Data Warehousing & Business Intelligent

(IT)

3rd Year, 1st Semester

Assignment 2

Submitted to

Sri Lanka Institute of Information Technology

Bachelor of science Special Honors Degree in Data Science

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Weekday Batch

Step 1-*Description Of The Data Set*

San Francisco Building permits - *kaggle.com*

I selected the San Francisco Building Permits as the data set. It consists of a large CSV file with a small xlsx file. Furthermore , I have partitioned the large CSV file into small sub CSV files. The sub CSV files consists of new IDs.

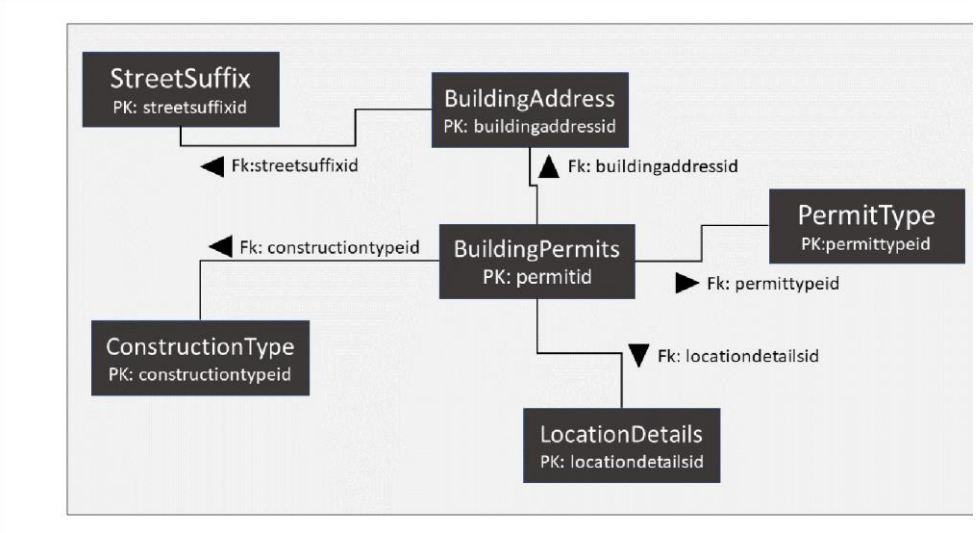
A building permit is an official approval document issued by a governmental agency that allows San Francisco's contractor to proceed with a construction or remodeling project on one's property. San Francisco has its own office related to buildings, that can do multiple functions like issuing permits, inspecting buildings to enforce safety measures, modifying rules to accommodate needs of the growing population etc.

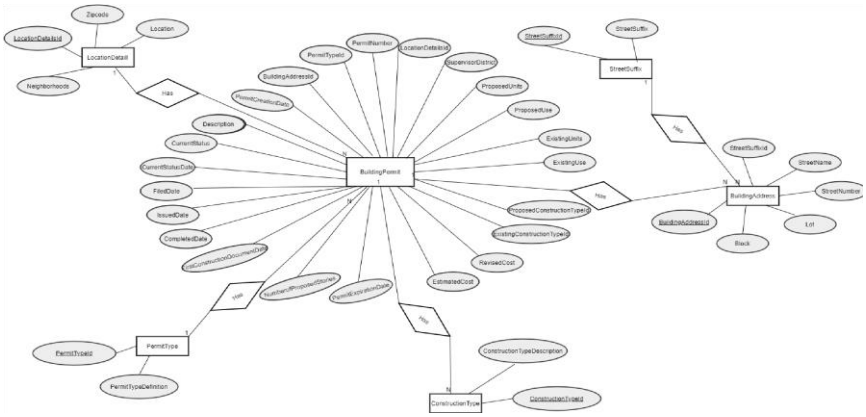
Reason for importance :- In the recent past, main discrepancy in demand and supply in real estate industry is due to delays in issuing building permits

Data set has these files named :

- Building_Permits.csv
- DataDictionaryBuildingPermit.xlsx

ER Diagram



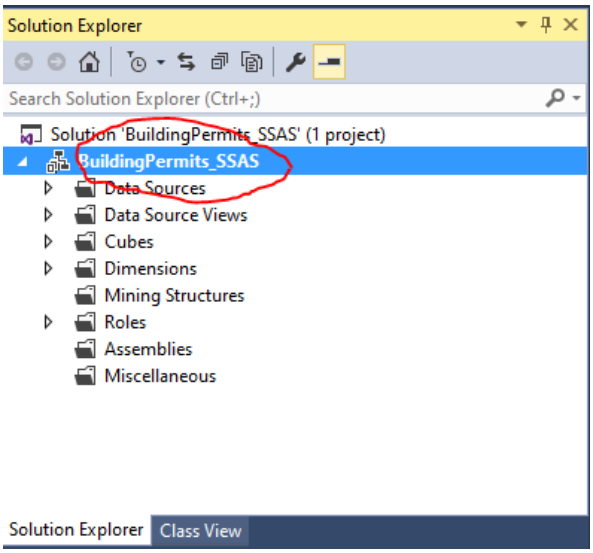


STEP 2 : SSAS Cube implementation

Creating the SSAS project

1.Firstly I opened the Visual Studio Data Tool in 'Administrator ' mode

2.Then I created an **Analysis Service** project. I created a new project named **"BuildingPermits_SSAS"** as a project based on Analysis Services Multidimensional and Data Mining Project.



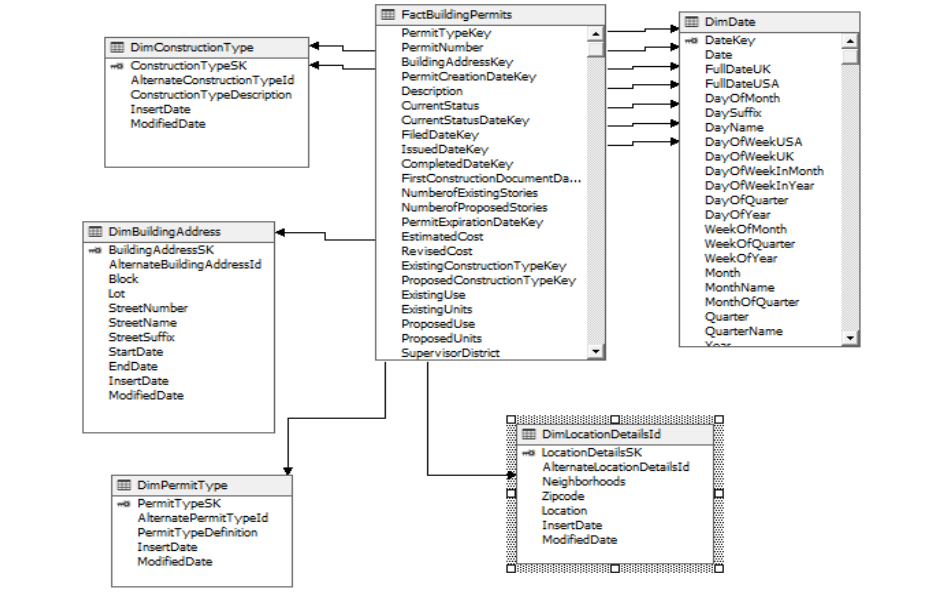
3.Then I Created a Data Source

- I right clicked on Data Sources in and selected New Data Source

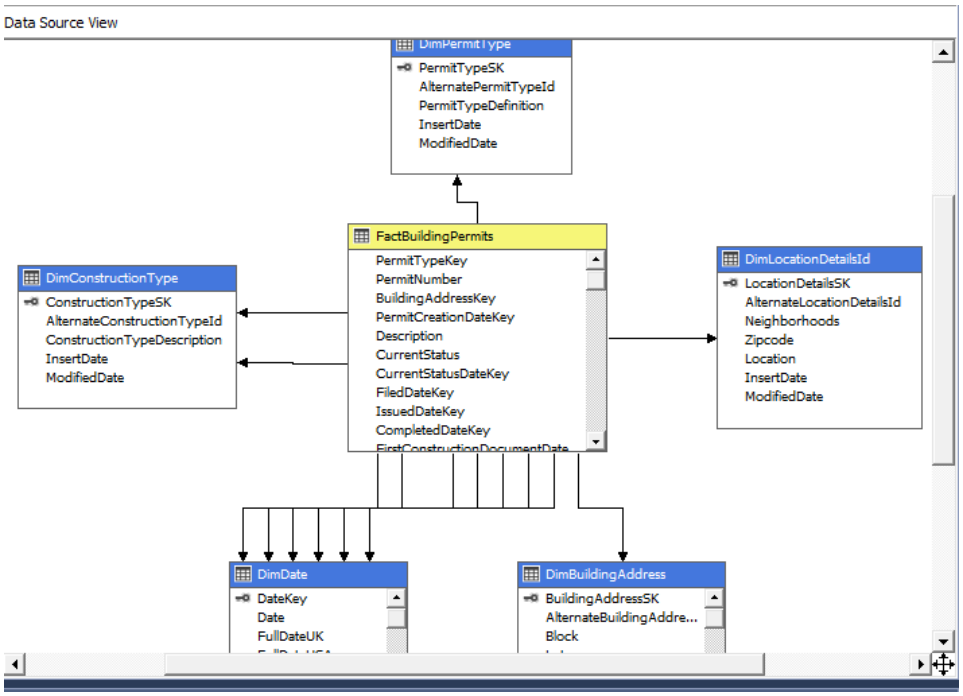
4. After that I created a Data Source View

- I Right clicked on Data Source Views and select New Data Source View… and gave necessary details.
- In the **Select Tables and Views page,** first I clicked on 'FactBuildingPermits (dbo)'and clicked **on >** button to move it to the Included objects window. Then I clicked on Add Related Tables button. Then I added

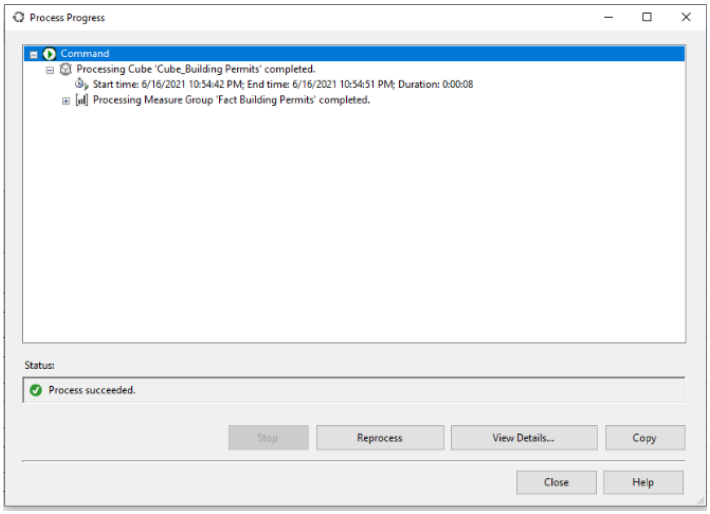
all the tables to the Included objects window by clicking >> button. Then I Clicked Next.After that I Provided a data source view name; **'DSV_Building Permits Data Warehouse'** and clicked Finish.



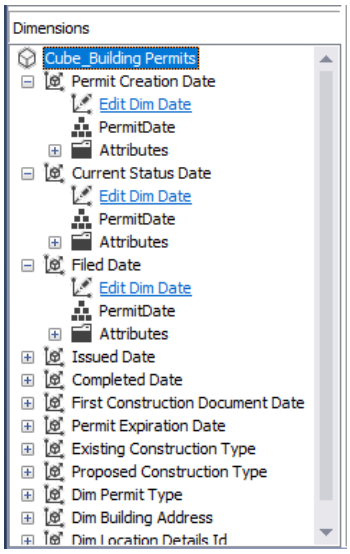
4.Then I created a Cube



After, I added those data to SQL Management studio under Analysis.



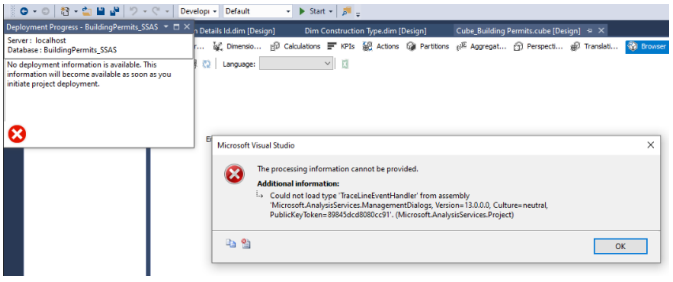
- Dimension Section



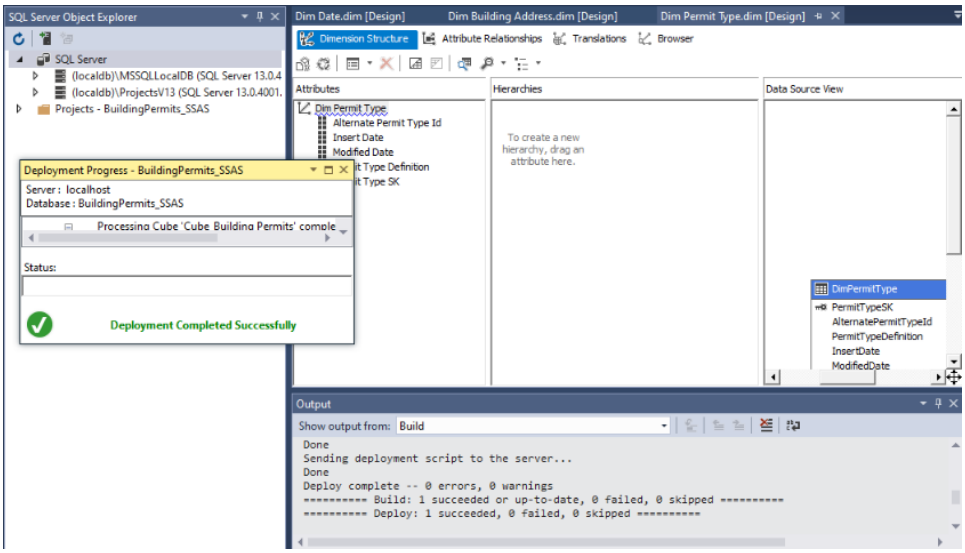
5. After creating the cube I Deploied the Cube

I) Right click on the project name, **'BuildingPermits_SSAS'** in solution explorer, and click on Deploy **.**

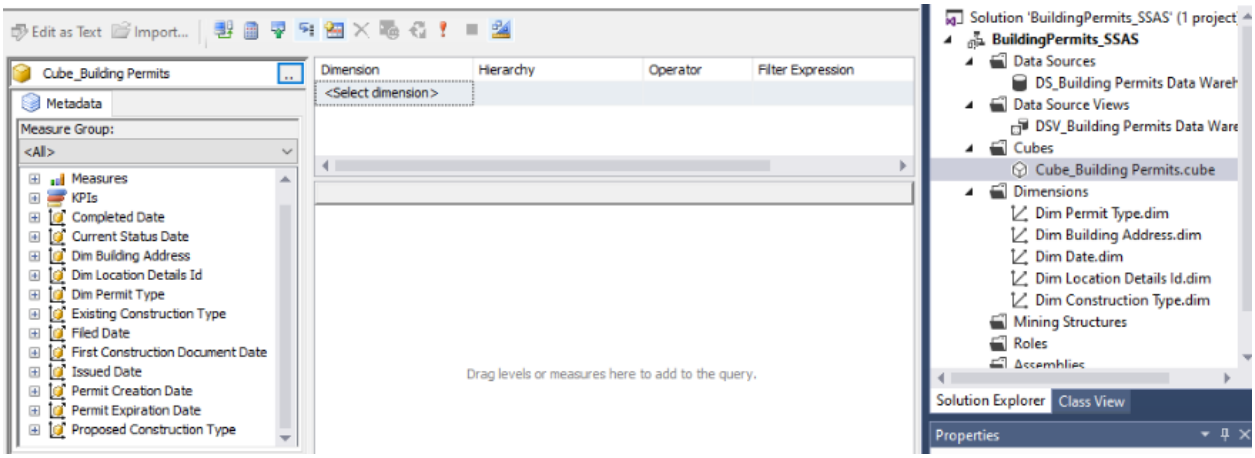
After that I saw a pop-up window displaying the deployment completed successfully.



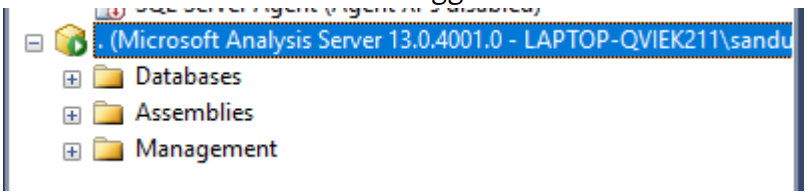
Before getting success I got this error .But I successfully solved that problem.



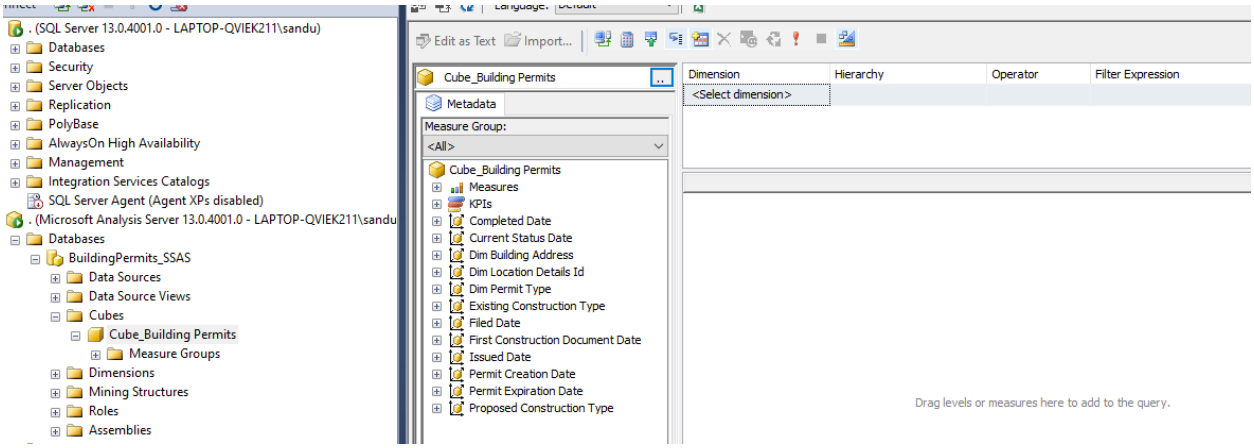
- Once successfully deployed, Browser tab under '**Cube_BuildingPermits**' design window ('**Cube_BuildingPermits.cube [Design]**'), will have the attributes of the model on the left hand side, where you can drag and drop the into the design area on the right hand side and do some test analysis.



- To check the deployment in SSMS, I opened SQL Server Management Studio, then I clicked on Connect and select Analysis Services. I Provided credentials and logged in.

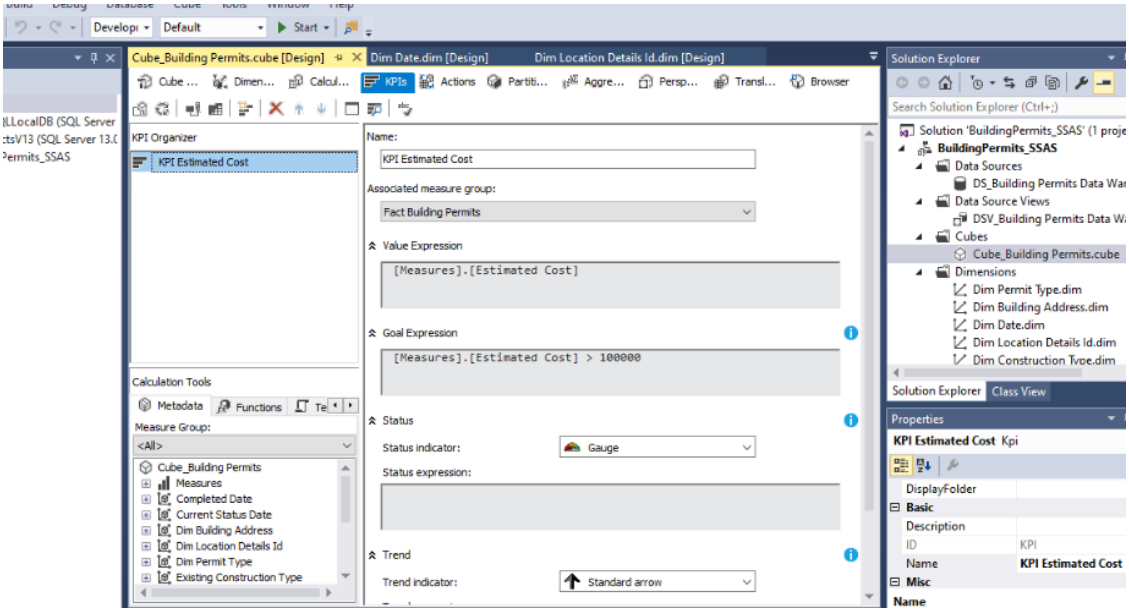


I expanded Databases, '**BuildingPermits_SSAS**', and right click on '**Cube_BuildingPermits**' and select Browse.

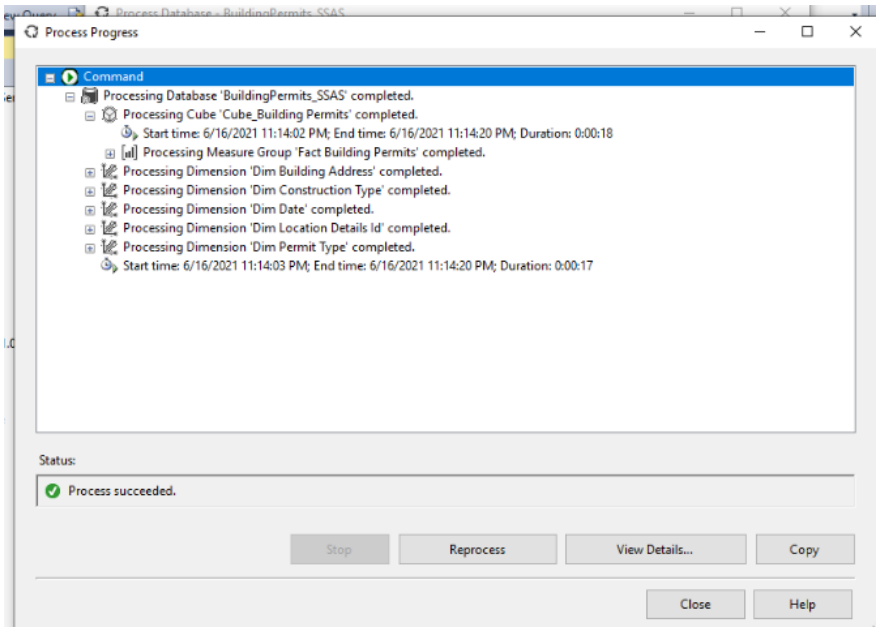


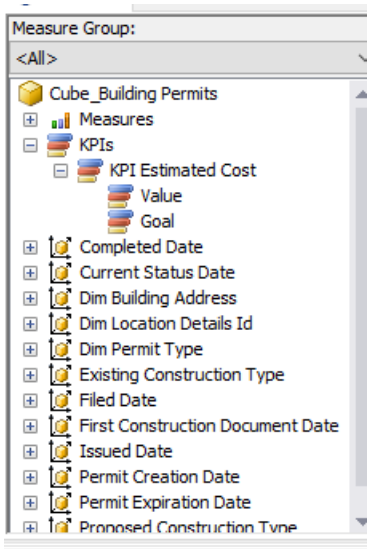
6. After that I created a KPI

I went back to Data Tools, located and went to KPIs tab in '**Cube_BuildingPermits**' design window ('**Cube_BuildingPermits.cube** [Design]'). In the KPIs tab, above KPI Organizer panel, located and clicked on New KPI button. I Named the KPI as 'KPI Estimated Cost', then selected 'Fact Building permits' as the Associated measure group and I gave the necessary details in the shown below.

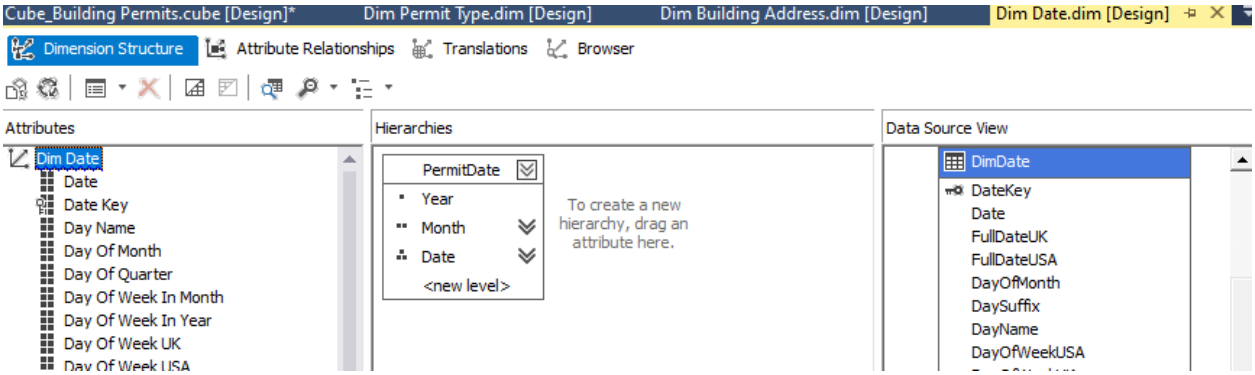


In order to update the cube, I right clicked on the cube name in the Solution Explorer; '**Cube_BuildingPermits.cube**' and clicked Process.





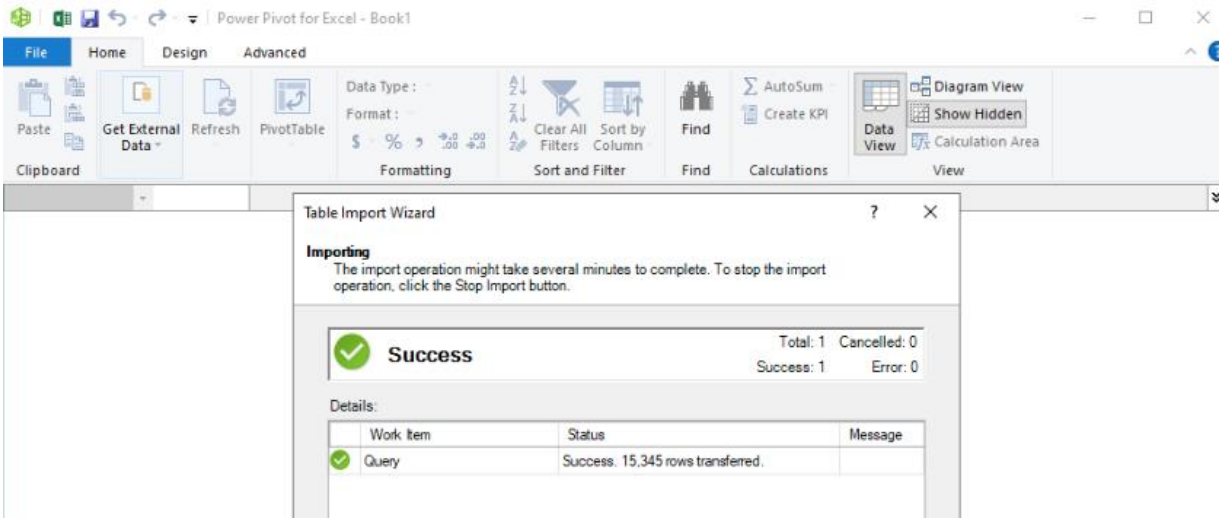
When I designing the cube ,I implemented a hierarchy for the date dimension



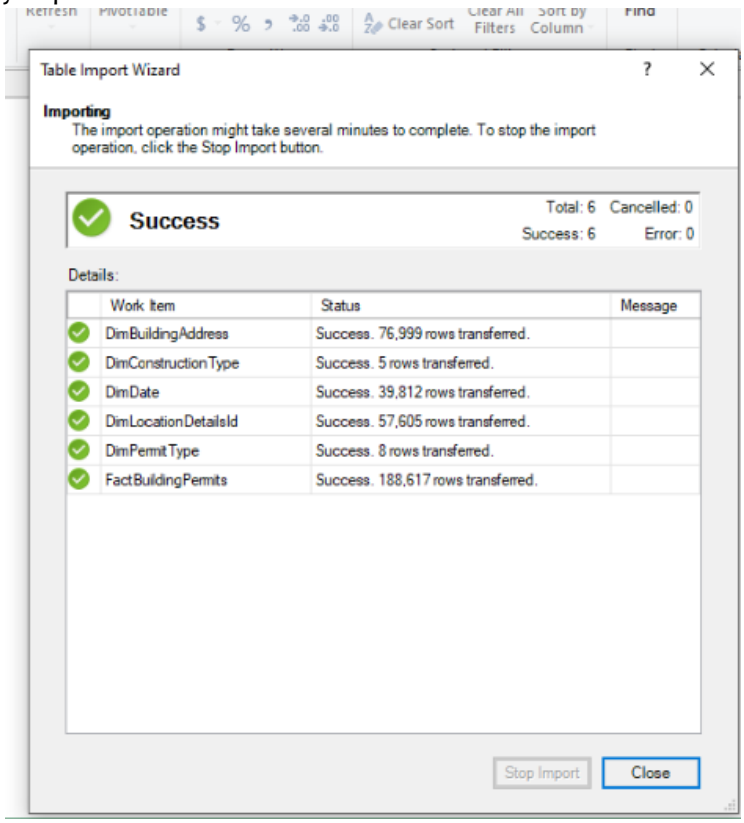
STEP 3 : Demonstration of OLAP operations

i) Connecting Excel to SSAS Cube using a MDX Query

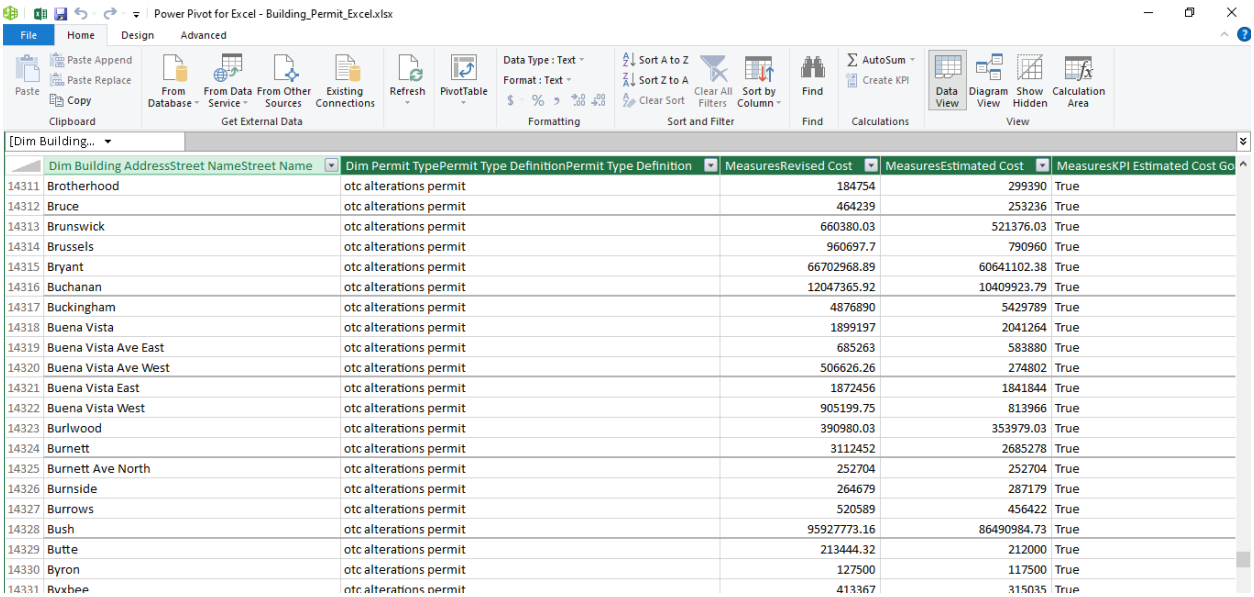
- I Expanded the '**BuildingPermits_SSAS**' project, and then Cubes Folder to locate the cube i created; '**Cube_BuildingPermits**'. Then Right clicked on the '**Cube_BuildingPermits**' and selected Browse to open the Browser window. Then I Dragged and dropped necessary fields to create an analysis. In order to get the MDX query,I executed them and clicked design mode button.Then MDX query was be available.
- In order to use MDX queries, Excel must have an add-in called Power Pivot.So I enabled power pivot and went to new tab POWERPIVOT and clicked on Manage. A new Excel window opened and In the home tab of this new window, clicked on **Get External Data -> From Database-> From Analysis Service or Power Pivot**. In the Table Import Wizard window,I provided connection details to connect to SSAS Server and provided the database name ('**BuildingPermits_SSAS**'), then tested the connection, and clicked **Next >** button. In the next window, I pasted the MDX query i copied, and clicked on Validate button to ensure there are no errors, and clicked Finish.



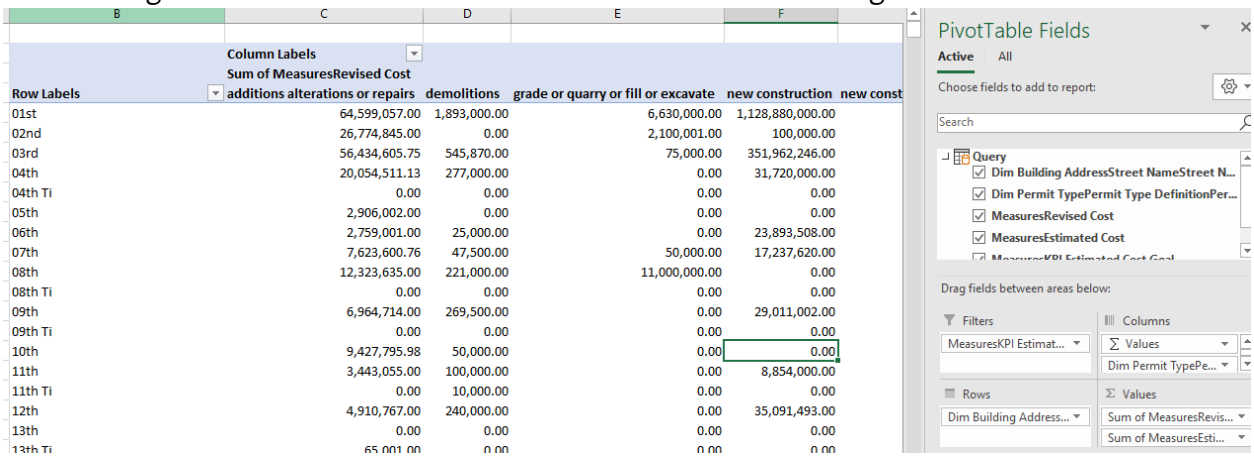
- Successfully imported dimension table and fact table data of the cube



- Then I could see an excel sheet shown below

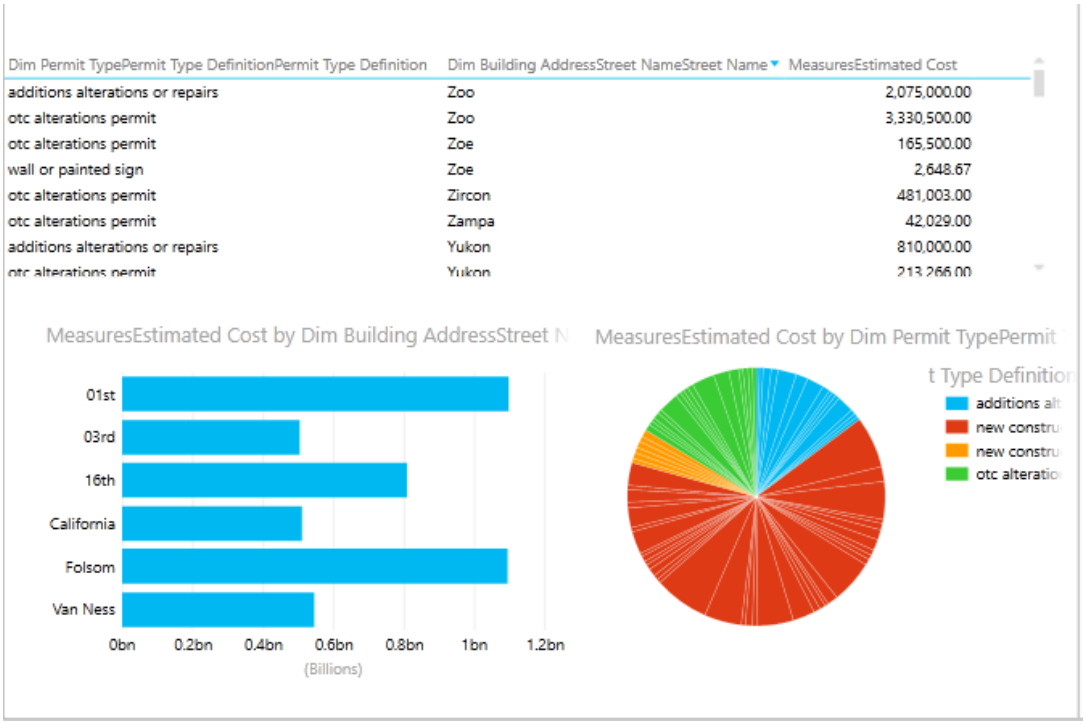


- After that I generated a Pivot Table area in POWERPIVOT tab in the original Excel workbook



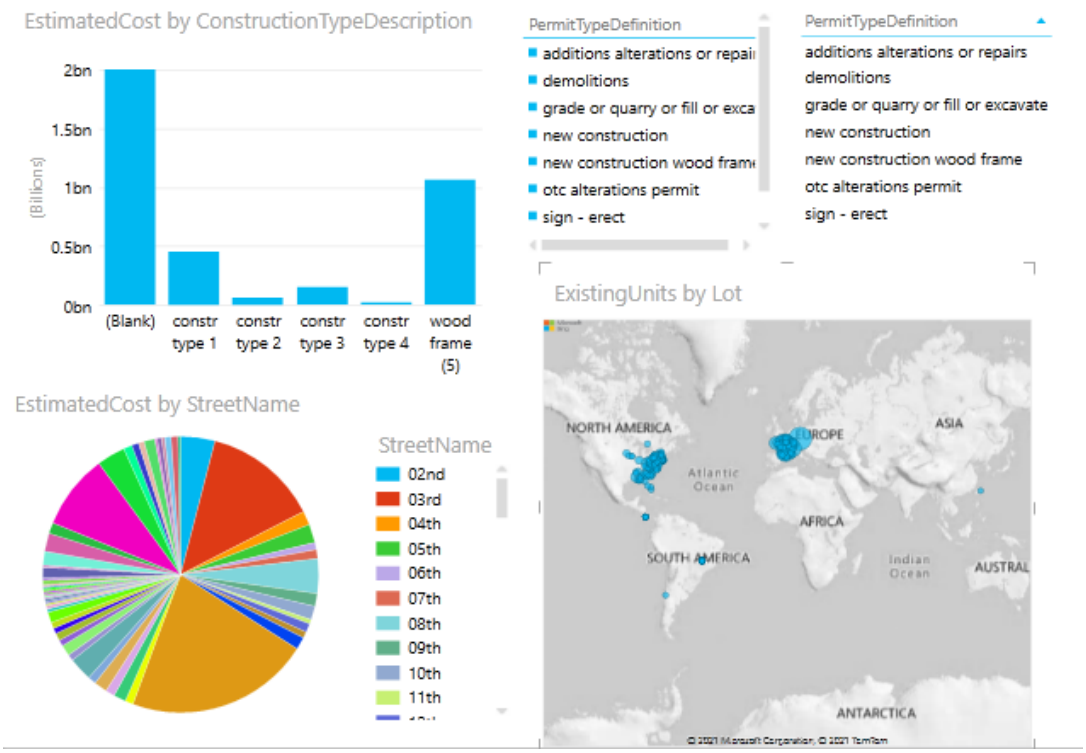
Row Labels	Sum of MeasuresRevised Cost: additions alterations or repairs	demolitions	grade or quarry or fill or excavate	new construction	new const
01st	64,599,057.00	1,893,000.00	6,630,000.00	1,128,880,000.00	
02nd	26,774,845.00	0.00	2,100,001.00	100,000.00	
03rd	56,434,605.75	545,870.00	75,000.00	351,962,246.00	
04th	20,054,511.13	277,000.00	0.00	31,720,000.00	
04th Ti	0.00	0.00	0.00	0.00	
05th	2,906,002.00	0.00	0.00	0.00	
06th	2,759,001.00	25,000.00	0.00	23,893,508.00	
07th	7,623,600.76	47,500.00	50,000.00	17,237,620.00	
08th	12,323,635.00	221,000.00	11,000,000.00	0.00	
08th Ti	0.00	0.00	0.00	0.00	
09th	6,964,714.00	269,500.00	0.00	29,011,002.00	
09th Ti	0.00	0.00	0.00	0.00	
10th	9,427,795.98	50,000.00	0.00	0.00	
11th	3,443,055.00	100,000.00	0.00	8,854,000.00	
11th Ti	0.00	10,000.00	0.00	0.00	
12th	4,910,767.00	240,000.00	0.00	35,091,493.00	
13th	0.00	0.00	0.00	0.00	
13th Ti	65,001.00	0.00	0.00	0.00	

- By creating Power View dashboards, I demonstrated OLAP operations
  - ❖ **DashBoard 1**



Dim Permit TypePermit Type DefinitionPermit Type Definition	Dim Building AddressStreet NameStreet Name	MeasuresEstimated Cost
additions alterations or repairs	Zoo	2,075,000.00
otc alterations permit	Zoo	3,330,500.00
otc alterations permit	Zoe	165,500.00
wall or painted sign	Zoe	2,648.67
otc alterations permit	Zircon	481,003.00
otc alterations permit	Zampa	42,029.00
additions alterations or repairs	Yukon	810,000.00
otc alterations permit	Yukon	213,266.00

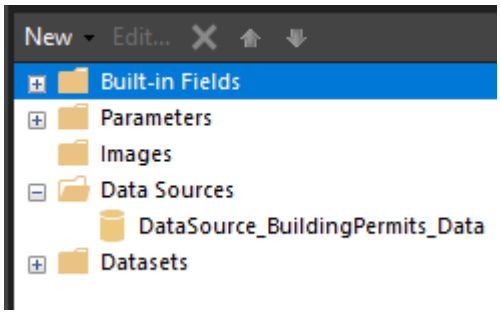
  - ❖ **DashBoard 2**



STEP 4 : SSRS Reports

i) Firstly I created a Data Source

Firstly I Opened Report Builder tool. Then I Right clicked on the Data Sources and clicked Add Data Sources… to openup the Data Source Properties window. Then Provided a data source name; **'DataSourse_BuildingPermits_Data'**, and selected **Use a connection embedded in my report**. After that Selected **Microsoft SQL Server** as the connection type. Clicked on the **Build…** button to create the connection. I created the connection to the **'BuildingPermits_Datawarehouse'**



ii) Then I created a Dataset

I right clicked on the Datasets and clicked Add Dataset… to open up the Dataset Properties window.Then I gave the necessary details .

In the Query section, I designed a query shown below.

Query type:

(•) Text ( ) Table ( ) Stored Procedure

Query:

```
select
fbp.NumberofExistingStories,fbp.NumberofProposedStories,fbp.RevisedCost,
fbp.EstimatedCost,fbp.ProposedUnits,fbp.ExistingUnits,dpt.PermitTypeDefinitio
n,dld.Location,dd.Year,dd.MonthName,dd.Quarter,dd.WeekOfMonth,dd.DayNa
me,
dct.ConstructionTypeDescription,dba.StreetName,dba.Block
from [dbo].[FactBuildingPermits] fbp
inner join [dbo].[DimBuildingAddress] dba on fbp.[BuildingAddressKey] =
dba.BuildingAddressSK
inner join [dbo].[DimConstructionType] dct on fbp.
[ProposedConstructionTypeKey] = dct.[ConstructionTypeSK]
inner join [dbo].[DimDate] dd on fbp.[PermitCreationDateKey] = dd.[DateKey]
inner join [dbo].[DimLocationDetailsId] dld on fbp.[LocationDetailsKey]= dld.
[LocationDetailsSK]
inner join [dbo].[DimPermitType] dpt on fbp.[PermitTypeKey]=dpt.[PermitTypeSK]
```

Query Designer... | Import... | Refresh Fields

Then I created several datasets and parameters according to the generating reports. So I created several reports based on various data.

Report with a matrix

BuildingPermits-wise YOY Report

Permit Type Definition	2012	2013	2014	2015	2016	2017	2018	Total
	Total	Total	Total	Total	Total	Total	Total	
additions alterations or repairs	1800.0000	1237435180.5200	898285837.5400	1005152543.9600	628962674.3300	611960287.7700	2633000.0000	4384431324.1200
new construction		1533537407.0000	2110927565.0000	2604756299.0000	4242901898.0000	850692969.0000		11342816138.0000
new construction wood frame	6353360.0000	366533176.0000	291349111.1600	365770092.9900	433870368.0000	77102247.5200	2450000.0000	1543428355.6700
otc alterations permit	51001.0000	976466814.1700	1009454043.4700	1378685962.7300	1194062671.0900	1134272060.0600	2647539.0000	5695640091.5200
Total	**6406161.0000**	**4113972577.6900**	**4310016557.1700**	**5354364898.6800**	**6499797611.4200**	**2674027564.3500**	**7730539.0000**	**22966315909.3100**

Matrix with one parameter

Permit Type: wall or painted sign, otc alte

View Repor

ConstructionType-wise YOY report

Construction Type Description	Permit Type Definition	2012 Estimated Cost	2012 Revised Cost	2013 Estimated Cost	2013 Revised Cost	2014 Estimated Cost	2014 Revised Cost
constr type 1	otc alterations permit	1.0000	1.0000	513268878.7500	540604318.2400	525758200.1500	597850718.6000
constr type 2	otc alterations permit			45870858.3800	48303077.2900	44734133.0600	52583276.0000
constr type 3	otc alterations permit	15000.0000	30000.0000	81453116.1400	90690108.1800	87618725.0000	100357427.1300
constr type 4	otc alterations permit			2845717.0000	3564741.0000	2855006.5000	3423780.5000
wood frame (5)	otc alterations permit	36000.0000	36000.0000	398313633.6100	434275223.7000	426545052.6500	502252220.4300
Total		51001.0000	66001.0000	1041752203.8800	1117437468.4100	1087511117.3600	1256467422.6600

Matrix with two parameters

Permit Type: wall or painted sign, otc alte | Construction Type: constr type 3, constr type 4 | View Report

Construction-wise YOY report

Permit Type Definition	Construction Type Description	2012 Estimated Cost	2012 Revised Cost	2013 Estimated Cost	2013 Revised Cost	2014 Estimated Cost	2014 Revised Cost	2015 Estimated Cost	2015 Revised Cost	2016 Estimated Cost	2016 Revised Cost	2017 Estimated Cost	2017 Revised Cost
⊞ additions alterations or repairs	Total			168610401.0000	188883802.5000	56504596.2300	76516437.8000	79831239.8100	94619679.6800	86902784.5400	70223436.8900	39655363.0000	11451754.0500
⊞ new construction	Total			180743000.0000	190690456.0000	42900000.0000	95551486.0000	131772350.0000	86086021.0000	68800000.0000	63779260.0000	55700000.0000	40000000.0000
⊞ new construction wood frame	Total			6100000.0000	6275000.0000	1500000.0000	1500000.0000	500000.0000	1600000.0000	11000000.0000	11500000.0000		
⊞ otc alterations permit	Total	15000.0000	30000.0000	84298833.1400	94254849.1800	90473731.5000	103781207.6300	111773398.0000	127997303.7400	95358966.0300	111399370.4600	66078413.6600	74888515.3500
Total		**15000.0000**	**30000.0000**	**439752234.1400**	**480104107.6800**	**191378327.7300**	**277349131.4300**	**323876987.8100**	**310303004.4200**	**262061750.5700**	**256902067.3500**	**161433776.6600**	**126340269.4000**

Drill Down Reports

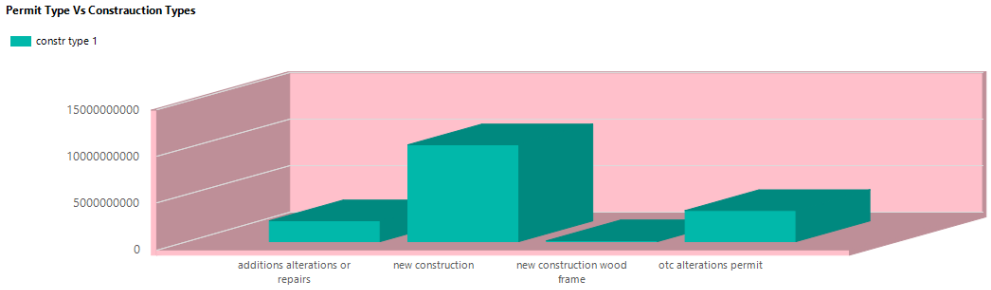
BuildingPermits-wise YOY Report

Permit Type Definition	2012 December	2012 March	2012 September	2012 Total	2013 Total	2014 Total	2015 Total	2016 Total	2017 Total
additions alterations or repairs	1800.0000			1800.0000	1237435180.5200	898285837.5400	1005152543.9600	628962674.3300	611960287.7
new construction					1533537407.0000	2110927565.0000	2604756299.0000	4242901898.0000	850692969.0
new construction wood frame			6353360.0000	6353360.0000	366533176.0000	291349111.1600	365770092.9900	433870368.0000	77102247.5
otc alterations permit		51001.0000		51001.0000	976466814.1700	1009454043.4700	1378685962.7300	1194062671.0900	1134272060.0
Total	**1800.0000**	**51001.0000**	**6353360.0000**	**6406161.0000**	**4113972577.6900**	**4310016557.1700**	**5354364898.6800**	**6499797611.4200**	**2674027564.3**

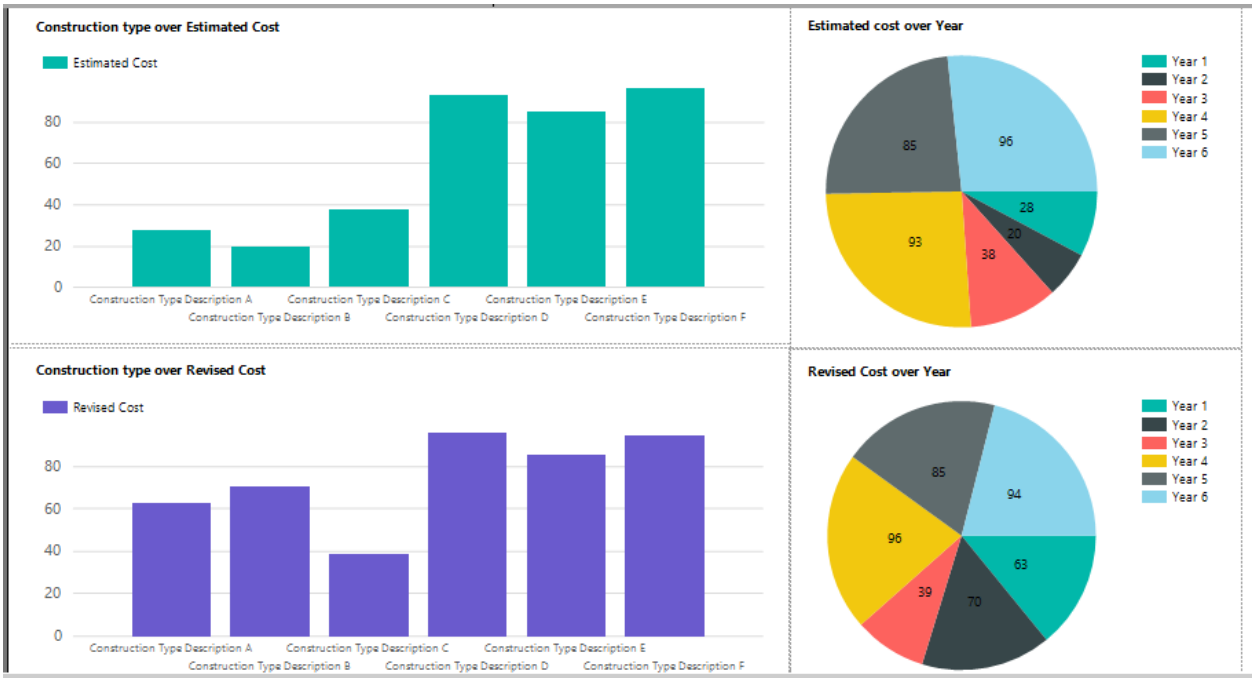
Drill through Reports

Permit type and Construction type Comparision with Revised Cost

#Error



6/25/2021 5:48:31 PM


Construction type over Estimated Cost
Estimated Cost
80
60
40
20
0
Construction Type Description A
Construction Type Description B
Construction Type Description C
Construction Type Description D
Construction Type Description E
Construction Type Description F
Estimated cost over Year
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
85
96
28
20
93
38
Construction type over Revised Cost
Revised Cost
80
60
40
20
0
Construction Type Description A
Construction Type Description B
Construction Type Description C
Construction Type Description D
Construction Type Description E
Construction Type Description F
Revised Cost over Year
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
85
94
96
63
39
70