



April 19, 2021

DB Engineering & Consulting USA Inc.
Attn: Ulrich Leister
2010 Main Street, Suite 220
Irvine, California 92614

Ulrich.Leister@deutschebahn.com

RE: RFP #20-03323BM FrontRunner Next Steps Strategy: On Call Operations Planning and Simulation Assistance

TASK ORDER NUMBER 2

Dear Ulrich:

The purpose of this letter is to authorize performance of Task Order No. 2 under the current Contract between DB Engineering & Consulting USA Inc. and Utah Transit Authority (UTA) dated January 12, 2021.

This Task Order covers FrontRunner Service and Ops Analysis as described in Exhibit A below. The not to exceed (NTE) price for all work covered under this amendment is \$320,105.80 as shown in Exhibit A. . Consultant may submit invoices on a monthly basis along with supporting justification for effort expended and work completed. Once invoices are reviewed and approved by UTA, payment shall be made within 30 days of invoice approval.

If you agree with the terms of this Task Order as described above and are willing to abide by such terms, please sign on the line indicated below.

All other terms & conditions of the contract remain in full force and effect

UTAH TRANSIT AUTHORITY

DB Engineering & Consulting USA Inc.

By: _____ Date: _____ By: _____
Date:

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Carolyn Gonot
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David Hüffmeier
Chief

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Date: _____

Manjeet Ranu
Chief Executive Officer

Mark Evans Director of Capital Projects

Approved as to Form and Content

DocuSigned by:
Mike Bell 4/26/2021

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Michael Bell

Assistant Attorney General UTA
Counsel

Exhibit A

Simulation and Operations Planning Task Order 2

UTA – Simulation and Operations Planning
Task Order 2

DB Engineering & Consulting USA, Inc.

Consulting

2010 Main Street STE 220

Irvine, CA 92614 USA

March 22, 2021

DB Engineering & Consulting USA, Inc.

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1 FrontRunner Service and Ops Analysis Task Order 2 Overview

DB Engineering & Consulting USA Inc (DB), as requested by Utah Transit Authority (UTA), has developed the following scope of work in response to Task Order 2 ☐ Reduce Travel Time in the Short Term, Define Initial Investment Service, Simulate Scenarios being considered, provided to DB by UTA on March 10, 2021. Because this scope of work is being agreed upon prior to the full notice to proceed for the FrontRunner Forward Program Management team, some adjustments to the specifics of each sub-task described herein may change, but the total amount of the Task Order 2 would remain the same.

The primary objectives of this Task Order is to further the development of operationally feasible concepts that allow UTA to expand service in the peak operating periods as well the development of conceptual plans in support of FrontRunner strategic business plan.

In support of those primary objective, there are several sub-objectives that need to be addressed during the planning process:

- Understand future market demands of the corridor, including future growth and changes in travel patterns.
- Understand the signal and station safety improvements needed to support express service and increase in top speeds to 90 MPH;

The Technical Working Group (TWG) organized for Task Order 1 will continue to provide guidance for the technical workstreams in Task Order 2. The TWG will meet regularly (bi- weekly) to define objectives, discuss input needs, analyze results, and identify potential concept refinements.

1.1 Proposed Sub-Tasks

This work effort will be structured in Four Sub-Tasks:

- Sub-Task 1: FrontRunner Forward Program Manager Coordination
- Sub-Task 2: Strategic Concept Development Support
- Sub-Task 3: Simulation Modelling
- Sub-Task 4: Signal and Stations Safety Enhancements

2 Sub-Task 1: FrontRunner Forward Program Manger Coordination

DB will plan regular coordination with FrontRunner Forward Program Manager (FRFPM) to inform and update the FRFMP team on the status of the service and operational planning, and to receive feedback and guidance from other work streams that may impact ongoing operations planning. Coordination will be initiated with a kick-off meeting in which DB will present a summary of findings from Task Order 1 and the roles and responsibilities will be delineated for how information will be shared going forward among the teams.

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DB estimates that coordination will occur in regular bi-weekly information sharing sessions.

Deliverables: Sub-Task 1

- Presentation style report summarizing service and operations planning work done to date for Kick-Off Meeting
- Bi-weekly participation in coordination meetings

3 Sub-Task 2: Strategic Concept Development Support

In Task Order 1, DB used an iterative process to develop service concepts consisting of a select network configuration and set of stopping patterns and frequencies that meet one or more of the service goals and/or emphasize service to certain travel markets. These concepts were reconciled to be free of operating conflicts and illustrated with stringlines for discussion and review with the working group.

This sub-task will use that same approach to develop of conceptual service plans in support of the strategic business plan. We will be responsive to ideas shared in the coordination meeting with the FRFPM that result from conceptual engineering analysis, and/or market considerations such as demographic data and market trends. Conceptual service concepts will assess the service benefits and infrastructure needs from changes to MAS, fleet, and/or service frequencies and patterns. [Deliverables: Sub-Task 2](#)

- Presentation style report process and method for concept development describing recommended adjustment to existing operations;

4 Sub-Task 3: Simulation Modelling

In Task Order 1, DB developed a dynamic simulation model in RailSys for use in future task orders. In Task Order 2, DB will conduct dynamic simulation to validate the stability and robustness of the developed concepts.

Up to seven peak-hour timetables, as defined by the TWG, will be simulated on infrastructure defined in the conceptual development phase for the Provo – Ogden corridor. The timetables will be simulated using continuous peak hour conditions (with a ramp up and ramp don period) and will include all revenue and non-revenue moves.

The simulation will be used to

(a) identify whether delay accumulates due to daily variability in operations, and (b) assist in understanding how the bottlenecks on the proposed infrastructure will impact operation.

Each timetable concept will be tested under two conditions. In a first step, each timetable will be simulated with no perturbations to develop a baseline

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understanding of the timetable's stability from which to measure variability against. In a second step, minor disruptions associated daily operation will be introduced using agreed perturbations as directed by the TWG (e.g., run time variation, entry delay, dwell time extension, etc.). Our simulation tool allows the user to define the distribution of parameters used for perturbation to match the expected level of disruption. After the perturbations are defined, 100 simulations, which represent 100 days of operation, will be run to obtain statistically significant results for output analysis. For each of the simulations, perturbation of parameters will be introduced with randomized values. This is to simulate the interaction between infrastructure, signaling system, rolling stock, and timetable and to examine if delay builds up when random disruptions happen. The results (such as train actual arrival/departure time at all the stations) will be generated as a csv file for further analysis and visualized through stringlines.

Key metrics, as defined by the TWG, such as total minutes of delay and on-time performance (OTP) standards will be calculated at a summary level to assess the overall stability of the timetable during the peak hour for daily operations and assess the impact of potential bottlenecks. The UTA target of 95 percent OTP will be used as a threshold as minimum acceptable standard. More detailed analysis of specific problem days (top 5 percent delay scenarios) will be developed with operations visualized for a full understanding of the causes of delays and how the system recovered from those.

Infrastructure changes identified through simulation that reduce delay and contribute to bringing the system below acceptable delay thresholds will be presented to the TWG for potential follow up analysis.

Prior to the beginning the simulation, DB E&C will hold an initial meeting with the TWG to define and confirm the following assumptions:

- 1) Operation parameters
- 2) Timetable for simulation
- 3) Variables to perturb for dynamic simulation and threshold and distribution of variability
- 4) On-time performance standards and other Metric of Interest to UTA

Deliverables: Sub-Task 3

- Presentation style report deck that includes simulation input, methodology, assumptions, simulation output, output analysis, conclusions, and recommendations including locations and extent of required capital and operating changes if any

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5 Sub-Task 4: Signal Enhancements and Station Safety Considerations

Team member RailPros will lead an assessment of potential enhancements to the signal system and needed safety improvements at graded crossings and stations needed for increased speed to 90 mph and implementation of express services. While the simplicity of a ‘speed increase’ appears great on paper, there are physical limitations

within the wayside signal system, cab signals, wayside programming, ASR times, braking blocks, track circuit lengths (blocks), signal aspects, signal spacing, crossing approaches, remote DAX/UAX and turnout speeds. This is not an all-inclusive list however it highlights the complexity of the current UTA signal system.

RailPros will perform an initial, high level review of the entire the signal system. Up to three locations identified as potential bottle necks from the conceptual service planning and simulation will then be studied in more detail recommendation on what needs to improve and the estimate for that improvement (design, material, and construction).

Deliverables: Sub-Task 4

- A summary of system wide assessment of opportunities of signal and station enhancements
- Recommendations on up to three locations for specific enhancements

6 Estimated Project Schedule

The following estimated project schedule is proposed. Bi-weekly interactions with the Technical Working Group are assumed throughout the project.

DB is responsible for timely development of materials and will ensure best efforts to coordinate with UTA and other stakeholders as needed to deliver outlined scope above.

Week Of -->	May	June	July	Aug	Sep	Oct	Nov	Dec
Sub-Task 1: FrontRunner Forward Program Manager Coordination								
Sub-Task 2: Strategic Concept Development Support								
Sub-Task 3: Simulation Modeling								
Sub-Task 4: Signal and Stations Safety Enhancements								

7 Estimated Level of Effort – **Not to Exceed Budget**

DB E&C reserves the right to reassign work hours among the project team, as required, to fulfil the scope of work for this task. If complexity is beyond the anticipated level, additional budget may be necessary to complete this effort.

DB Engineering & Consulting USA Inc.

	Principal Consultant	Managing Consultant	Senior Consultant	Consultant	Analyst	Total	Total
Sub-Task 1: FrontRunner Forward Program Manager Coordination	80	0	0	0	0	80	\$23,564.80
Sub-Task 2: Strategic Concept Development Support	200	80	0	0	460	740	\$137,932.80
Sub-Task 3: Simulation Modeling	40	0	120	220	119	499	\$83,641.00
Sub-Task 4: Signal and Stations Safety Enhancements	20	0	200	200	0	420	\$74,967.20
Total	340	80	320	420	579	1739	\$320,105.80