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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

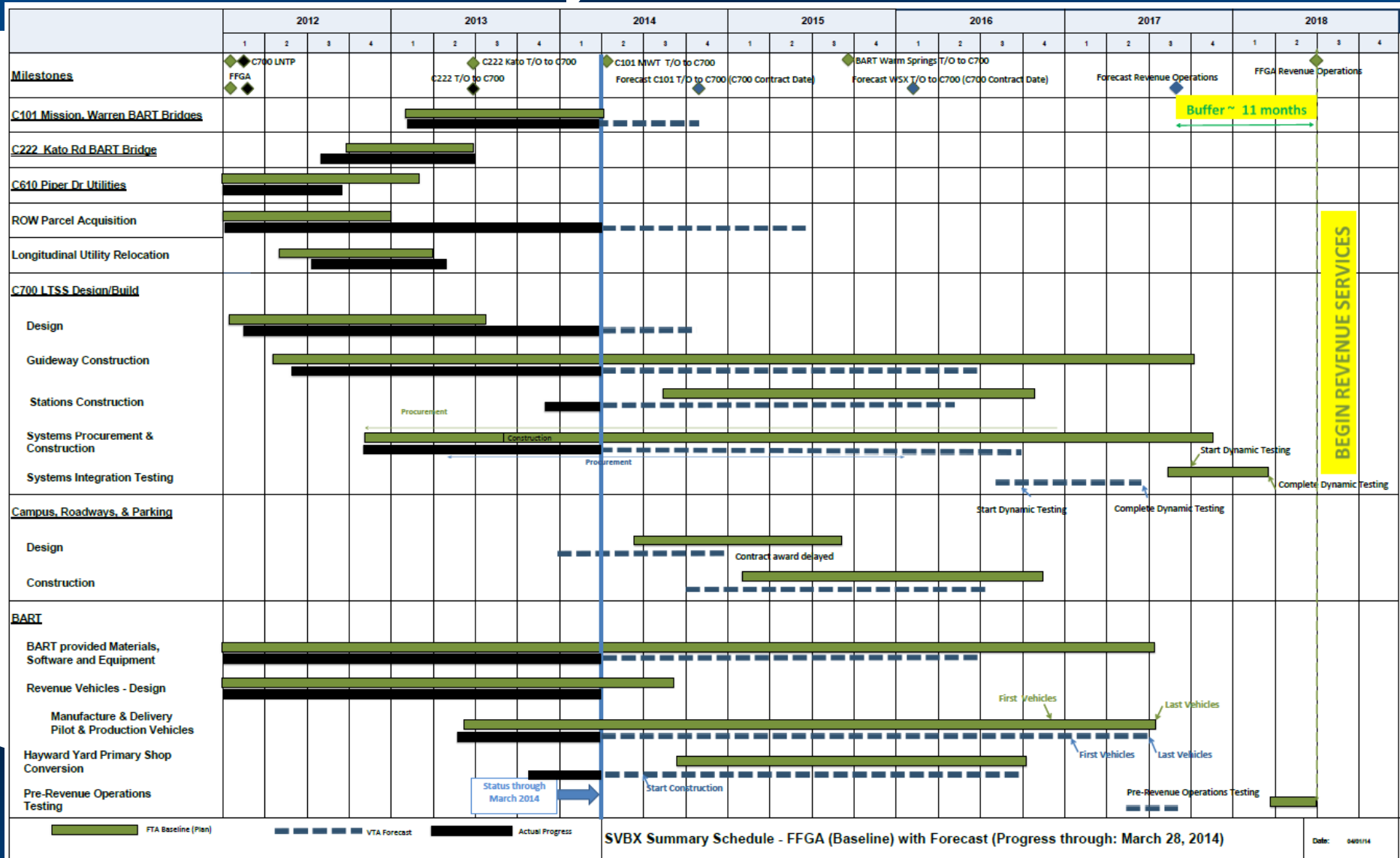
- Mission Boulevard/Warren Avenue Freight Railroad Relocation Construction. (July 2014)
- Kato Road BART Bridge Construction (**completed**).
- Piper Drive Utility Relocation (**completed**).
- ROW Parcel Acquisition. (2Q 2015)
- Longitudinal Utility Relocations (**completed**).
- Line/Track/Stations/Systems (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.



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Project Schedule



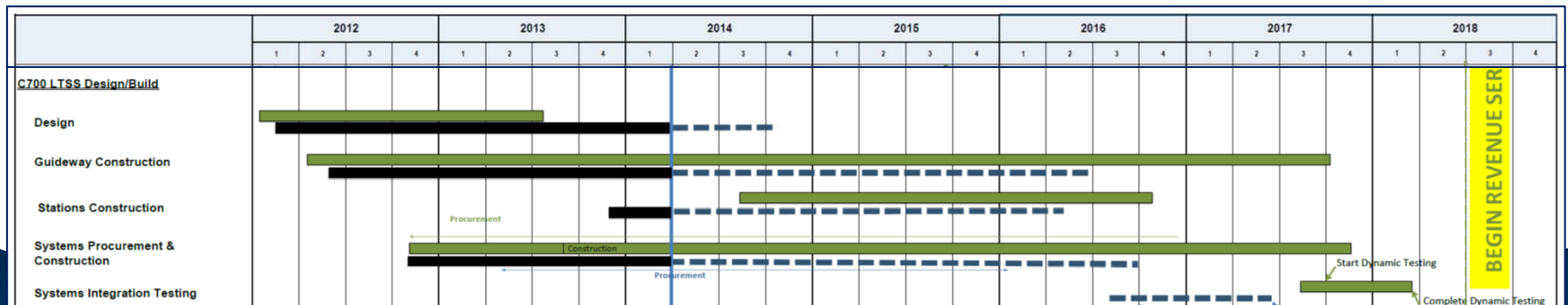
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Date: 04/01/14

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.

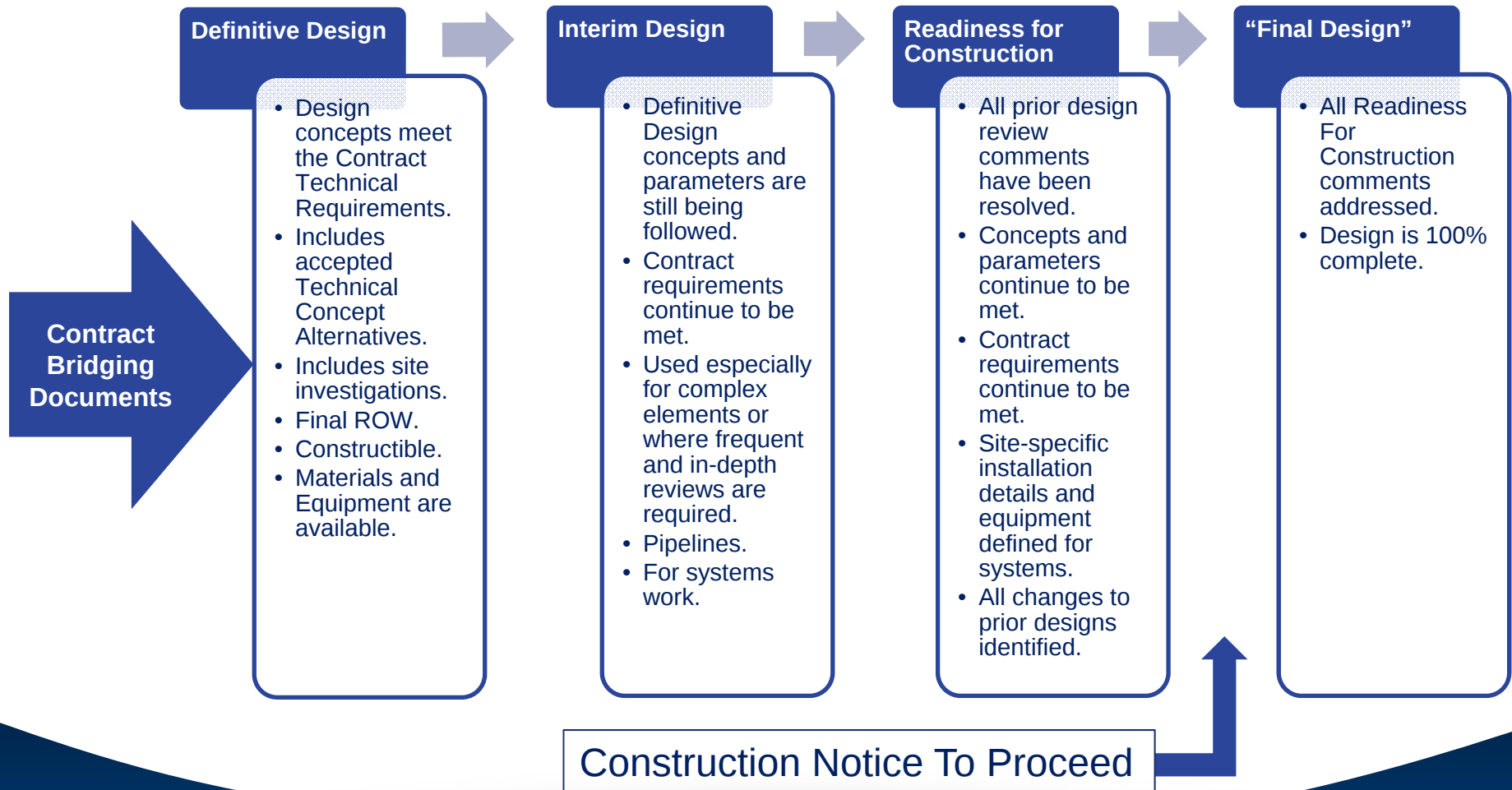
Design Integration; Systems Integration; QA/QC Compliance



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Design Phase Process



Design Phase Performance - Stations

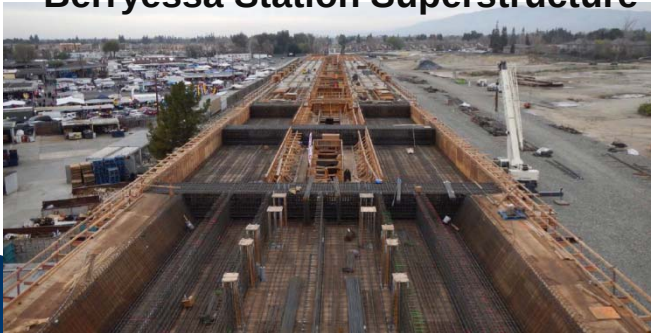
How Design-Build is Working:

Design Units	RFC Rev 0	Comments to SSH	Comment Resolution Meeting	Approved RFC	Total Sheets	Approved Sheets	
	Actual						
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	
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	

- 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



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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!

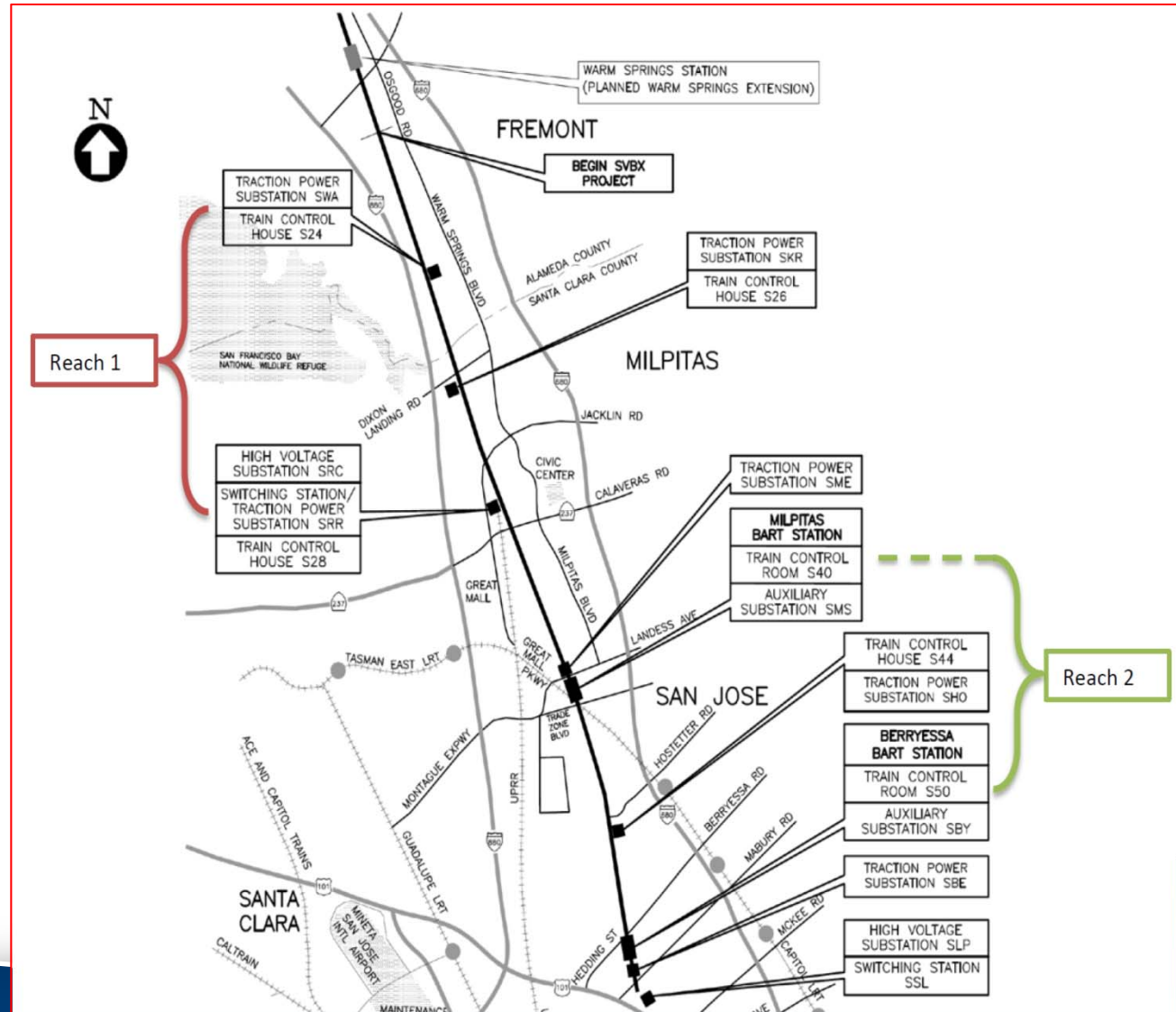


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Design Phase Performance - Systems

- 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.

