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.
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

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Buffer ~ 11 months

SVBX Summary Schedule - FFAG (Baseline) with Forecast (Progress through: March 28, 2014)

Gannett Fleming Excellence Delivered As Promised
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

Definitive Design
- Design concepts meet the Contract Technical Requirements.
- Includes accepted Technical Concept Alternatives.
- Includes site investigations.
- Final ROW.
- Constructible.
- Materials and Equipment are available.

Interim Design
- Definitive Design concepts and parameters are still being followed.
- Contract requirements continue to be met.
- Used especially for complex elements or where frequent and in-depth reviews are required.
- Pipelines.
- For systems work.

Readiness for Construction
- All prior design review comments have been resolved.
- Concepts and parameters continue to be met.
- Contract requirements continue to be met.
- Site-specific installation details and equipment defined for systems.
- All changes to prior designs identified.

“Final Design”
- All Readiness For Construction comments addressed.
- Design is 100% complete.

Construction Notice To Proceed
Design Phase Performance - Stations

How Design-Build is Working:

<table>
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<th>Design Units</th>
<th>RFC Rev 0</th>
<th>Actual</th>
<th>Comments to SSH</th>
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- 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!
• 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.