	Mandate Requirement	Service Requirement	Capital	O&M	Personnel	Grant	Total Expenditures	Cost Recovery (%)
1.2M MRL TAXABLE 2018A	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$94,680.00	100.0%
1.6M MARY AVE W DEBT SRVS	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$117,245.00	100.0%
2.6M MRL TAX EXEMPT 2018B	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$189,426.00	100.0%
2010C ENERGY BONDS DEBT SERVICE	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$86,800.00	100.0%
ABANDONED VEHICLE PROGRAM	0	Required by State Law	0	$0.00	$17,869.00	$72,898.00	$0.00	$90,767.00	1.7%
AC HOTEL SERIES 2021	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$98,132.00	0.0%
ACCELA LOAN DEBT SERVICE	0	Other Requirement	Bond holders	$0.00	$0.00	$0.00	$0.00	$90,647.00	100.0%
ADMIN	0	0	0	$0.00	$0.00	$0.00	$475,000.00	$475,000.00	100.0%
ADMINISTRATION	0	0	0	$162,567.00	$3,345,474.50	$9,062,557.00	$460,050.00	$16,308,514.50	44.4%
ADMINISTRATION & CIVIL LAW	0	0	0	$143,800.00	$22,429.00	$726,162.00	$0.00	$892,391.00	0.0%
AGING SERVICES	0	0	0	$0.00	$0.00	$0.00	$368,845.00	$368,845.00	0.0%
ANIMAL CONTROL SERVICES	0	0	0	$0.00	$0.00	$0.00	$483,263.00	$483,263.00	0.0%
AQUATICS MAINTENANCE	Organizational Excellence and Resilience	0	0	$59,000.00	$7,000.00	$0.00	$0.00	$66,000.00	0.0%
ARPA - PUBLIC SAFETY ONE-TIME 1	Community Safety, Health and Well-Being	0	Granting Agency	$0.00	$110,871.00	$438,574.00	$807,149.00	$1,356,594.00	51.4%
ART MUSEUM	0	0	0	$0.00	$0.00	$0.00	$45,862.00	$45,862.00	0.0%
BANDS	0	0	0	$0.00	$0.00	$0.00	$12,000.00	$12,000.00	0.0%
BaRSSA (Gas Tax)	Community Design and Livability	0	0	$250,000.00	$0.00	$0.00	$0.00	$500,000.00	100.0%
BIKE/PED MDT	Community Design	Required by	Granting	$0.00	$28,838.00	$20,920.00	$0.00	$49,758.00	98.2%

Figure 4.2: Budget & Program Breakdown Dashboard Page

This page of the dashboard includes columns that reveal the name of the strategic goal alongside the mandated and service level requirement entities. This puts

required budget allocation into a new perspective for the decision-maker, hopefully narrowing down decision processing time and making more data-driven budget cuts and allocations.

A summary of the more granular monetary details can be explained by each of the categories Capital, O&M, Personnel, Grant, and Total Expenditures.

- Capital (sum of all the **.9**** object codes)
- O&M (sum of **.2**, .3**, .5**** object codes): Office and Operation Supplies, Repairs / Maintenance, Fuel and Vehicle Accommodations. Services such as; communication and publicity related expenses, utilities, operational office expenses and subscriptions. Other fixed charges such as rent and office space accommodations.
- Personnel (sum of all "**.1****" object codes): Salary, Health Insurance, Overtime/Termination, Other Contributions, Employee Education Benefits and Retirement Contributions line item.
- Grant (sum of all "**.7****" object codes)
- Debts (not shown) are the sum of all "**.6****" object codes.

I encourage you to ***interact with this live dashboard***, at your convenience. It will most likely be updated with the most current Fiscal Year data.

As a reminder, the full data definitions are included at the end of the report in the Appendix.

Outcomes

The cleaned data and dashboard unlock multiple benefits:

- Department heads can quickly reference programs and costs.
- Councilmembers can explore investments by strategic priority.
- Staff and the public can assess whether programs are mandated or elective.
- All parties can better understand where City resources are going and why.

By tying financial and narrative data together, this work strengthens Missoula's capacity for informed, transparent governance.

Limitations

Current limitations can also be viewed as tomorrow's greatest opportunities for improvement. In the next section I will discuss the current limitations of this project as of May 2025. I believe some of these limitations can be quick fixes, while some of the others may require more decision-making and advocating for change within infrastructure and accessible tools and resources at the City-level.

- **Single-year focus**: Currently, the data can bring into focus, a single year of data at any time. This creates a limited understanding of historical information, and makes it difficult to forecast different ideal outcomes. Program Inventory data intake is a main factor of this limitation as the form does not include a year identifier at time of submission. If the intake form was modified to include this piece of data, another view of year-over-year comparisons would greatly enrich this information. Historical and future data would allow for trend analysis available at a glance and a more accurate picture of year over year comparisons.
- **Manual survey input**: Some Program Inventory fields are subjective with long and lengthy information about specific programs and inconsistently filled. This creates a boundary between understanding a uniformed approach to long-winded, or very wordy descriptions of data and programs. This information is essential for getting a full understanding of any given program or activity. It would be more useful to comprehend the information in less time than it currently would.
- **Manual pieces in the process could lead to a breakdown in the pipeline due to human error**. While the process is straightforward, things can break. A mistake in the type of report downloaded, or the cleaned files just don’t make it to the right folder to update the dashboard. Sometimes errors happen.

Still, these are surmountable challenges. Advocating for future iterations of both data collection and data cleaning versions can address these gaps as more time is invested in this project and further decision-making processes at the City-level.

Recommendations

If this project were to support refinement in the entire process, from data collection to final dashboarding view, there are a few key recommendations I might provide. These recommendations could greatly benefit future versions of this project and provide more robust, at-a-glance information. Rich with context and unlock further potential in how the City may approach budget decisions in the future.

1. **Continue annual Program Inventory Data collection** with stronger formatting standards and more robust feedback provided. Supporting year-over-year data input would greatly improve and unlock further understanding in data visualization possibilities as well. Forecasting and historical understanding would greatly improve the function of the dashboard as a whole and provide a great asset. Greater uniformity in collecting descriptive data would allow for further visual creation and increase the comprehensiveness of the finer details that lay in context-rich, but lengthy descriptions. Investing in the data collection process with outcomes in mind, will also benefit the decision-makers using the tools created in this project and following through with the formal proceedings of adopting the budget. Creating a positive experience that limits information overload and decision fatigue will allow them the cognitive attention to focus on more efficient and strategic decision-making. ***Note that if the intake form is modified in the future; I highly recommend that the code be reviewed*** to ensure any hard coded variables are not negatively impacted in the cleaning and visualization of this data. Additionally, a new view that can accommodate year-over-year time-series insights, and perhaps even a forecasting aspect would need to be created to take advantage of some of the benefits of including year data alone.
2. **Advocate for Building KPIs** for evaluating program effectiveness. Investing in creating measurements that allow for greater interpretation would only benefit decision-makers and increase transparency in how decisions are made regarding cuts and increases.
3. **Remove the opportunity for human error** by increasing the efficiency of the cleaning to dashboard pipeline to truly support a more automated approach to reporting. While this project does include the step by step process, it is not foolproof entirely. There are still many manual steps that need to take place for the pipeline to work. Investing in the ability to create a direct pipeline from the Workiva and Tyler Edens through a transformative process and then automatically updating the Power BI Dashboard is highly ideal. Overtime, this process could be improved with time and attention.

Access to tools that will make this process easier, and advocating for access to common updated tools such as Python, Power BI and others.

4. **Including Revenue data** for a comprehensive, complete and fully informative view of the total budget and how it aligns with the program inventory survey responses. Investing more time to include the revenue data into the data cleaning pipeline and then incorporating this into the dashboard in a visual way would only enhance the data being reviewed. Once this information is incorporated, more granular information can be extracted to describe an incredibly detailed narrative of the data.

Project Handover

This project officially came to a close on May 5, 2025. While the original work behind the project will remain in the GitHub Repository, the City of Missoula supports the project in their infrastructure through the use of free and easy to use tools that are compatible with their technical requirement standards.

The handover of the working tools and training materials included a detailed step-by-step document that outlined the manual and automated pieces of updating this project annually. Any City-trained staff will be able to follow the five stage process and update the dashboard for use each year if current conditions don't change. If you'd like to explore this document, you can **review the entire step-by-step documentation** in the GitHub Repository. Please note that access to certain pieces of implementation will be internalized and not provided unless you are a city-trained employee who has been assigned this task. Other portions of the project are definitely accessible to the public including the GitHub Repository, Written Product and the Dashboard.

Conclusion

The question this project answers is simple: *How do we make Missoula's budget easier to understand and more connected to what matters?*

Through methodical data cleaning, thoughtful data integration, and strategic dashboard design, this work transforms disconnected spreadsheets into a centralized, user-friendly view of the City's operations. But more than that, it creates a narrative framework that connects budget numbers to community

outcomes. It is imperative that meaning is created alongside efficiency in understanding what is truly going on behind Missoula's financial information.

In a time when residents expect the government to be both responsive and responsible, this project equips decision-makers with tools that promote clarity, context, and confidence. This project enhances internal workflows, supports strategic alignment, and lays the foundation for a more participatory budgeting process in future fiscal years to come.

The work delivered through this capstone, a unified dataset and interactive dashboard, is simply a starting point to greater iterations to come. It opens new possibilities for performance analysis, program evaluation, and truthful and interactive data storytelling. With continued development and institutional support, this project can truly evolve into a vital pillar of Missoula's approach to transparent governance and fold into their frequent tools for making budgetary decisions.

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Their combined wisdom and encouragement helped shape a project that I hope will continue to deliver value to the City of Missoula and its residents.

Appendix A: Program Inventory Fields

Field	Description
fund	Financial fund supporting the program
dept_no	Department code; formerly “Org”
activity	Code for program function or financial activity
program_title_h8	Program or service name
requested_title_change_i9	Suggested title changes by departments
department_h6	Department managing the program
ftes_h36	Full-Time Equivalent staff assigned
personnel_g27	Budget for salaries and compensation
o&m_g28	Operational and maintenance costs
debt_g29	Debt service obligations
grant_g30	Grants paid to other organizations
transfers_g31	Transfers between funds/departments
capital_g32	Capital expenditures (e.g., infrastructure)
total_expenditures_g33	Total budgeted cost of the program
cost_recovery_e58_yn	Whether costs are offset by revenue
cost_recovery_p24_percent	Percent of cost recovered
description_e12	Program purpose and community benefit
additional_activities_e20	Notes on extra roles or services
mandate_e41_yn	Whether the program is legally mandated
mandate_h41_entity	Authorizing entity (federal, state, court)
mandate_e43_descript	Rationale for legal mandate
service_requirement_e47_yn	Whether external service rules apply

service_requirement_h47_entity	Regulatory agency name
service_requirement_e49_descript	Justification for service requirement
reliance_e53_level	Community dependence or disruption risk
reliance_e55_high_descript	Description of high reliance factors
strategic_goal_e64_yn	If aligned with a strategic goal
strategic_goal_e66_name	Name of strategic goal supported
strategic_goal_e68_action_descript	Description of actions taken
strategic_goal_e74_additional_activities	Additional details on goal support
strategic_goal_e80_2nd_additional_activities	Secondary supporting info
trend_demand_e87_level	Demand trend (growing, stable, etc.)
trend_demand_e89_descript	Explanation of demand level
risk_e93_type	Short-term risks (funding, legal, etc.)
risk_e95_descript	Additional risk context

Appendix B: Program Inventory Fields

Field	Description
adjusted_appropriation	Final amended budget for each line item
fund_no	Four-digit code for funding source
dept_no	Three-digit department code
activity_code	Unique six-digit program code
object_code	Three-digit expense category
sub_object_code	Further subcategory of object code
account_description	Descriptive label for expense
department	Full name of the associated department