



2006 GIS-T Symposium Columbus Ohio

California OneMap Road Database Solution for California DOT

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California OneMap What is it?

- ④ Public/private collaboration between California DOT and Tele Atlas North America (*TANA*)
- ④ Tele Atlas road product (Dynamap/Transportation) populated with Caltrans specific road attributes:
 - Functional Classification
 - HPMS



California OneMap

- Ⓢ Response to business needs
- Ⓢ Convergence of database directions
- Ⓢ Solution to some problems
- Ⓢ Creator of other problems?



Today's outline

- ④ About California DOT (Caltrans)
- ④ Background to our involvement with Tele Atlas
- ④ Reasons for our choice
- ④ Conflation process
- ④ Data development / work flow
- ④ Risks & Benefits
- ④ Where we are right now



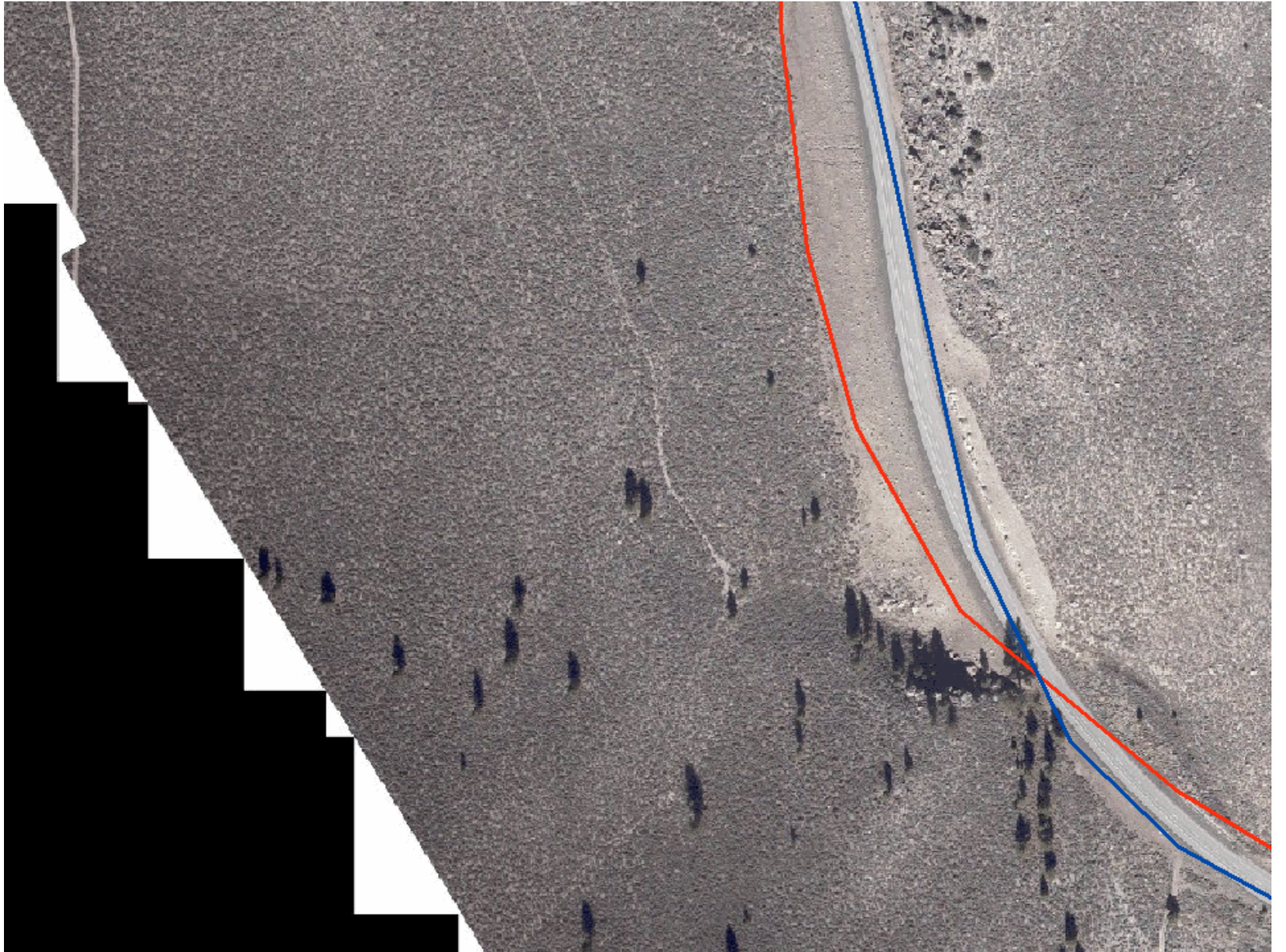
About Caltrans GIS

- ④ 16,000 centerline miles
- ④ 45,000 lane miles
- ④ 22,000 employees
- ④ 12 Districts, many Programs
- ④ Diverse topography
- ④ Highways, airports, transit, rail, land use
- ④ GIS going on 20 years
- ④ Beginning of a new era



Background

- ⓐ Need for improved road data
- ⓐ Both surface streets and State Highway system
- ⓐ Road data quality issues
- ⓐ DLG – poor location, attributes, currency
- ⓐ Increased use of imagery in conjunction with road data (i.e. DHIPP)
- ⓐ Consultant-led effort to create public domain road database unsuccessful (2001)
- ⓐ Caltrans effort to create new State Highway Centerline (2002)





State Highway Centerline Alternatives

1. GPS it
 - Stand alone effort
 - Piggy back on existing pavement condition survey
 - Stereo based van
2. Digitize from aerial photography (DHIPP)
3. Utilize existing survey data/as-builts
4. Gather from local agencies
5. Purchase from vendor

Recommendation = 1 + 2



GPSing the State Highway Centerline

- ⓐ Budget woes put halt to recommendation
- ⓐ Strong need for improved state highway line work remained
- ⓐ No luxury of waiting
- ⓐ Work began on a new state highway data model



Where else to go for road data?

- ④ Navteq
- ④ TIGER
- ④ Thomas Brothers Maps
- ④ Tele Atlas (formerly GDT) *Dynamap/Transportation*



Tele Atlas North America

- ④ Wide use in state government
- ④ Data sharing agreement
- ④ Continual product improvement
- ④ Effort for statewide purchase



Decision to go with Tele Atlas

④ Driven by business needs

Database improvement opportunities

State Highway Database Model

California Road System (CRS) Mapping

Data sharing needs



Database improvement

- ④ The initial need for data to support CRS mapping created an opportunity for improvement
- ④ Realize benefits of RDBMS
- ④ Looking for ability to spatially enable HPMS



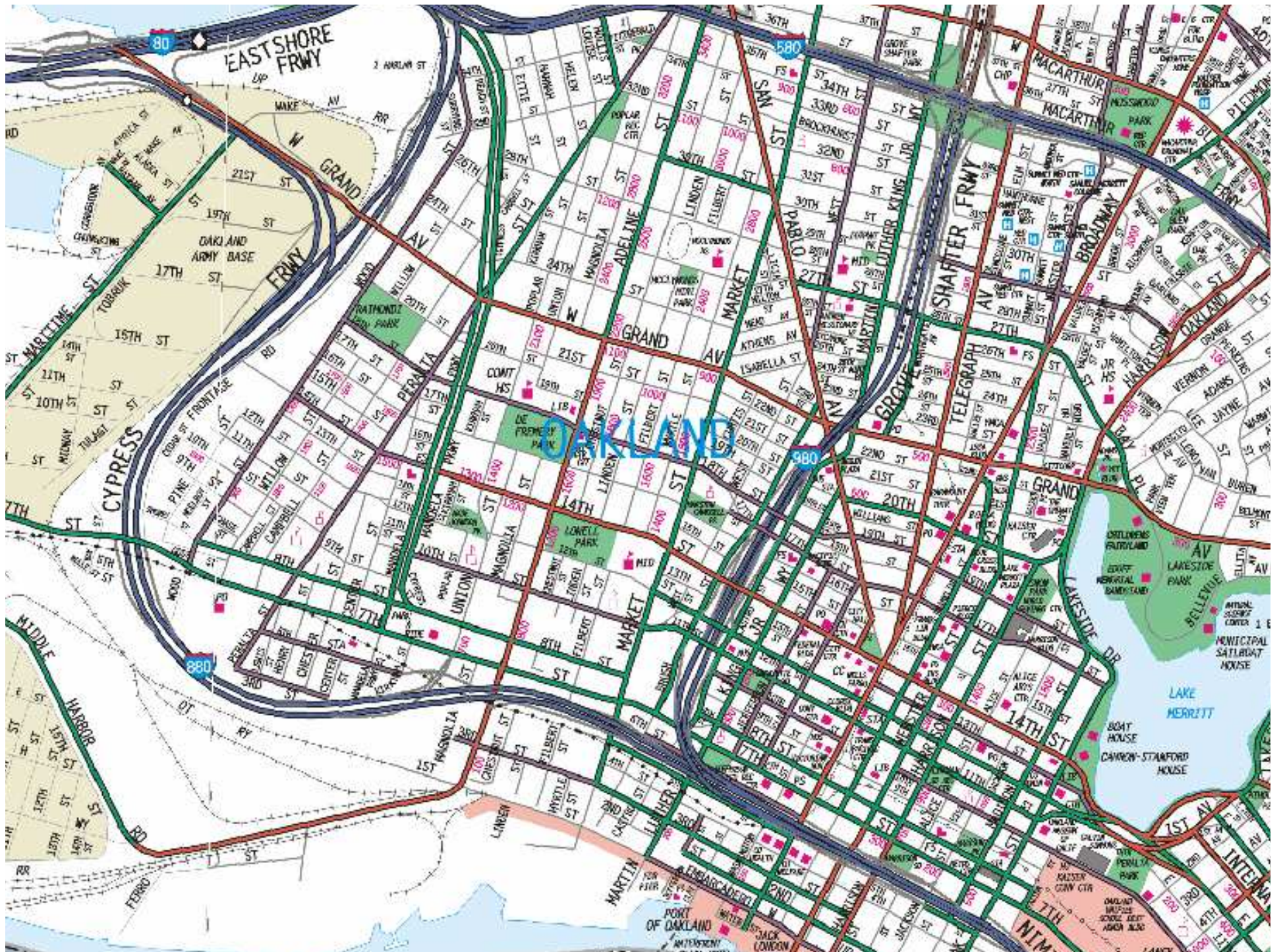
State Highway Database Model

- ④ Measures supporting LRS along a route are independent from the route itself
- ④ Applicable to multiple road data sets
- ④ Necessary to start somewhere
- ④ Decision: Use TANA Dynamap/Transportation roads layer in the initial construction of the state highway data model



CRS Mapping Needs

- ④ Official document used for approvals of functional classification by FHWA
- ④ Show overall context
- ④ Show surface streets with names
- ④ Move away from creating static paper maps/images
- ④ Map template maintained that points to current data





License Terms support Business Requirements

- Ⓢ Caltrans allowed to:
- Ⓢ Distribute Tele Atlas-based FUNC without restriction
- Ⓢ Distribute Tele Atlas-based State Highway without restriction
- Ⓢ Distribute subsets of State Highway generated by LRS/Dyn Seg
- Ⓢ Distribute CRS maps in .pdf format on the internet
- Ⓢ Share full TANA product with business partners
- Ⓢ 5 year survival of rights after termination of agreement



Summary of Justification

- ④ Tele Atlas road data is available
- ④ Road data can be shared with CT business partners
- ④ Tele Atlas is improving the quality of its road data
- ④ Use of Tele Atlas does not preclude use of other lifework



Tele Atlas roads satisfy CRS mapping needs, but.....

- ⓐ Need to display functional classification
- ⓐ Therefore, need to conflate Caltrans attributes to Dynamap/Transportation



Conflation of FUNCCL

- ④ Functional Classifications come from HPMS
- ④ Placing HPMS unique identifier will get you to FUNCCL
- ④ Therefore conflate the HPMS unique identifier



Gets you other HPMS attributes

- Ⓢ AADT
- Ⓢ Urban Area Code
- Ⓢ Number of Lanes
- Ⓢ Access control
- Ⓢ Median type, width
- Ⓢ IRI



Preparation for conflation

- ④ FIPS added, concatenated with SEG# for uniqueness (SEG# not unique statewide)
- ④ From HPMS, added:
 - Street name
 - From street
 - To street



Automated conflation process

- ④ By Tele Atlas
- ④ 80-90% match
- ④ 10-20% remainder, manual effort by Caltrans staff
- ④ Conflated both FUNCCL and HPMS-id
- ④ FUNCCL QC'd, HPMS not

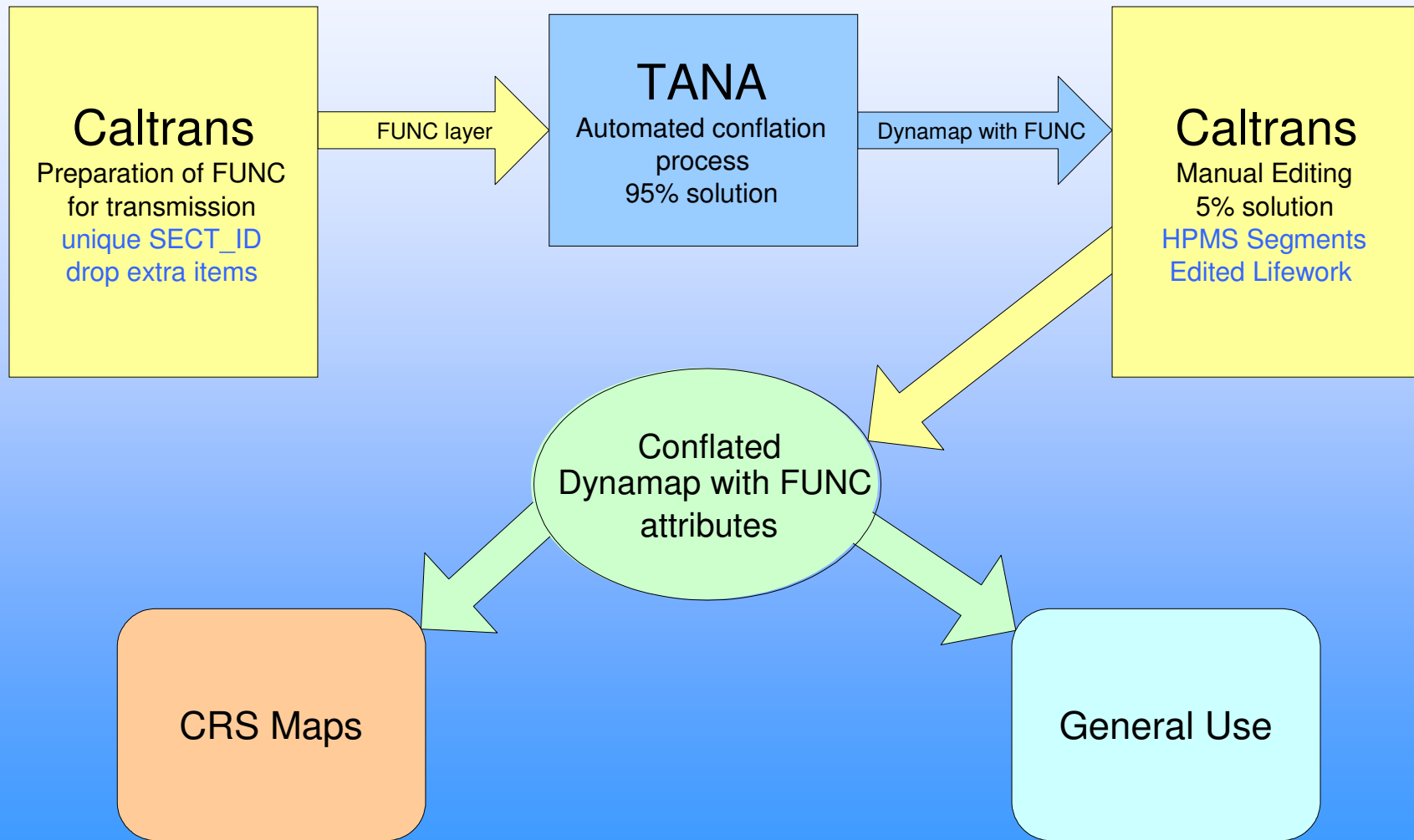


Quality Control

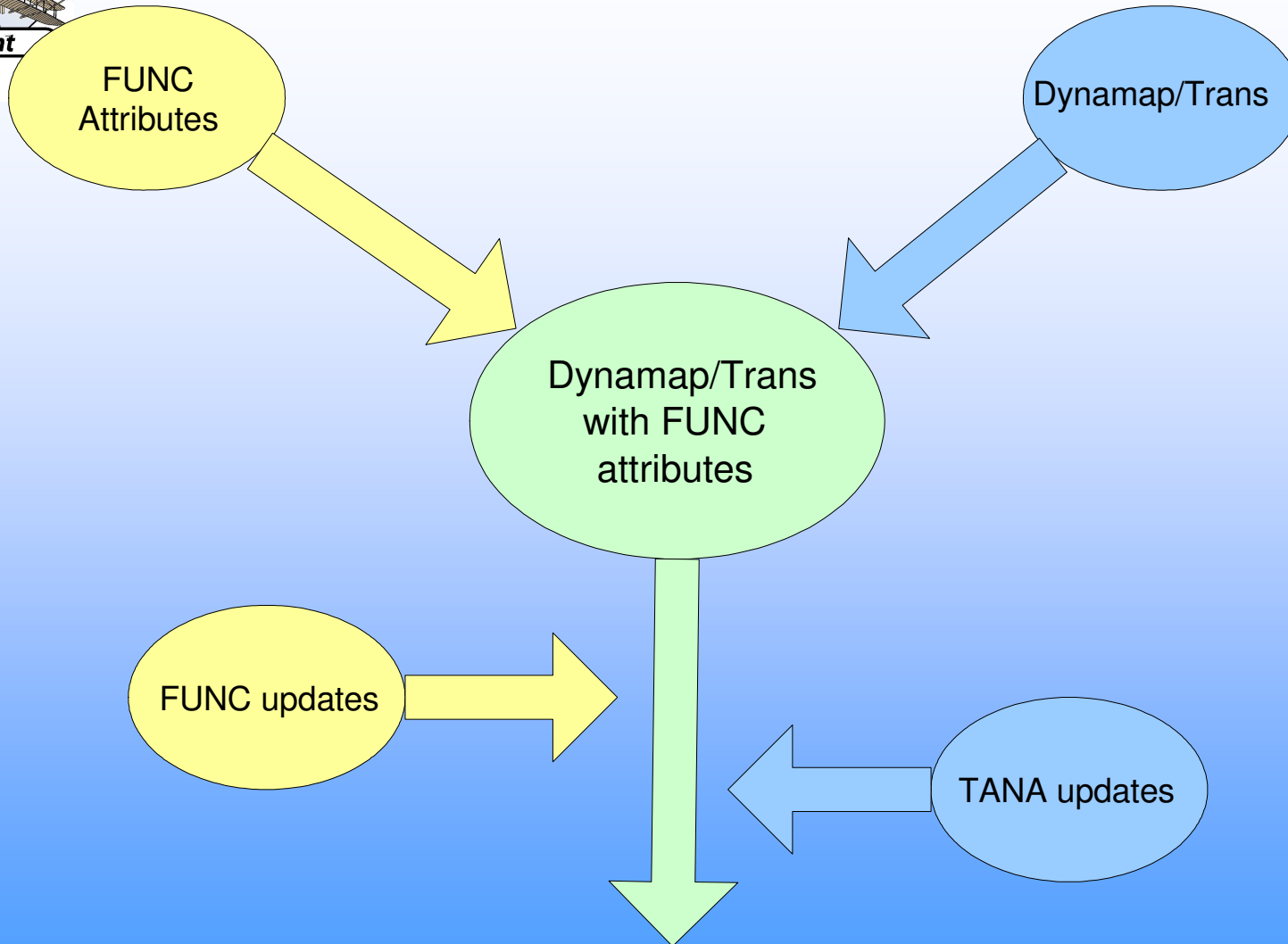
- ④ FUNCCL much easier to QC than HPMS
- ④ Ideally do HPMS first, then link
- ④ Map production needs drive effort to complete FUNCCL
- ④ HPMS strategy being developed



Data creation



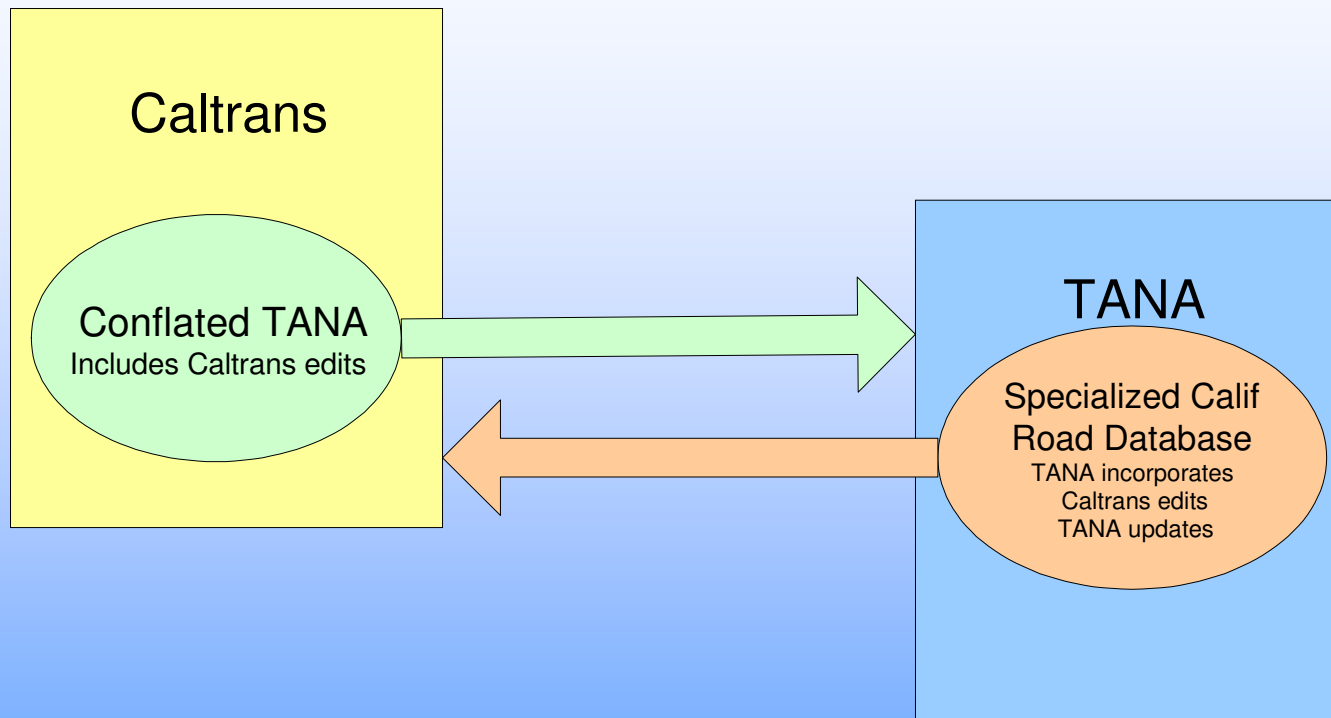
Data Maintenance



Long Term
Maintenance



Option 1
Caltrans sends updates to Tele Atlas

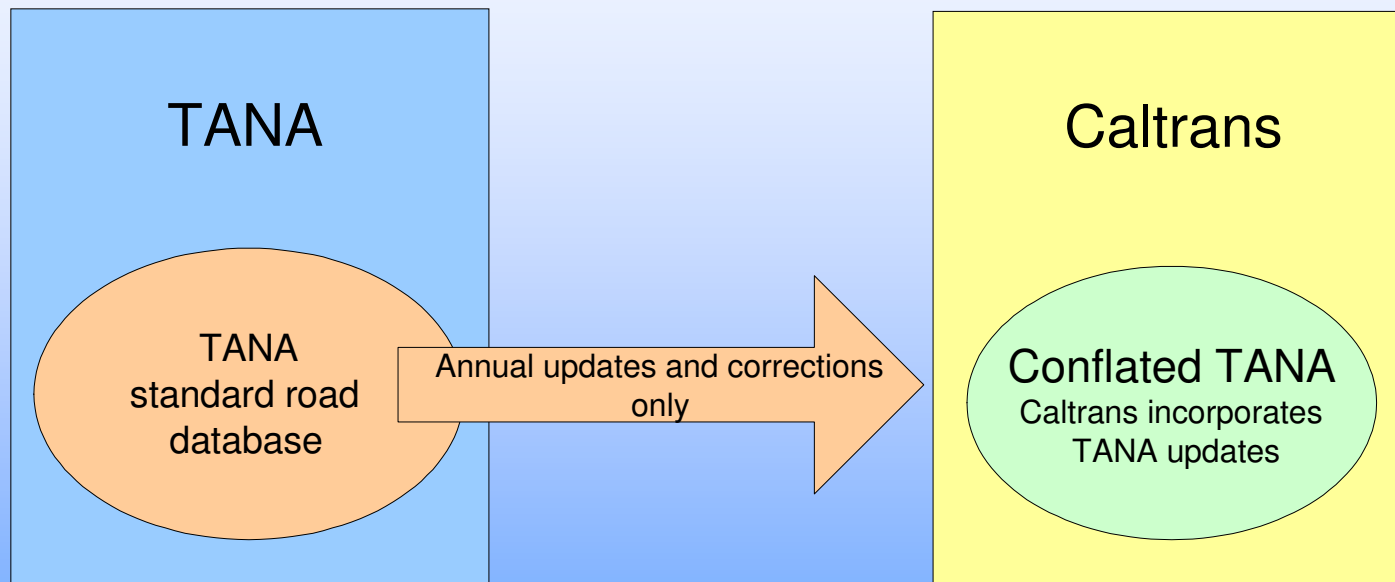


Pro: Tele Atlas are experts on their data

Con: Tele Atlas is not expert in FUNC/HPMS matters



Option 2
Tele Atlas sends updates to Caltrans



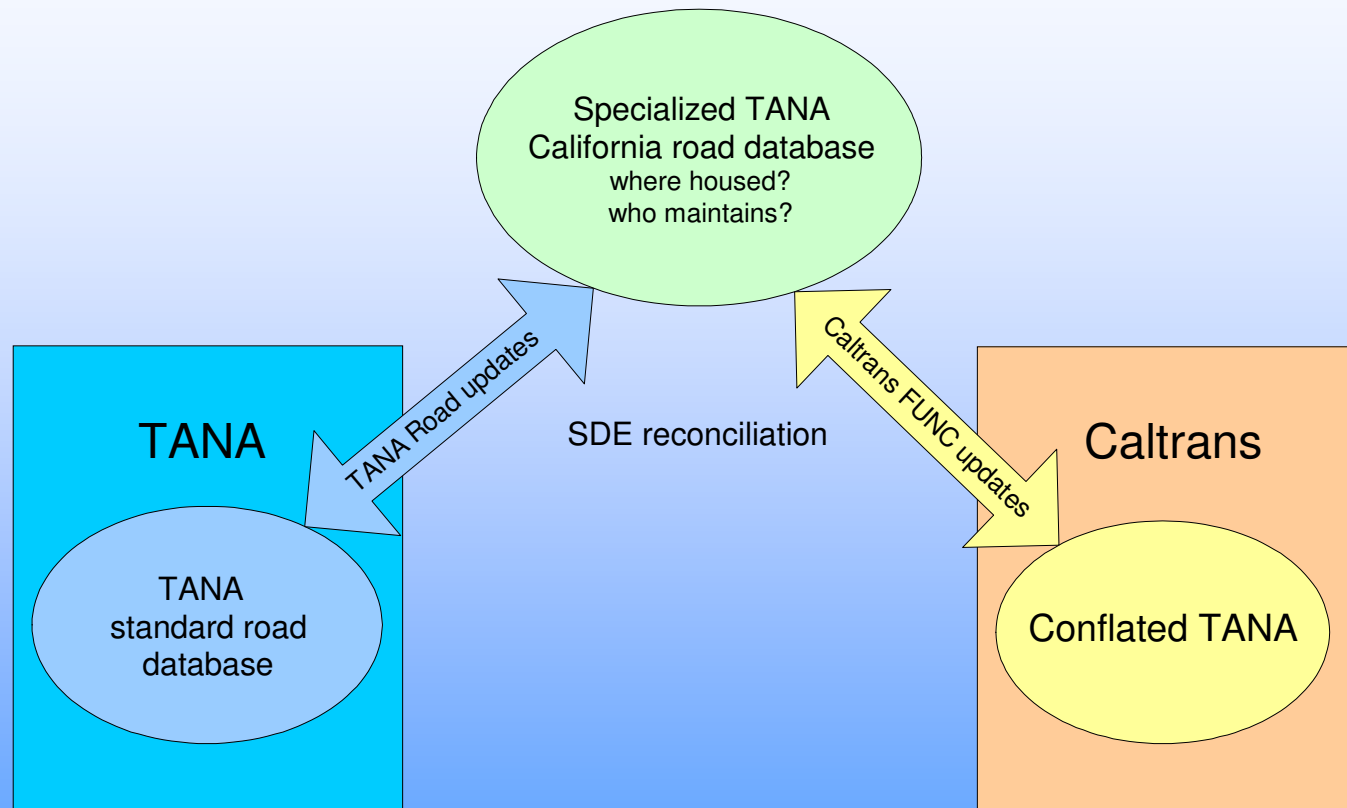
Pro: Caltrans maintains control of their data

Con: Difficulty in processing Tele Atlas updates



Option 3

Caltrans and Tele Atlas both send updates to a centralized database



Pro: Caltrans and Tele Atlas only responsible for their own updates

Con: Database management, coordination



Discussions with Tele Atlas

- ② Explored the ideas
- ② Had meeting with technical staff – August 04
- ② Pilot performed on Sacramento County
- ② Included HPMS updates
- ② Demonstrated feasibility
- ② Proceeded with requirements document



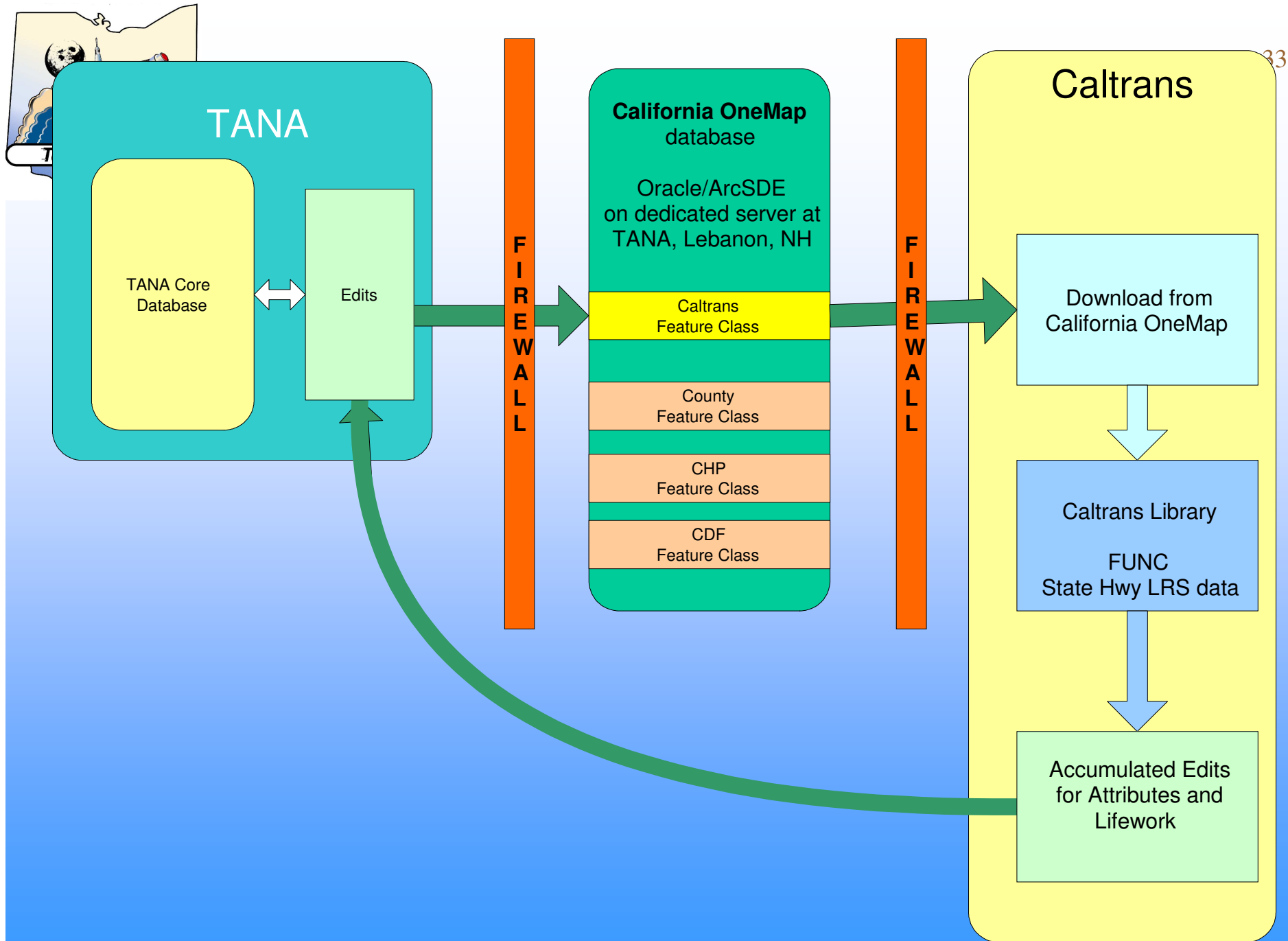
Requirements Document

- 1.0 Database format
- 2.0 Access to database
- 3.0 Road Attributes
- 4.0 Lifework - Roads
- 5.0 Lifework – County Boundary
- 6.0 Metadata for Edits/Updates
- 7.0 Update cycle
- 8.0 Data Views and Extractions
- 9.0 Data Sharing
- 10.0 Workflow



Tele Atlas Proposal to Caltrans

- ⓐ Tele Atlas hosts database on dedicated server
- ⓐ Oracle/ArcSDE format
- ⓐ County tiled
- ⓐ Dedicated Tele Atlas staff
- ⓐ Caltrans has direct read access
- ⓐ Tele Atlas processes our updates
 - Apply to Tele Atlas core database
 - Apply to California OneMap





Documentation

- ⓐ Letters of Transmittal
- ⓐ Notification of updates
- ⓐ Metadata
- ⓐ Changes documented
 - Source, Type, Who, Date
- ⓐ Rejections documented



Work Flow

- ④ Caltrans downloads county
- ④ Edits performed
- ④ ftp'd back to Tele Atlas, with metadata
- ④ Tele Atlas applies to core, California OneMap
- ④ Notification of update given to Caltrans
- ④ Caltrans accepts or rejects within 40 days

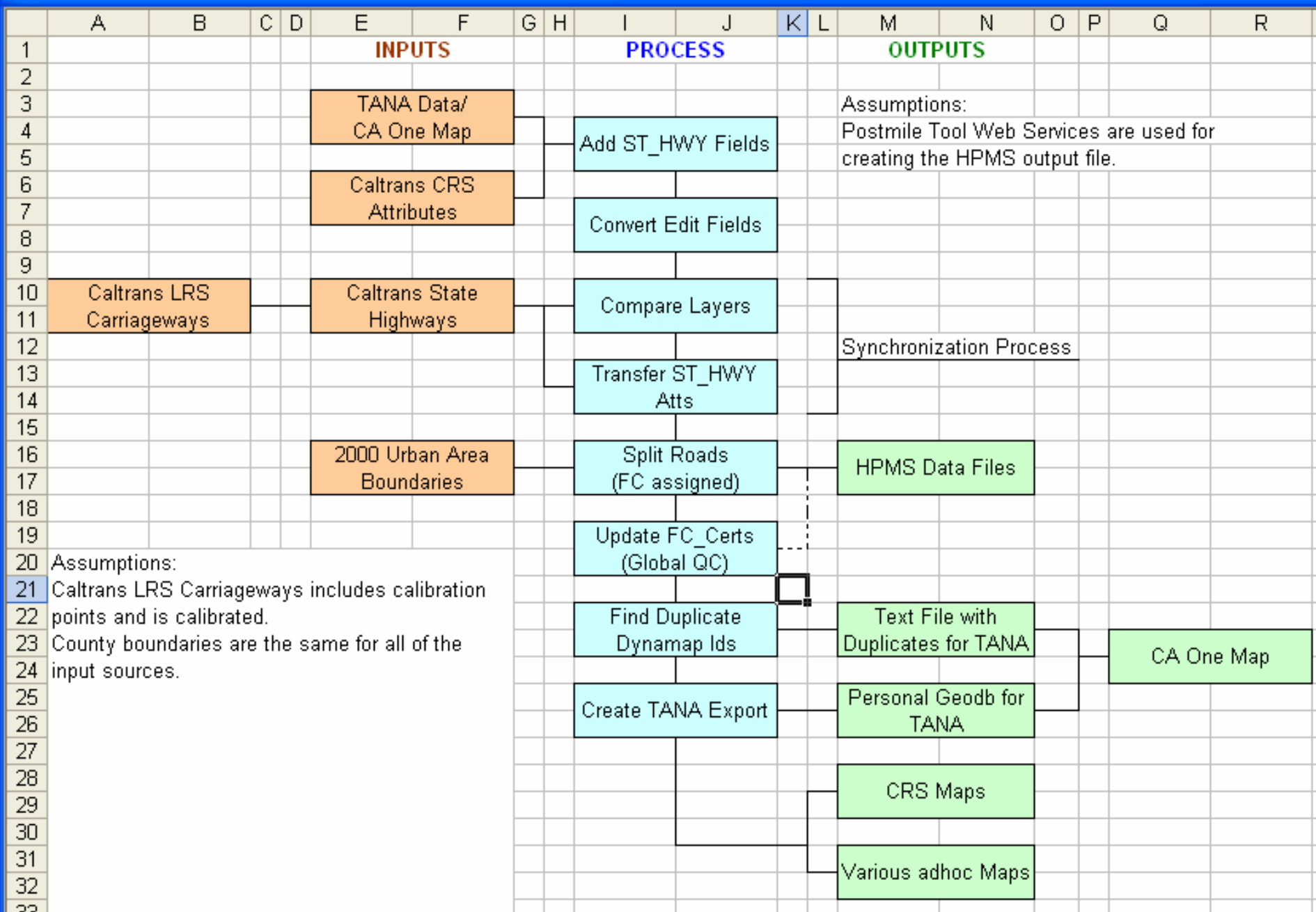
This approach has been abandoned



Challenges

- ④ Internal impacts at Caltrans
 - CRS Mapping
 - Feature linked annotation
 - State Highway carriage way for LRS
 - Associated county library layers
 - County lines and post miles
- ④ Stepping beyond the SOW
- ④ Requirements creep
- ④ HPMS work-plan and BPR
- ④ Version discrepancy 5.3 vs. 8.1

CRS-CA1_Flow





Process Enhancement

- ④ Issues were illuminated through discovery process
 - ④ Ebb and flow of database field requirements
 - ④ Proposed enhancement to the process
1. Reconciliation to the current version of Dynamap/Transportation
 2. Maintenance through change tables



Current Status

- ④ First conflation has been completed
- ④ Solid product for CRS map production
Based on Dynamap/Transportation v. 5.3
- ④ Enhancement to process – New statement of work
To bring us up to the current version, and migrate attributes to future versions
- ④ Approach to spatial enablement of HPMS under review
- ④ Short term vs. long term



Summary - Risks

- ⓐ Over-dependence on one vendor
- ⓐ County Boundary conflicts/confusion
- ⓐ Tele Atlas stops support
- ⓐ Tele Atlas get purchased, policies change
- ⓐ Perception we are beholden to Tele Atlas
- ⓐ Tele Atlas corners market, raises rates



Mitigation of Risk Factors

- ④ License Agreement addresses data sharing requirements and limits business risk
- ④ Statement of Work, mutual QC efforts and close technical relationship reduce technical risk



Summary - Benefits

- ④ Data support for CRS mapping
- ④ Ongoing Tele Atlas updates rolled in
- ④ Ability to share data
- ④ FUNC attributes maintained in HPMS database
- ④ FHWA has interest
- ④ Reasonable cost



Lessons Learned

- ④ Project management structure helped
- ④ Communication is important
- ④ Among team members
- ④ Between companies
- ④ Understanding your resources
- ④ Separating short term from long term



Thank you

Questions

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Conclusion

- ⓐ Both sides committed
- ⓐ Seek the win-win
- ⓐ Setting foundation for years to follow
- ⓐ Long term HPMS solution