# Complete Program Interaction Architecture Diagram

**Cook County Tax Extension COBOL System -- All 70 Programs**

This document provides a comprehensive view of every program in the Cook County Tax Extension system, organized by execution phase. It includes high-level phase interactions, detailed per-phase diagrams with file-mediated and CALL dependencies, and a shared VSAM file cross-reference.

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## Table of Contents



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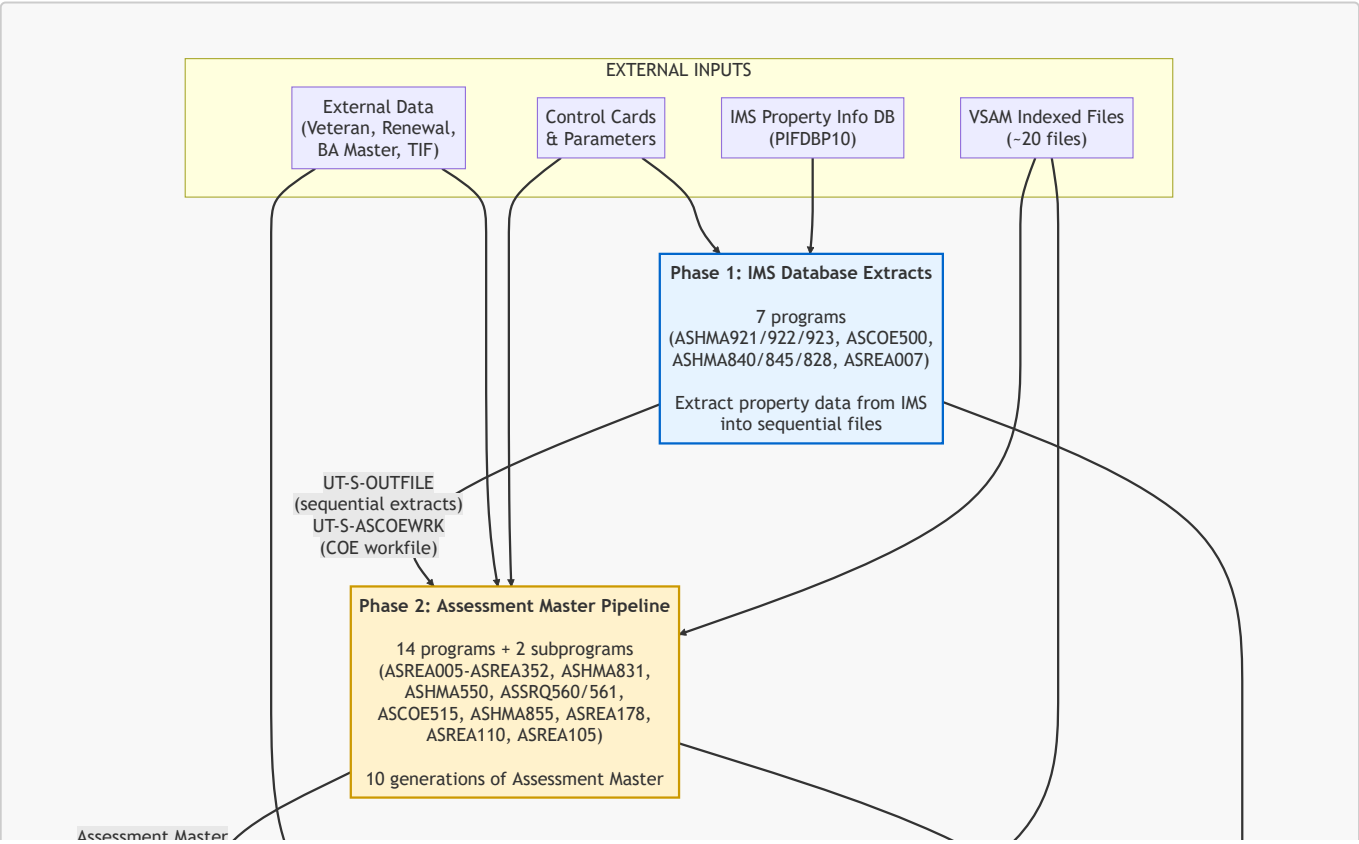
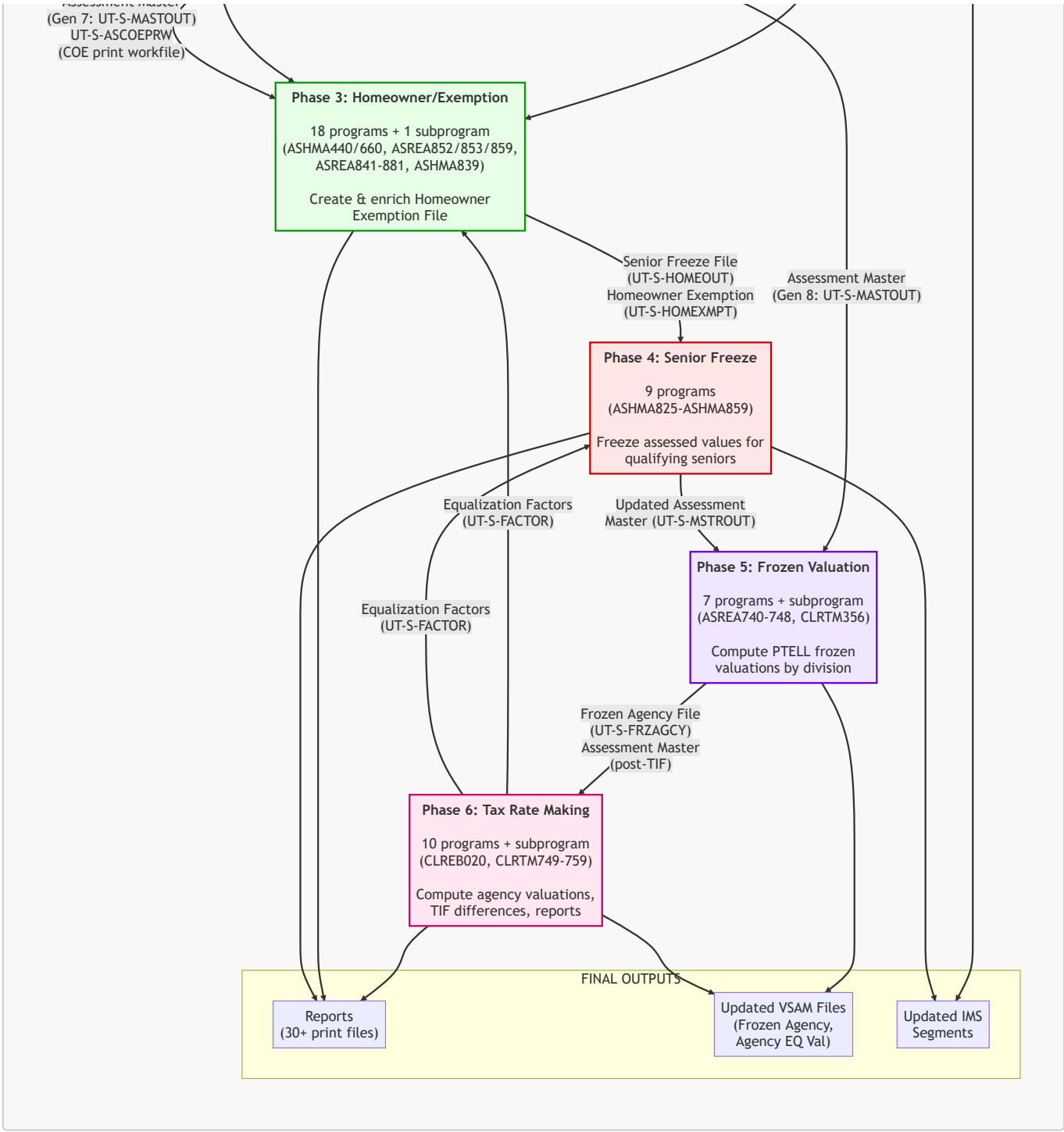
## 1. High-Level Summary Diagram

The following diagram shows the six execution phases as processing stages, with the major inter-phase data flows labeled. Each phase is a batch processing stage; data flows between phases via sequential files and VSAM datasets.






## Narrative: High-Level Summary

The Cook County Tax Extension system is a batch-oriented pipeline that transforms raw property assessment data from an IMS hierarchical database into equalized assessed valuations, frozen agency files, and tax rate computation inputs. The system executes in six sequential phases:

- **Phase 1** extracts data from the IMS Property Information Database (PIFDBP10) into sequential files. It also performs IMS maintenance operations (updates, deletions).
- **Phase 2** is the backbone of the system: the Assessment Master file flows through 10 sequential programs ("generations"), each reading the master, transforming it, and writing the next generation. By the end, the master contains validated tax codes, recomputed property classes, assessed valuations, homestead/veteran indicators, and service request assignments.

- **Phase 3** creates and enriches the Homeowner Exemption file by merging the Assessment Master with VSAM Homestead data, renewal records, property master lookups, equalization factors, and landmark processing.
- **Phase 4** processes Senior Freeze exemptions -- freezing assessed values for qualifying seniors, loading data to IMS, computing proration, and calculating base value tax differences.
- **Phase 5** computes frozen valuations for PTELL (Property Tax Extension Limitation Law) compliance, comparing current vs. prior year assessments and breaking down valuations by division and tax code.
- **Phase 6** performs tax rate making: applying taxing agencies, computing disconnected/annexed valuations, processing TIF (Tax Increment Financing) differences, and producing agency-level reports.

A critical cross-phase dependency exists: **CLREB020** (Phase 6) produces the equalization factor file that is consumed by programs in Phases 3 and 4 (ASHMA850, ASHMA855, ASHMA857). This means equalization factor editing must occur before Senior Freeze base value computation.

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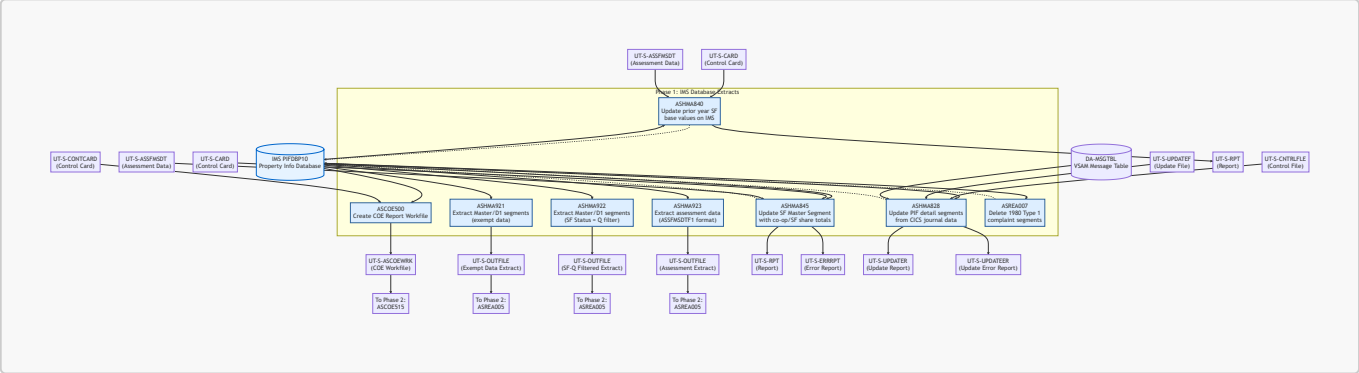
## 2. Phase 1: IMS Database Extracts

Phase 1 extracts raw data from the IMS Property Information Database and performs database maintenance. These programs require an IMS/DB runtime environment.




### Narrative: Phase 1

Phase 1 is the extraction and maintenance layer for the IMS Property Information Database (PIFDBP10). All 7 executable programs in this phase require IMS/DB runtime support (the `ENTRY 'DLITCBL'` linkage).

**Key programs and data flows:**

- **ASHMA921, ASHMA922, ASHMA923** are near-duplicate IMS extract programs. Each extracts Master and D1 (detail) segments to sequential output files, but with different filters: ASHMA921 extracts exempt data broadly, ASHMA922 filters for Senior Freeze status = 'Q', and ASHMA923 outputs in a different record format (ASSFMSDTF1). Typically, one or two run per job stream depending on which downstream processing is needed.
- **ASCOE500** extracts Certificate of Error data from IMS into a workfile (UT-S-ASCOEWRK) that feeds ASCOE515 in Phase 2.
- **ASHMA840 and ASHMA845** perform IMS update operations: ASHMA840 updates prior year Senior Freeze base values, while ASHMA845 updates the Senior Freeze Master Segment with co-op and SF share totals. Both read assessment data files and control cards.
- **ASHMA828** is a complex program with checkpoint/restart logic that updates PIF detail segments from CICS journal qualifying data. It reads a VSAM message table (DA-MSGTBL) and produces update and

error reports.

- **ASREA007** is a cleanup utility that deletes 1980 Type 1 complaint segments from IMS. It is likely obsolete and a candidate for retirement.

**Critical observation:** The sequential extract files from ASHMA921/922/923 are the starting point for the entire Assessment Master pipeline in Phase 2. Any errors in extraction propagate through every downstream phase.

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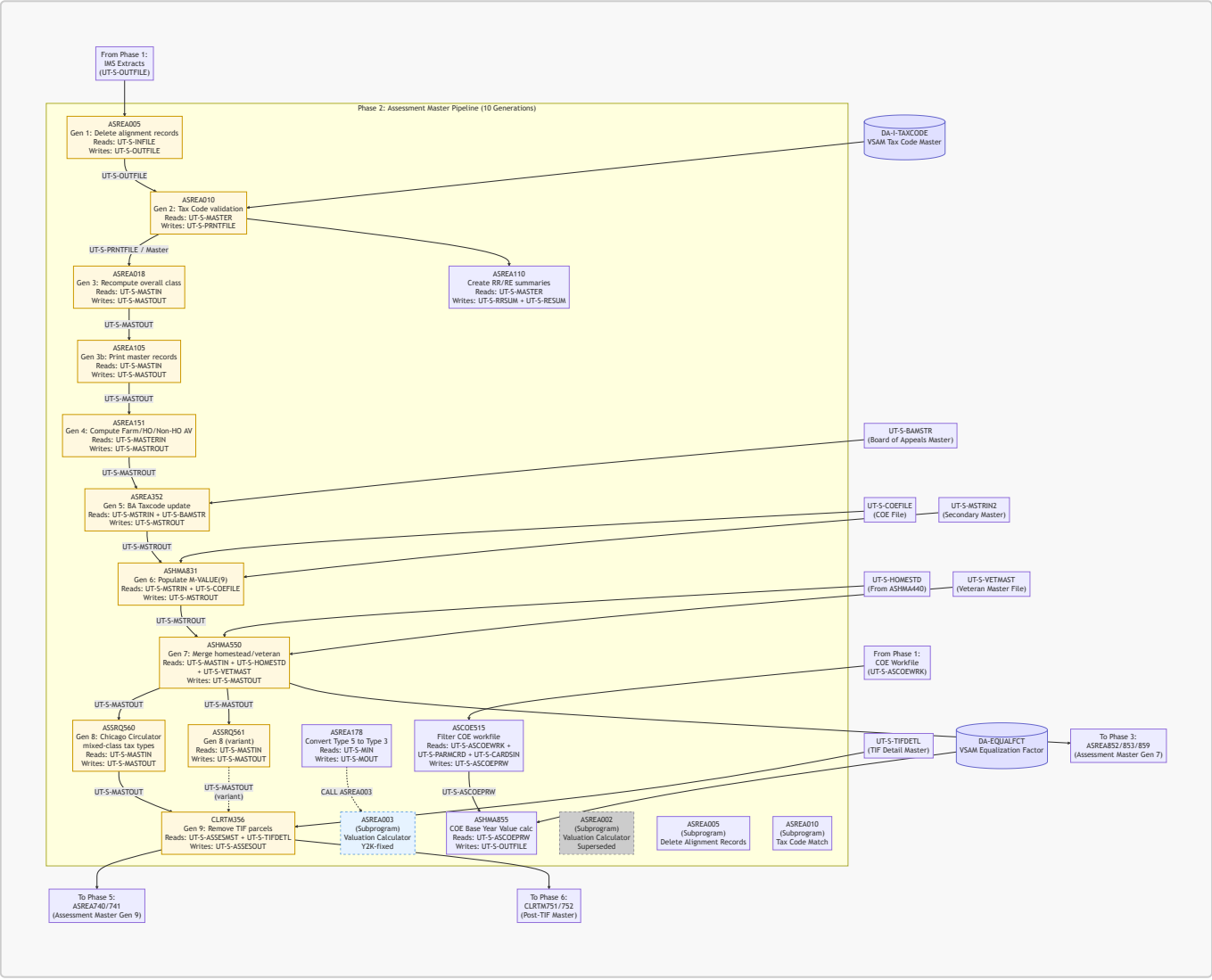
# 3. Phase 2: Assessment Master Pipeline

Phase 2 is the core of the system. The Assessment Master file flows through 10 sequential "generations," each program reading the master, applying a transformation, and writing the next generation. Two parallel sub-pipelines also operate: COE processing and Type 5-to-3 conversion.




## Narrative: Phase 2

Phase 2 is the heart of the system. The Assessment Master file -- a sequential file containing one record per property parcel -- flows through 10 programs in strict sequence. Each program reads one generation and writes the next.

**Assessment Master Generation Chain:**

| Gen | Program | Transformation |
|---|---|---|
| 0 -> 1 | ASREA005 | Remove print alignment records from IMS extract |
| 1 -> 2 | ASREA010 | Validate tax codes against VSAM Tax Code Master (DA-I-TAXCODE) |
| 2 -> 3 | ASREA018 | Recompute overall property class |
| 3 -> 3b | ASREA105 | Print/pass through master records within parameter ranges |
| 3b -> 4 | ASREA151 | Compute Farm, Homeowner, and Non-Homeowner Assessed Valuations |
| 4 -> 5 | ASREA352 | Merge Board of Appeals tax code corrections |
| 5 -> 6 | ASHMA831 | Populate current total equalized value M-VALUE(9), apply COE adjustments |
| 6 -> 7 | ASHMA550 | Three-file merge: add homestead and veteran exemption indicators |
| 7 -> 8 | ASSRQ560/561 | Assign Chicago Circulator mixed-class tax types |
| 8 -> 9 | CLRTM356 | Remove TIF district parcels for separate processing |

**Parallel sub-pipelines:**

- **ASREA110** branches off the Gen 2 master to create Railroad and Real Estate summary files.
- **ASREA178** converts Type 5 detail segments to Type 3, calling **ASREA003** (the valuation calculator subprogram) dynamically.
- **ASCOE515** filters the COE workfile (from Phase 1's ASCOE500) with 22 parameters, producing a print report workfile that feeds **ASHMA855** for base year value calculation using VSAM equalization factors.

**Subprograms in this phase:** ASREA003 (production valuation calculator) and ASREA002 (superseded predecessor). Neither executes independently; they are called via `CALL 'ASREA003'`.

**Key external inputs:** VSAM Tax Code Master (DA-I-TAXCODE), Board of Appeals Master (UT-S-BAMSTR), COE File, Veteran Master, Homestead sequential file (from ASHMA440 in Phase 3), and TIF Detail Master.

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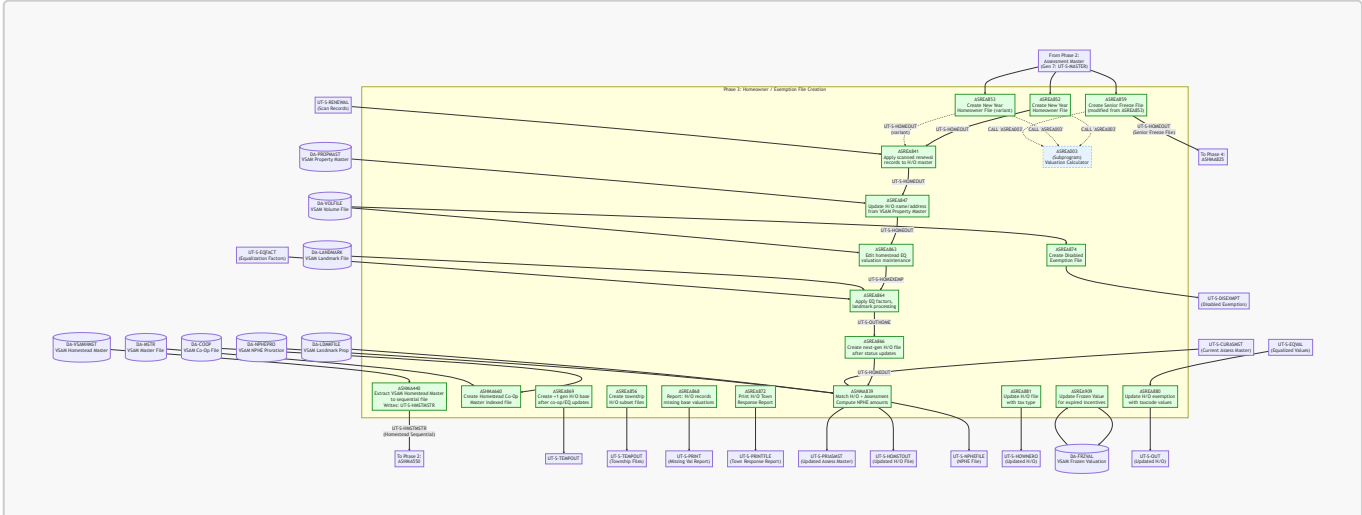
## 4. Phase 3: Homeowner / Exemption File Creation

Phase 3 creates and enriches the Homeowner Exemption file through a series of merge, update, and validation steps. This is the largest phase by program count.



### Narrative: Phase 3

Phase 3 is the most program-rich phase, with 18 executable programs plus the ASREA003 subprogram. It handles the creation, enrichment, and finalization of the Homeowner Exemption file.

**Main processing chain:**

1. **ASHMA440** extracts the VSAM Homestead Master (DA-VSAMHMST) into a sequential file, making it available for batch processing in this and other phases.
2. **ASHMA660** creates the Homestead Co-Op Master indexed file from VSAM Co-Op and Master files.
3. **ASREA852/853** create the New Year Homeowner File by merging the Assessment Master (Gen 7) with the prior year homeowner file. Both dynamically CALL **ASREA003** for property valuation computation. ASREA852 and ASREA853 are near-duplicates serving slightly different processing conditions.
4. **ASREA859** creates the Senior Freeze File (a variant of the ASREA853 logic), also calling ASREA003. Its output feeds Phase 4.
5. **ASREA841** applies scanned exemption renewal records to the homeowner master.
6. **ASREA847** updates homeowner name and address from the VSAM Property Master (DA-PROPMAST).
7. **ASREA863** edits homestead equalized valuation maintenance records using the VSAM Volume File (DA-VOLFILE).
8. **ASREA864** applies equalization factors and landmark property special handling using the VSAM Landmark file (DA-LANDMARK).
9. **ASREA866** creates the next-generation homeowner file after status updates.
10. **ASHMA839** performs the final match/merge of the homeowner file with the current assessment master, computing NPHE (Non-Primary Homeowner Exemption) amounts. It produces three outputs: an updated assessment master, an updated homeowner file, and the NPHE file.

**Utility and report programs:**

- **ASREA856** creates township-level subset files from the homeowner master.
- **ASREA868** reports homeowner records missing base valuations.
- **ASREA869** creates a subsequent generation of the homeowner base file after co-op/EQ factor updates.
- **ASREA872** prints the Homeowner Town Response Report.
- **ASREA874** creates the Disabled Exemption File.
- **ASREA880** updates the homeowner exemption file with taxcode values.
- **ASREA881** updates the homeowner file with tax type information.
- **ASREA909** updates the VSAM Frozen Value File (DA-FRZVAL) for expired incentive properties.

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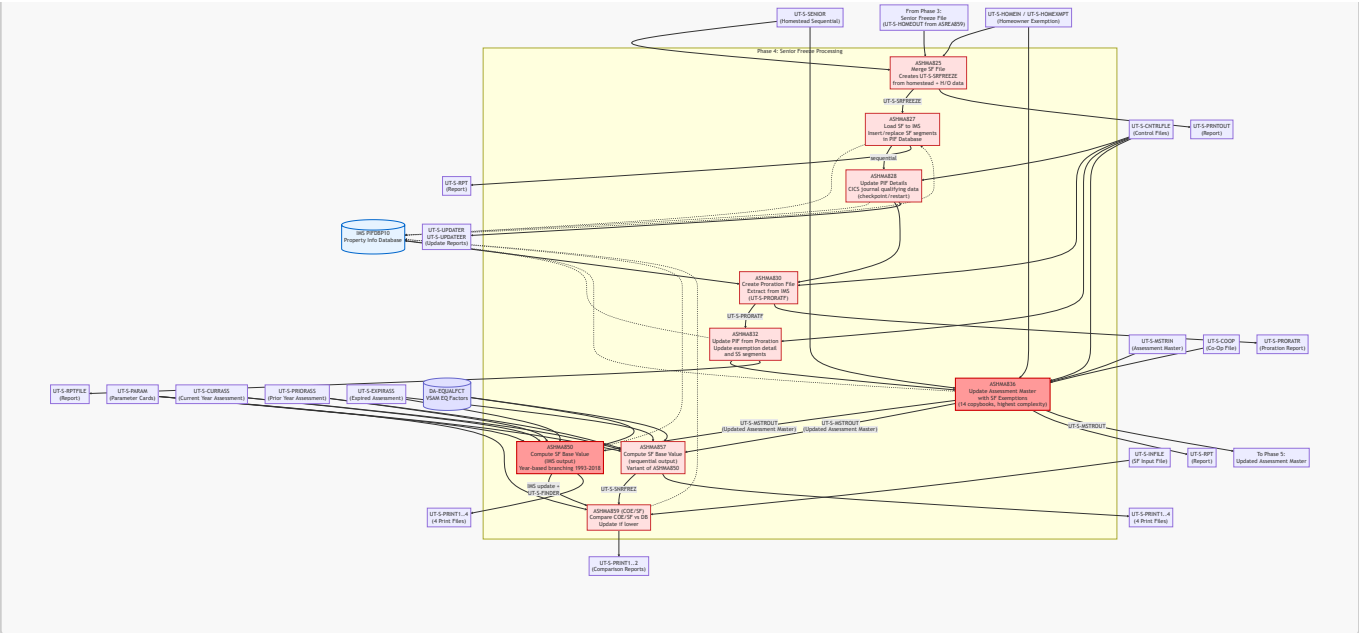
## 5. Phase 4: Senior Freeze Processing

Phase 4 processes the Senior Citizens Assessment Freeze Homestead Exemption. This is a strictly sequential pipeline of 9 programs that freezes assessed values for qualifying seniors and computes the tax difference.




## Narrative: Phase 4

Phase 4 is the longest single processing chain in the system -- 9 programs in strict sequence from ASHMA825 through ASHMA859. Any step failure blocks all subsequent steps.

**Processing flow:**

1. **ASHMA825** merges the Senior Freeze file (from ASREA859 in Phase 3) with homestead sequential and homeowner exemption data to create the consolidated Senior Freeze sequential file (UT-S-SRFREEZE).
2. **ASHMA827** loads the Senior Freeze data into IMS by inserting or replacing SF segments in the PIF database.
3. **ASHMA828** updates PIF detail segments using CICS journal qualifying data. This is a complex program with checkpoint/restart logic.
4. **ASHMA830** creates the Senior Freeze Proration file by extracting from IMS.
5. **ASHMA832** updates IMS exemption detail and SS segments from the proration file.
6. **ASHMA836** is the most complex program in the entire system (14 copybooks, IMS + 6 sequential files). It reads the Assessment Master, Homestead file, Homeowner Exemption file, and Co-Op file, then writes an updated Assessment Master with Senior Freeze exemptions applied. This updated master feeds Phase 5.
7. **ASHMA850** computes the Senior Freeze Base Value Tax Difference using year-based branching logic spanning 1993 through 2018. It reads three assessment files (current, prior, expired) plus equalization factors from VSAM (DA-EQUALFCT). It updates IMS directly.
8. **ASHMA857** is a variant of ASHMA850 that writes a sequential output file (UT-S-SNRFREZ) instead of updating IMS.
9. **ASHMA859** (in its COE/SF comparison role) compares COE/SF sequential file values against the database and updates if the sequential value is lower.

**Critical dependencies:** The equalization factor file (DA-EQUALFCT) consumed by ASHMA850 and ASHMA857 is produced by CLREB020 in Phase 6. This creates a cross-phase dependency: equalization factor editing must complete before Senior Freeze base value computation can run.

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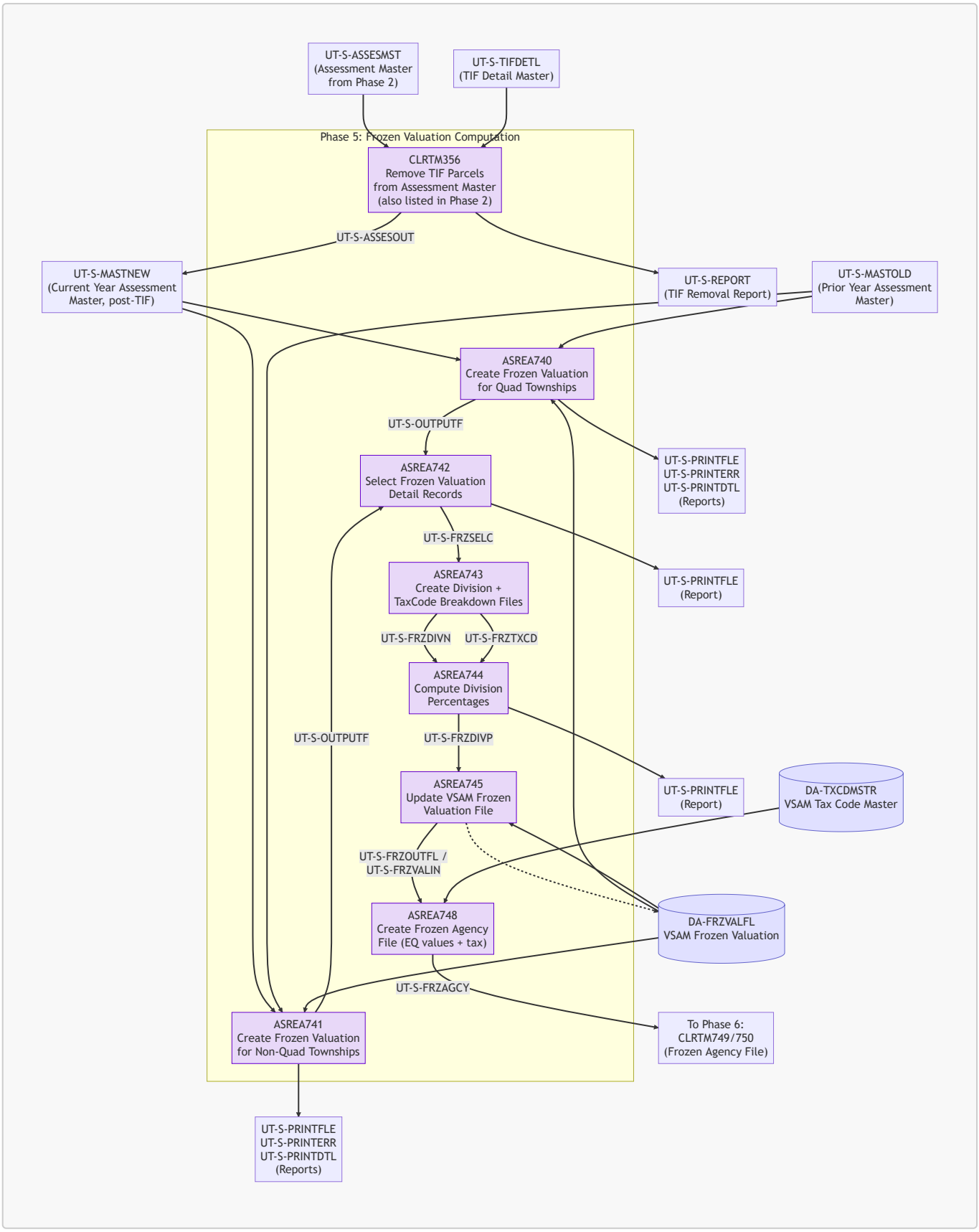
# 6. Phase 5: Frozen Valuation Computation

Phase 5 computes frozen valuations for PTELL (Property Tax Extension Limitation Law) compliance. It compares current vs. prior year assessment masters and breaks down valuations by division and tax code.




## Narrative: Phase 5

Phase 5 is a tightly coupled sub-pipeline of 7 programs (plus CLRTM356 which bridges from Phase 2) that computes frozen valuations for property tax limitation compliance.

**Processing flow:**

1. **CLRTM356** removes TIF district parcels from the Assessment Master, producing a clean master for general frozen valuation computation. (This program is listed in Phase 2 as Gen 9 of the Assessment Master chain, but its output directly feeds Phase 5.)
2. **ASREA740** (Quad Townships) and **ASREA741** (Non-Quad Townships) are near-duplicate programs that create frozen valuation records by comparing the current year assessment master against the prior year master and the VSAM Frozen Valuation file (DA-FRZVALFL). Only one runs per township type.
3. **ASREA742** selects frozen valuation detail records from the combined output.
4. **ASREA743** breaks down selected records into two files: a Division file (UT-S-FRZDIVN) and a Tax Code file (UT-S-FRZTXCD).
5. **ASREA744** computes division-level percentages using both the tax code and division files, producing the Division Percentage file (UT-S-FRZDIVP).
6. **ASREA745** updates the VSAM Frozen Valuation indexed file (DA-FRZVALFL) with the computed percentages.
7. **ASREA748** creates the Frozen Agency file (UT-S-FRZAGCY) by computing frozen equalized values and tax amounts per agency, using the VSAM Tax Code Master (DA-TXCDMSTR) to determine agency assignments.

**Key data products:** The Frozen Agency file (UT-S-FRZAGCY) is the primary output, feeding the CLRTM749 and CLRTM750 reporting programs in Phase 6. The updated VSAM Frozen Valuation file feeds back into future year processing.

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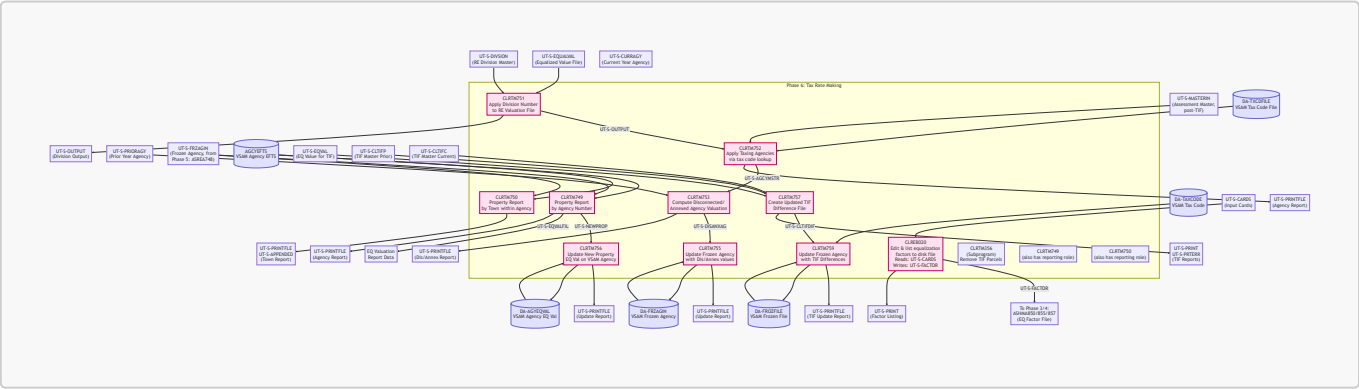
## 7. Phase 6: Tax Rate Making

Phase 6 is the final processing stage. It applies taxing agencies, computes disconnected/annexed valuations, processes TIF differences, and produces the agency-level reports and VSAM file updates used for tax rate computation.



### Narrative: Phase 6

Phase 6 completes the tax extension process with three parallel sub-pipelines and the critical equalization factor editing step.

**Equalization Factor Production:**

- **CLREB020** reads input cards (UT-S-CARDS) and produces the equalization factor file (UT-S-FACTOR) consumed by ASHMA850, ASHMA855, and ASHMA857. This is a cross-phase dependency: CLREB020

must run before the Senior Freeze base value programs in Phase 4.

**Division and Agency Sub-Pipeline:**

1. **CLRTM751** applies division numbers to the RE Division Valuation file.
2. **CLRTM752** is the critical linking step: it reads the Assessment Master and the VSAM Tax Code file (DA-TXCDFILE) to determine which taxing agencies (school districts, municipalities, parks, etc.) apply to each property, producing an Agency Assessment Master (UT-S-AGCYMSTR).
3. **CLRTM753** computes disconnected and annexed agency valuations by comparing current vs. prior year agency data.
4. **CLRTM755** updates the VSAM Frozen Agency file (DA-FRZAGIN) with disconnected/annexed valuations.

**TIF Sub-Pipeline:**

1. **CLRTM757** creates the TIF Difference file by comparing current equalized values against TIF frozen base values, using prior and current TIF master files. This is financially significant -- it determines the revenue directed to TIF districts.
2. **CLRTM759** updates the VSAM Frozen Agency file (DA-FROZFILE) with TIF differences using the VSAM Tax Code file (DA-TAXCODE).

**Reporting and Final Updates:**

1. **CLRTM749** produces the Property Report by Agency Number, reading the Frozen Agency file and VSAM Agency EFTS file. It also outputs a New Property file (UT-S-NEWPROP).
2. **CLRTM750** produces the Property Report by Town within Agency.
3. **CLRTM756** updates the VSAM Agency Equalized Valuation file (DA-AGYEQVAL) with new property equalized values.

**Final data products:** Updated VSAM Frozen Agency file, updated VSAM Agency EQ Valuation file, Property Reports by Agency and Town, and TIF Difference Reports.

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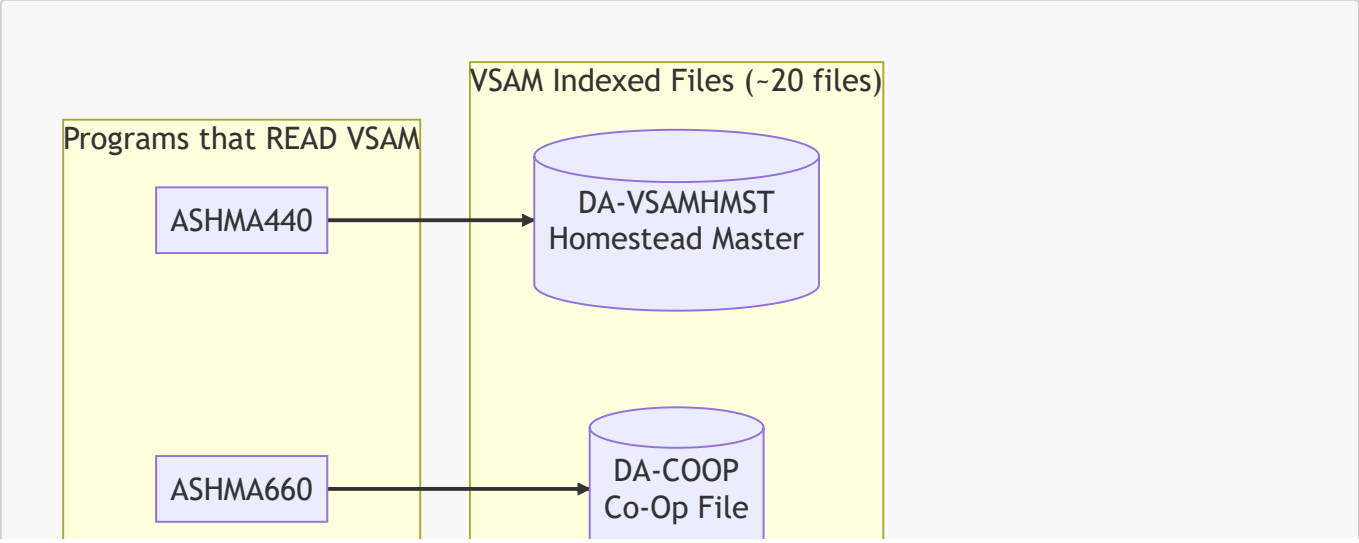
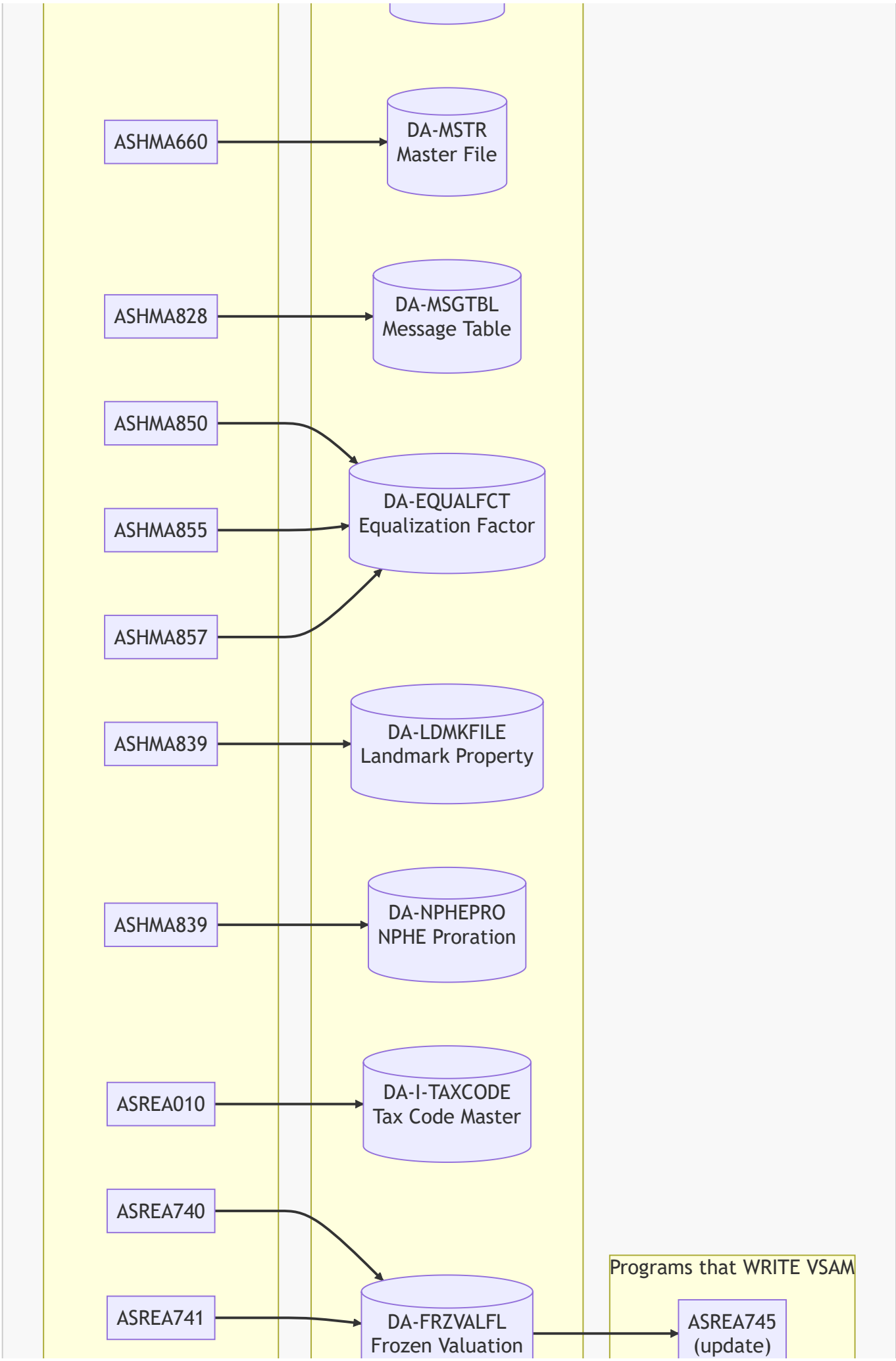
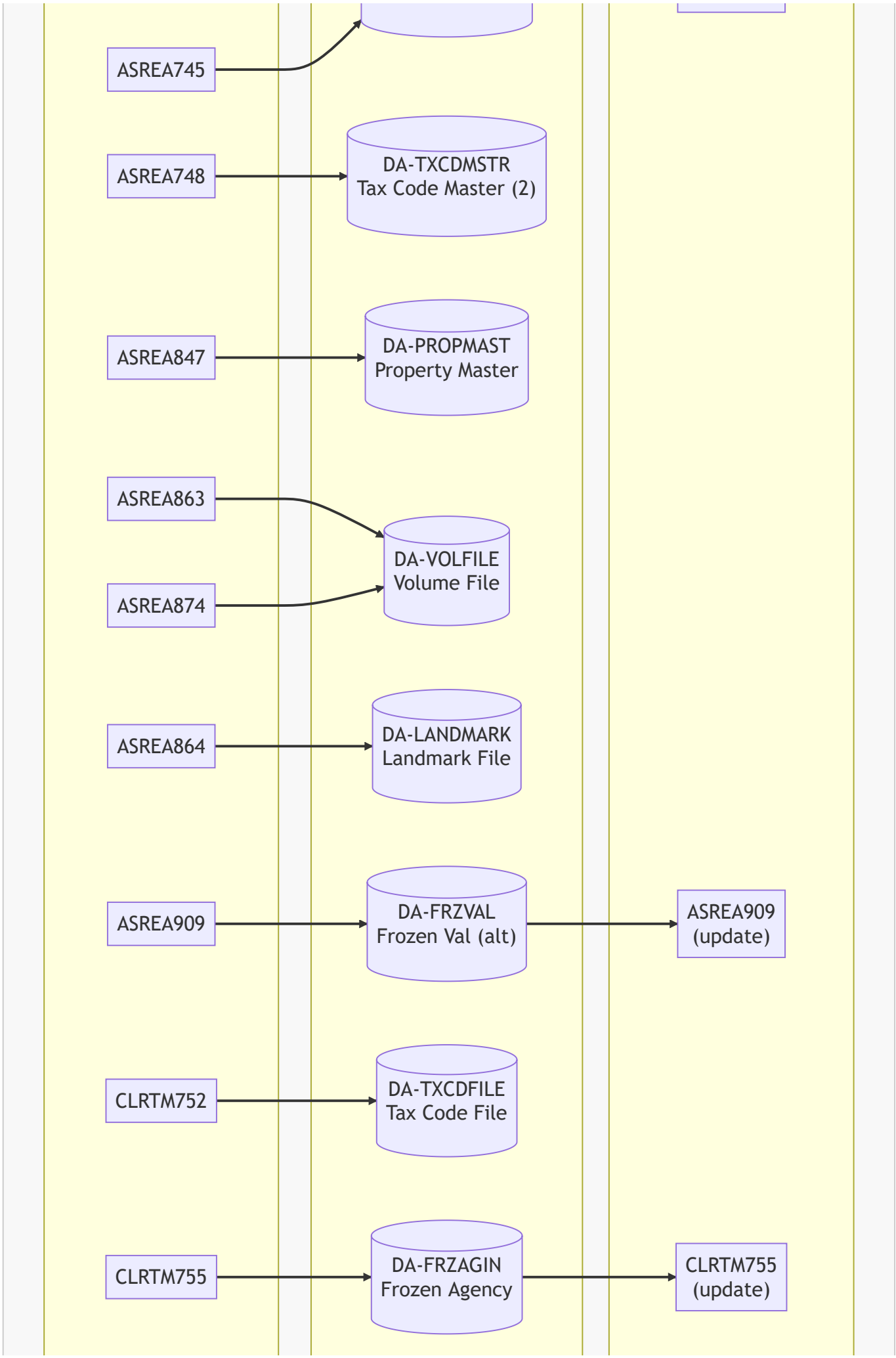
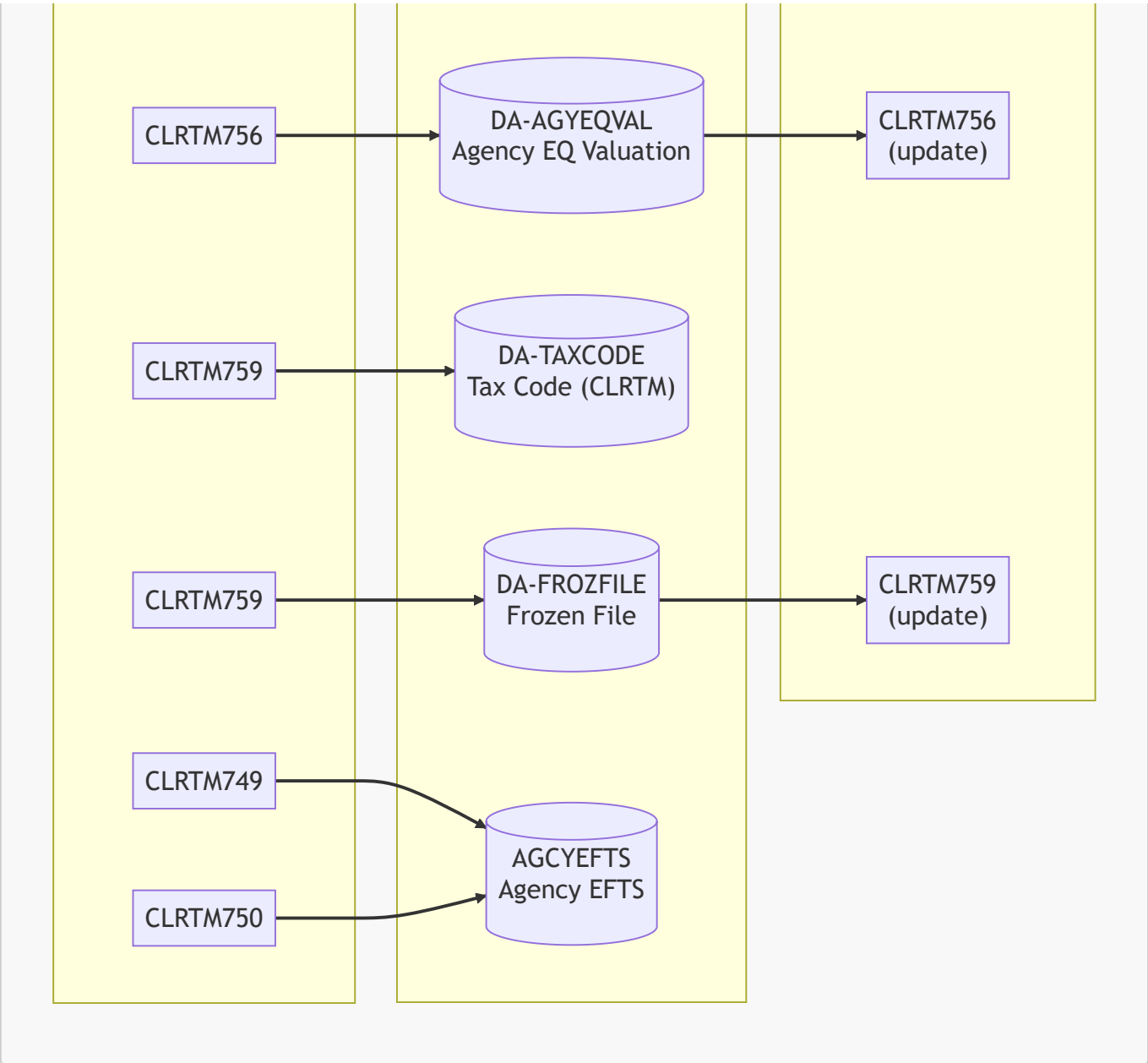
## 8. Shared VSAM Files Diagram

The following diagram shows all 20 VSAM indexed files and which programs read from or write to them. VSAM files are the primary persistent data stores shared across phases.




ASHMA660
DA-MSTR
Master File
ASHMA828
DA-MSGTBL
Message Table
ASHMA850
ASHMA855
DA-EQUALFCT
Equalization Factor
ASHMA857
ASHMA839
DA-LDMKFILE
Landmark Property
ASHMA839
DA-NPHEPRO
NPHE Proration
ASREA010
DA-I-TAXCODE
Tax Code Master
ASREA740
ASREA741
DA-FRZVALFL
Frozen Valuation
Programs that WRITE VSAM
ASREA745
(update)


ASREA745
ASREA748
DA-TXCDMSTR
Tax Code Master (2)
ASREA847
DA-PROPMAST
Property Master
ASREA863
ASREA874
DA-VOLFILE
Volume File
ASREA864
DA-LANDMARK
Landmark File
ASREA909
DA-FRZVAL
Frozen Val (alt)
ASREA909
(update)
CLRTM752
DA-TXCDFILE
Tax Code File
CLRTM755
DA-FRZAGIN
Frozen Agency
CLRTM755
(update)




## VSAM File Cross-Reference Table

The following table provides a complete cross-reference of all 20 VSAM indexed files, the programs that access them, and their access mode (Read/Write/Update).

| # | DD Name | Description | Reading Programs | Writing/Updating Programs | Phase(s) |
|---|---|---|---|---|---|
| 1 | DA-VSAMHMST | Homestead Master | ASHMA440 | (external) | 3 |
| 2 | DA-COOP | Co-Op File | ASHMA660 | ASHMA660 | 3 |
| 3 | DA-MSTR | Master File | ASHMA660 | (external) | 3 |
| 4 | DA-MSGTBL | Message Table | ASHMA828 | (external) | 1 |
| 5 | DA-EQUALFCT | Equalization Factor | ASHMA850, ASHMA855, ASHMA857 | (from CLREB020 output) | 4, 6 |

| # | DD Name | Description | Reading Programs | Writing/Updating Programs | Phase(s) |
|---|---|---|---|---|---|
| 6 | DA-LDMKFILE | Landmark Property | ASHMA839 | (external) | 3 |
| 7 | DA-NPHEPRO | NPHE Proration | ASHMA839 | (external) | 3 |
| 8 | DA-I-TAXCODE | Tax Code Master | ASREA010 | (external) | 2 |
| 9 | DA-FRZVALFL | Frozen Valuation | ASREA740, ASREA741, ASREA745 | ASREA745 | 5 |
| 10 | DA-TXCDMSTR | Tax Code Master (2) | ASREA748 | (external) | 5 |
| 11 | DA-PROPMAST | Property Master | ASREA847 | (external) | 3 |
| 12 | DA-VOLFILE | Volume File | ASREA863, ASREA874 | (external) | 3 |
| 13 | DA-LANDMARK | Landmark File | ASREA864 | (external) | 3 |
| 14 | DA-FRZVAL | Frozen Val (alt) | ASREA909 | ASREA909 | 3 |
| 15 | DA-TXCDFILE | Tax Code File | CLRTM752 | (external) | 6 |
| 16 | DA-FRZAGIN | Frozen Agency | CLRTM755 | CLRTM755 | 6 |
| 17 | DA-AGYEQVAL | Agency EQ Valuation | CLRTM756 | CLRTM756 | 6 |
| 18 | DA-TAXCODE | Tax Code (CLRTM) | CLRTM759 | (external) | 6 |
| 19 | DA-FROZFILE | Frozen File | CLRTM759 | CLRTM759 | 6 |
| 20 | AGCYEFTS | Agency EFTS | CLRTM749, CLRTM750 | (external) | 6 |

**Key observations:**

- **DA-EQUALFCT** is the most widely shared VSAM file, read by programs in both Phase 4 (ASHMA850, ASHMA857) and Phase 3 (ASHMA855). Its content originates from CLREB020's sequential output being loaded to VSAM.
- **DA-FRZVALFL** is both read and written by Phase 5 programs: ASREA740/741 read it for comparison, and ASREA745 writes updated frozen valuations back.
- **DA-FRZAGIN**, **DA-AGYEQVAL**, and **DA-FROZFILE** are all updated by Phase 6 programs as final outputs of the tax rate making process.

- Multiple distinct VSAM files serve similar purposes with different DD names (DA-I-TAXCODE, DA-TXCDMSTR, DA-TXCDFILE, DA-TAXCODE) -- these may or may not point to the same physical file, depending on JCL configuration.

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## 9. Complete Program Checklist

The following table confirms that all 70 programs appear in at least one diagram above. Programs are listed with their phase assignment and diagram appearance.

### Executable Programs (50)

| # | Program | Phase | Role | Appears In |
|---|---|---|---|---|
| 1 | ASCOE500 | 1 | COE Workfile from IMS | Phase 1 diagram |
| 2 | ASCOE515 | 2 | COE Filter/Print | Phase 2 diagram |
| 3 | ASHMA440 | 3 | VSAM Homestead Extract | Phase 3 diagram |
| 4 | ASHMA550 | 2 | Homestead/Vet Merge (Gen 7) | Phase 2 diagram |
| 5 | ASHMA660 | 3 | Co-Op Master | Phase 3 diagram |
| 6 | ASHMA825 | 4 | Merge SF File | Phase 4 diagram |
| 7 | ASHMA827 | 4 | Load SF to IMS | Phase 4 diagram |
| 8 | ASHMA828 | 1, 4 | Update PIF Details | Phase 1 + Phase 4 diagrams |
| 9 | ASHMA830 | 4 | Create Proration | Phase 4 diagram |
| 10 | ASHMA832 | 4 | Update PIF Proration | Phase 4 diagram |
| 11 | ASHMA836 | 4 | Update Master w/ SF | Phase 4 diagram |
| 12 | ASHMA840 | 1 | Update prior year SF base values | Phase 1 diagram |
| 13 | ASHMA845 | 1 | Update SF Master Segment | Phase 1 diagram |
| 14 | ASHMA850 | 4 | SF Base Value (IMS) | Phase 4 diagram |
| 15 | ASHMA855 | 2 | COE Base Year Value | Phase 2 diagram |
| 16 | ASHMA857 | 4 | SF Base Value (seq) | Phase 4 diagram |
| 17 | ASHMA859 | 4 | COE/SF Comparison | Phase 4 diagram |
| 18 | ASHMA921 | 1 | IMS Extract (exempt) | Phase 1 diagram |
| 19 | ASHMA922 | 1 | IMS Extract (SF='Q') | Phase 1 diagram |
| 20 | ASHMA923 | 1 | IMS Extract (assess) | Phase 1 diagram |
| 21 | ASREA001 | -- | Test harness (not production) | Phase 2 note below |
| 22 | ASREA007 | 1 | IMS record deletion | Phase 1 diagram |

| # | Program | Phase | Role | Appears In |
|---|---|---|---|---|
| 23 | ASREA018 | 2 | Recompute Class (Gen 3) | Phase 2 diagram |
| 24 | ASREA110 | 2 | RR/RE Summaries | Phase 2 diagram |
| 25 | ASREA151 | 2 | Farm/HO/Non-HO AV (Gen 4) | Phase 2 diagram |
| 26 | ASREA352 | 2 | BA Taxcode Update (Gen 5) | Phase 2 diagram |
| 27 | ASREA743 | 5 | Div + TaxCode Files | Phase 5 diagram |
| 28 | ASREA744 | 5 | Division Percentages | Phase 5 diagram |
| 29 | ASREA745 | 5 | Update VSAM Frozen | Phase 5 diagram |
| 30 | ASREA841 | 3 | Apply Renewals | Phase 3 diagram |
| 31 | ASREA847 | 3 | Update from PropMast | Phase 3 diagram |
| 32 | ASREA863 | 3 | Edit EQ Val Maint | Phase 3 diagram |
| 33 | ASREA866 | 3 | Next-Gen H/O | Phase 3 diagram |
| 34 | ASREA868 | 3 | Missing valuation report | Phase 3 diagram |
| 35 | ASREA869 | 3 | +1 Gen H/O base | Phase 3 diagram |
| 36 | ASREA872 | 3 | Town Response Report | Phase 3 diagram |
| 37 | ASREA874 | 3 | Disabled Exemption File | Phase 3 diagram |
| 38 | ASREA880 | 3 | Update H/O with taxcode values | Phase 3 diagram |
| 39 | ASREA881 | 3 | Update H/O with tax type | Phase 3 diagram |
| 40 | ASREA909 | 3 | Update Frozen Val (expired) | Phase 3 diagram |
| 41 | ASSRQ560 | 2 | Circulator (Gen 8) | Phase 2 diagram |
| 42 | ASSRQ561 | 2 | Circulator variant (Gen 8) | Phase 2 diagram |
| 43 | CLREB020 | 6 | EQ Factor Edit | Phase 6 diagram |
| 44 | CLRTM751 | 6 | Apply Divisions | Phase 6 diagram |
| 45 | CLRTM752 | 6 | Apply Agencies | Phase 6 diagram |
| 46 | CLRTM753 | 6 | Dis/Annex Values | Phase 6 diagram |
| 47 | CLRTM755 | 6 | Update Frozen Agency | Phase 6 diagram |
| 48 | CLRTM756 | 6 | Update Agency EQ Val | Phase 6 diagram |
| 49 | CLRTM757 | 6 | TIF Difference | Phase 6 diagram |
| 50 | CLRTM759 | 6 | Update Frozen w/ TIF | Phase 6 diagram |

## Subprograms (20 modules)

| # | Program | Type | Called By / Used In | Appears In |
|---|---|---|---|---|
| 1 | ASREA003 | Dynamic subprogram (valuation calc, Y2K) | ASREA178, ASREA852, ASREA853, ASREA859 | Phase 2 + Phase 3 diagrams |
| 2 | ASREA002 | Superseded subprogram (valuation calc) | None (replaced by ASREA003) | Phase 2 diagram (noted) |
| 3 | ASREA005 | Gen 1 master processing | Phase 2 chain | Phase 2 diagram |
| 4 | ASREA010 | Gen 2 tax code validation | Phase 2 chain | Phase 2 diagram |
| 5 | ASREA105 | Gen 3b master print/pass | Phase 2 chain | Phase 2 diagram |
| 6 | ASREA178 | Type 5 to 3 conversion | Phase 2 branch | Phase 2 diagram |
| 7 | ASHMA831 | Gen 6 M-VALUE(9) | Phase 2 chain | Phase 2 diagram |
| 8 | ASHMA839 | H/O + Assessment Match | Phase 3 final step | Phase 3 diagram |
| 9 | ASREA740 | Frozen Val (Quad) | Phase 5 | Phase 5 diagram |
| 10 | ASREA741 | Frozen Val (Non-Quad) | Phase 5 | Phase 5 diagram |
| 11 | ASREA742 | Frozen Val Select | Phase 5 | Phase 5 diagram |
| 12 | ASREA748 | Frozen Agency File | Phase 5 | Phase 5 diagram |
| 13 | ASREA852 | New Year H/O File | Phase 3 | Phase 3 diagram |
| 14 | ASREA853 | New Year H/O File (var) | Phase 3 | Phase 3 diagram |
| 15 | ASREA856 | Township H/O Files | Phase 3 | Phase 3 diagram |
| 16 | ASREA859 | Senior Freeze File creation | Phase 3, feeds Phase 4 | Phase 3 + Phase 4 diagrams |
| 17 | ASREA864 | Landmark Processing | Phase 3 | Phase 3 diagram |
| 18 | CLRTM356 | Remove TIF Parcels | Phase 2 Gen 9, Phase 5 | Phase 2 + Phase 5 diagrams |
| 19 | CLRTM749 | Report by Agency | Phase 6 | Phase 6 diagram |
| 20 | CLRTM750 | Report by Town | Phase 6 | Phase 6 diagram |

**Note on ASREA001:** This is a test harness program with no file I/O and no production role. It does not participate in any data flow but is included in the program count for completeness. It is a candidate for retirement during modernization.

**Note on program classification:** The distinction between "executable" and "subprogram" in the original task listing reflects the original repository's categorization. In practice, many programs listed as "subprograms" are standalone batch executables (e.g., ASREA005, ASREA010, ASREA740-742). Only ASREA003 (and the superseded ASREA002) are true called subprograms that execute within another program's address space via the COBOL `CALL` statement.

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# 10. Key Architecture Observations

## 10.1 The Assessment Master Is the Central Artifact

The Assessment Master sequential file is the most heavily processed data structure in the system. It flows through at least 10 programs in Phase 2, then branches to feed Phases 3, 4, 5, and 6. Every phase depends on it either directly or indirectly.

## 10.2 Strict Sequential Coupling

All inter-program dependencies are mediated through sequential files (except ASREA003's dynamic CALL). This means programs are loosely coupled at the code level but tightly coupled at the operational level. Each program must complete before the next can begin. In a modernized system, collapsing multiple generation steps into fewer database operations would significantly reduce pipeline fragility.

## 10.3 Near-Duplicate Programs Are Consolidation Candidates

Five groups of near-duplicate programs serve the same pipeline position under different conditions:

| Group | Programs | Difference |
|---|---|---|
| IMS Extract | ASHMA921, ASHMA922, ASHMA923 | Filter criteria, output format |
| Frozen Valuation | ASREA740, ASREA741 | Quad vs. non-quad townships |
| New Year H/O | ASREA852, ASREA853 | Minor processing variants |
| Circulator | ASSRQ560, ASSRQ561 | Processing variant |
| SF Base Value | ASHMA850, ASHMA857 | IMS vs. sequential output |

## 10.4 Cross-Phase Dependencies Create Scheduling Constraints

The most notable cross-phase dependency is CLREB020 (Phase 6) producing equalization factors consumed by ASHMA850/855/857 (Phases 3-4). This means equalization factor editing must occur as a prerequisite, not as part of the final tax rate making phase. This ordering constraint would need to be preserved in any modernized scheduling system.

## 10.5 IMS Database Is a Critical Integration Point

15 programs access the IMS Property Information Database (PIFDBP10). In modernization, replacing IMS with a relational database would be one of the most impactful changes, but also one of the riskiest given the number of programs and the complexity of the hierarchical data model.