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Design-Build Essentials: BART Berryessa Extension Design Lessons Learned

PMOC Quarterly Conference Call

April 22, 2014




Agenda

- Project Overview
- Contracting Plan
- Project Schedule
- Line/Track/Stations/Systems (LTSS) Design
- Design Phase Considerations
- Design Phase Process
- Design Phase Performance
- Summary

Project Overview

- **Project Sponsor: Santa Clara Valley Transportation Authority (VTA).**
- **Bay Area Rapid Transit District (BART) Extension from Warm Springs Station in Fremont to San Jose, CA.**
- **10.2 mile Heavy Rail extension along exclusive Right-of-Way (ROW).**
- **Includes at grade, aerial guideway, bridges, and retained cut.**
- **Third rail, Automatic Train Control.**
- **Two Stations: Milpitas and Berryessa (San Jose).**
- **40 new revenue vehicles; non-revenue operations and maintenance vehicles.**
- **Maintenance shop upgrades.**
- **Ridership Forecast: 23,900 Opening Year 2018; 41,900 Forecast Year 2030.**
- **Cost Forecast at Completion: $2.33B.**

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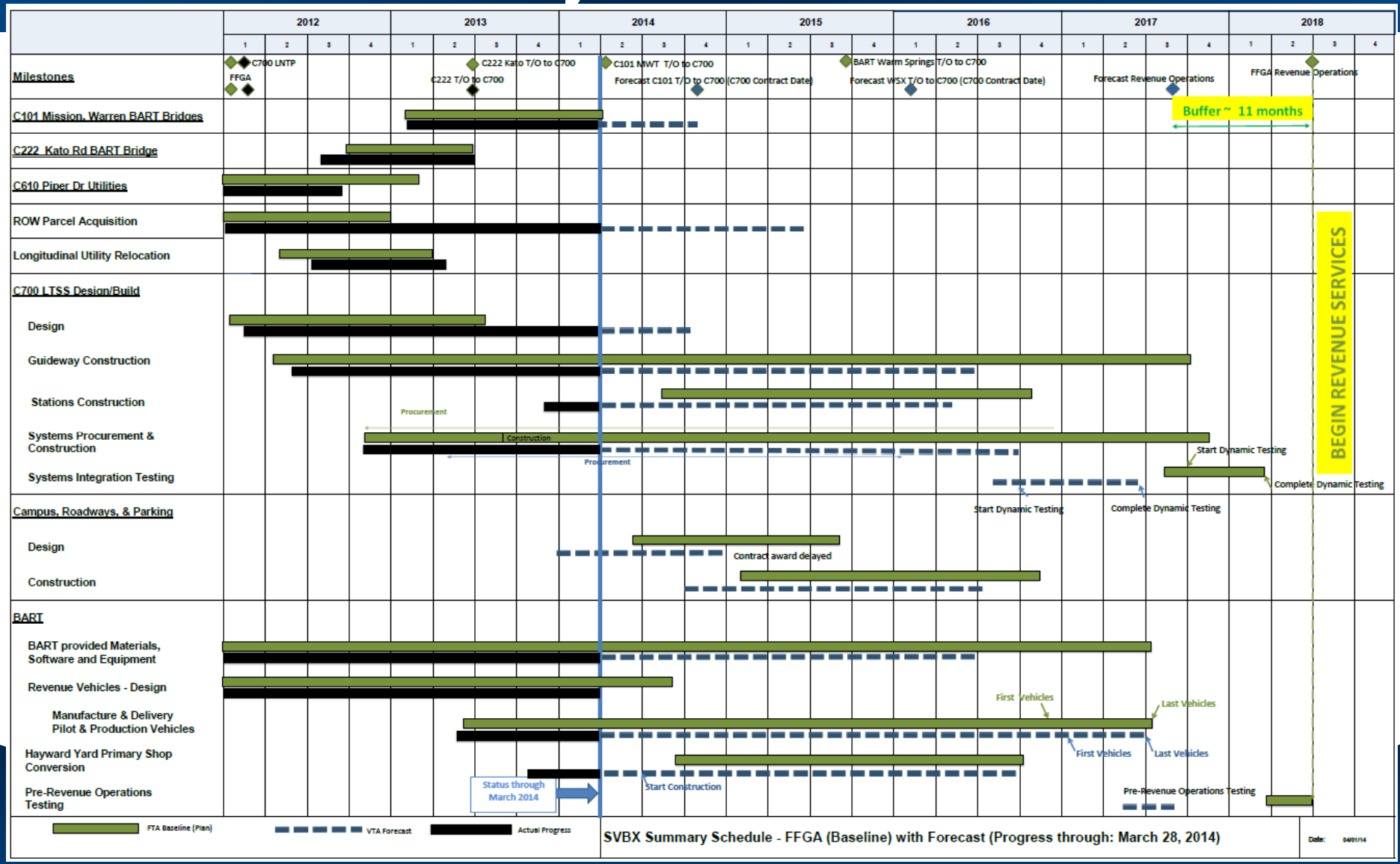
Contracting Plan

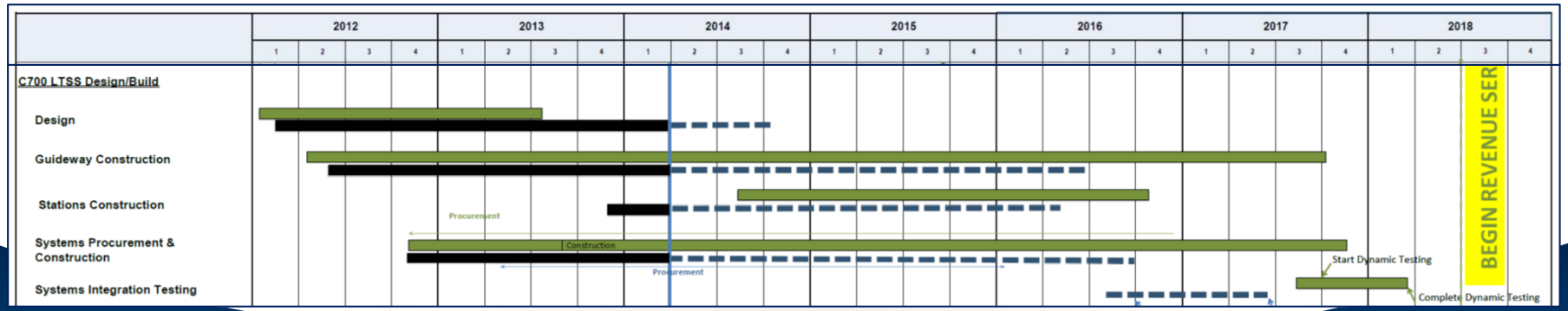
- Mission Boulevard/Warren Avenue Freight Railroad Relocation Construction. (July 2014)
- Kato Road BART Bridge Construction (completed).
- Piper Drive Utility Relocation (completed).
- ROW Parcel Acquisition. (2Q 2015)
- Longitudinal Utility Relocations (completed).
- Line/Track/Stations/Systems (LTSS) Design-Build. (4Q 2016)
- Campus, Roadway, and Parking Structure Design. (4Q 2014).
- Milpitas and Berryessa Parking Structures Design-Build. (4Q 2016)
- Milpitas and Berryessa Campus Construction. (4Q 2016)
- BART Materials and Software. (3Q 2017)
- Revenue and Non-Revenue Vehicles. (3Q 2017)
- Hayward Yard Primary Shop Conversion. (4Q 2016)
- Project is organized as a joint effort between VTA and BART with well defined responsibilities.

Project Schedule



LTSS Design

- Skanska-Shimmick-Herzog JV was awarded the LTSS Design-Build contract in February 2012 for $772 million.
- Lockwood, Andrews, & Newnam/T.Y. Lin International JV is the Prime Designer on the SSH team.
- Design phase is scheduled for completion in 4Q 2014.
- Guideway construction is under way including work at grade crossings, stations, aerial guideway, and trenches.
- Systems and equipment are under procurement.
- Substantial Completion scheduled 4Q 2016.



Design Phase Considerations

- **Preparation of technical requirements – By Project Sponsor or Consultant?**
  - –Effect on schedule.
- **Use of prescriptive vs. performance design requirements.**
- **Sponsor's design reviews requirements:**
  - –Effect on schedule & liability.
  - –Time limits; participation by third parties.
- **Alternate Technical Proposals (ATPs):**
  - – Permitted?
  - – Ownership, evaluation, scoring.
- **Use of ATPs by competing firms; credit for originator.**
- **Process for unique design elements, e.g., a signature bridge or elaborate station:**
  - –Timing and consideration of community based process.
- **Owner initiated post-award design changes:**
  - –Effect on budget and schedule.
- **Timely evaluation of post-award contractor suggested changes.**

Design Phase Process

LTSS Design-Builder Activities:

Review:

- Prescriptive Requirements.
- Guidance Materials.
- Design Criteria.
- Contract Drawings and Specifications.
- References, Codes, and Standards.

Obtain Field Data

Perform Design Analyses and Calculations

Design Package Distribution:

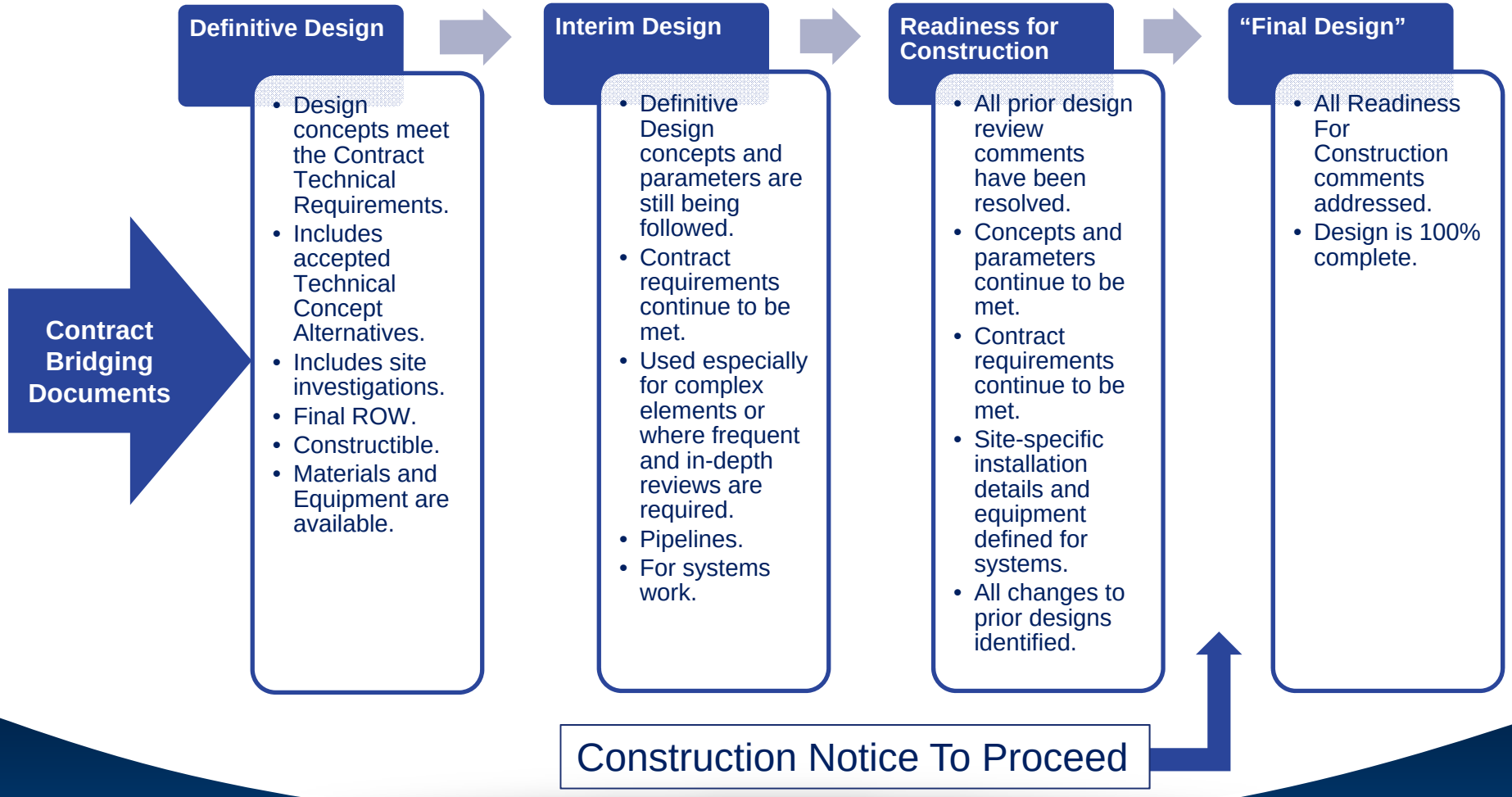
- Design Units.
  - Work Packages.

Prepare:

- Definitive Design.
- Intermediate Design (as required).
- Readiness for Construction.
- Final Design.
- Shop Drawings.
- Record Drawings and Specifications.

Design Integration; Systems Integration; QA/QC Compliance

Design Phase Process



Design Phase Performance - Stations

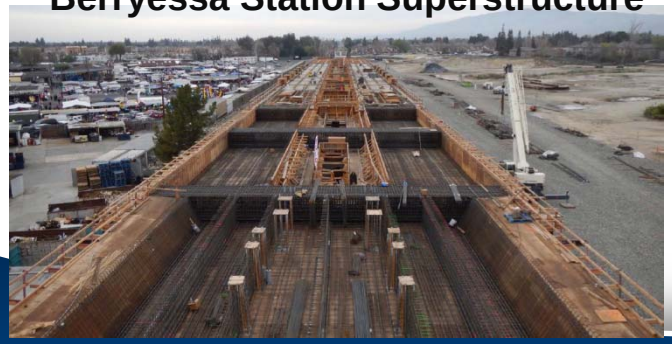
How Design-Build is Working:

Design Units		RFC Rev 0 Actual	Comments to SSH	Comment Resolution Meeting	Approved RFC	Total Sheets	Approved Sheets	
DU006	Guideway - Milpitas	**4-Apr-13**	5/17/2013	7/12/2013	12/11/2013	268	266	Construction
DU017	Berryessa Aerial Structure	**20-Nov-12**	1/4/2013	1/22/2013	5/14/2013	147	147	Construction
DU023	Milpitas Station	**16-Jul-13**	8/30/2013	9/26/2013		939	177	Design Review
DU024	Berryessa Station	**24-Jun-13**	8/9/2013	8/28/2013		665	186	Design Review

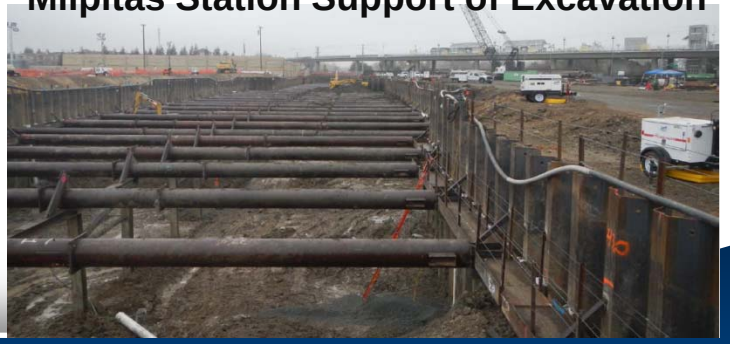
- **Station foundations and superstructure designs progressed quickly to RFC and are currently under construction.**
- **Station packages are separate from foundations and progressed from Definitive Design directly to Ready for Construction: *However*….based on their relative complexity, the approval progress has been slow.**

An Intermediate Design review was warranted to verify progress along the way.

Berryessa Station Superstructure



Milpitas Station Support of Excavation



Design Phase Performance - Grade Crossings

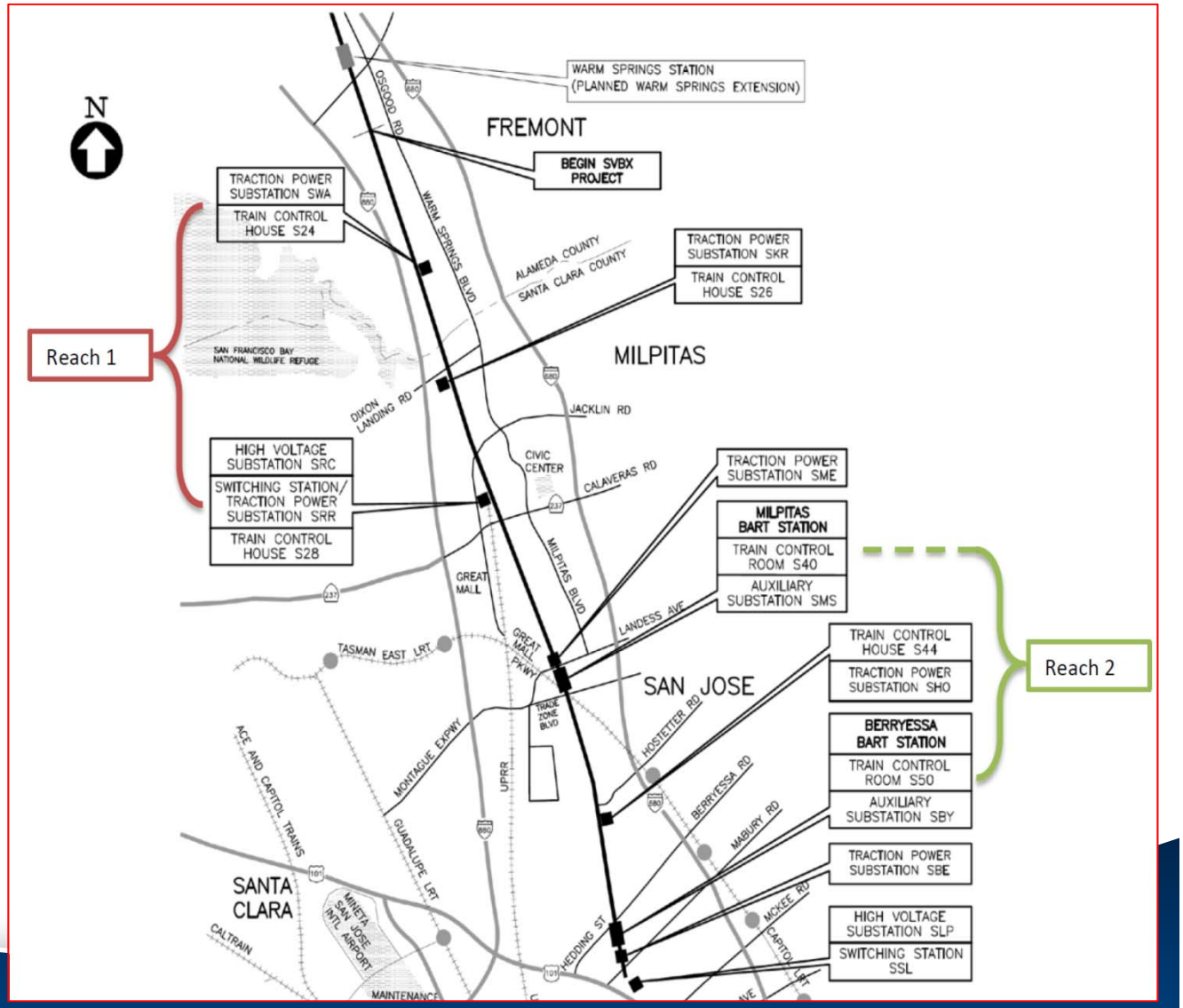
Sometimes Plans Can Change:

- **Dixon Landing Road (Milpitas) grade crossing and support of excavation designs were already approved, including plans for partial closure:**
  - Requires up to seven traffic switches.
  - Challenges: Nine utility moves; large traffic volume; maintaining retail and truck access.
  - 16 month duration.
- **Full Closure is now under consideration:**
  - Defined detour that won't change.
  - Surrounding intersection and street improvements to handle traffic flow.
  - Emergency vehicle access maintained.
  - 8 month duration.

The Design-Build Process should be flexible if better plans emerge!

Design Phase Performance - Systems

- The Contractor's system test plan originally included complex station elements.
- To accelerate the schedule, the Contractor redefined the first phase of testing (Reach 1) to stop north of the Milpitas Station.
- This will allow the Contractor to begin system integration testing several months earlier and resolve integration issues in advance of waiting for the complex station elements to be completed.



Summary

- ***Don't Bite Off More Than You Can Chew:*** **Allow the Contractor the flexibility to propose dividing major design packages into smaller, more manageable, units; this will allow less complex major works to proceed early on while more complex design elements are refined.**
- ***Not All Designs are Created Equal:*** **A flexible design review process is desirable, as it can save time and money; *however*… it's important to recognize early on during the RFP process what project elements should require more frequent review along the way.**
- ***Circumstances Can Change:*** **The Design-Build delivery method excels at allowing the Contractor to propose faster, more efficient construction methods.**
- **Stay Flexible: Flexibility should be built into the RFP process by striking a balance between prescriptive and performance requirements; sometimes the Contractor's first idea isn't the best one; allow a means to pursue better plans as they emerge.**