



I-85 Reconstruction and Widening MM 77 to 98



Main Contractor: Blythe Zachry Joint Venture



CPM Scheduling Consultant: HSE Contractors Inc.

<u>TIA Narrative Report Based on November 2021 Update</u> <u>I-85 Reconstruction and Widening MM 77 to 98</u>





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1. Executive Summary

BZJV's November 01, 2021 rebaseline schedule was analyzed for consistency, contemporaneousness, and accuracy. After analyzing the changes that were made in the rebaseline, it was clear that BZJV mitigated the delays that remained behind schedule after the settlement of the CSX and Wet utilities claim. To further validate the steps taken by BZJV we replicated the process.

The next part of the analysis of the project schedule, using the November 1, 2021 schedule update, was conducted in response to significant changes requested by South Carolina Department of Transportation (SCDOT) during the summer of 2021. These changes focused on revising approved MOT plans for approximately 65% of the remaining project, primarily driven by safety improvement goals. Specifically, SCDOT requested the discontinuation of "Split-traffic" conditions, which were previously allowed and approved as part of the Traffic flow or Maintenance of Traffic (MOT) plans.

Throughout the summer of 2021, BZJV collaborated closely with SCDOT to develop strategies for swiftly relocating existing traffic from "Split Condition" and preventing future traffic from entering such conditions. These strategies were formally documented in a Memorandum of Understanding (MoU). Concurrently, SCDOT granted approval for an extension of 876 days out of a total delay of 987 days as indicated in the November 1, 2021 schedule update.

At the request of SCDOT, facilitated through their claim's consultant, BZJV prepared a schedule demonstrating that the project would meet its approved contract completion date `with the 876-day time extension. For this analysis, BZJV used the November 2021 schedule update, which conveniently aligned with the resolution of delays and damages related to CSX and Wet Utilities on the project.

In Step 1 of this analysis the CSX and Wet Utilities claim resolution allows for a revised target date of substantial completion of November 29, 2023. This analysis incorporates closures of specific ramps and the opening of major phases of the Y Line to its final alignment on the Intermediate Course. The analysis outlines additions and deletions of predecessor activity relationships to reflect how the project was able to be built based upon the additional requirements and concessions of the SCDOT.

This analysis also addresses successor activity relationships that were adjusted to reinforce task sequencing. Notable changes include Install Permanent Signs - Dewberry Rd 890+00 to 902+74 (S2Y1770) being followed by Mill Asphalt / Undercutting Shoulder to Grade - CSX S2 ST3A PH1 (S2C1440) and Install Permanent Signs - Shelby Hwy 209+45 to 218+25 (S4Y3610) being followed by Section 4 Complete (M1370). The analysis moves successor relationships to alters the project flow, such as Install Permanent Signs - Shelby Hwy 203+60 to 209+38 (S4Y2440) no longer being followed by Open New Bridge - SC18 (S4B2772).

Step 2 of the analysis reveals a delay of 303 days, attributed to several factors created by the requests of the SCDOT to remove "Split Conditions" going forward in the project. This was accomplished by doing variable wedging for height difference, changing concrete paving to asphalt paving, adding additional widening, and changing the overall MOT sequence for construction the Southbound Lanes of the project.





This analysis serves as a comprehensive report of the potential changes to the November 1, 2021 update that show actions, and schedule changes that recover the remaining delays in the project completion date after the CSX and Wet Utility schedule extension. This analysis then shows the effect of the SCDOT request to remove all future "Split Conditions" on the project completion date.

2. Scope Of Work

SCDOT, and its two contractors, a Joint Venture of Blythe Construction, Inc. and Zachry Construction Corp. (BZJV) have begun widening and rehabilitation of the existing Interstate 85 between mile marker 77 and 98.

This project utilizes the design-build contract method, which required BZJV to design, obtain permits, acquire right-of-way, coordinate utility relocation, and construct the 21 miles of interstate, all under the oversight of the SCDOT and the Federal Highway Administration.

BZJV continues to rehabilitate and widen from mile marker 77 to mile marker 80 in Spartanburg County and reconstruct and widen the existing four-lane interstate to six lanes between mile marker 80 and mile marker 98 in Cherokee County. The BZJV's scope involves adding a travel lane in both directions and interchange reconstruction for exits at mile markers 83, 87, 95, and 96. In addition, the contractor provides rehabilitation of the existing ramps for exits at mile markers 78, 80, 90, and 92. Additionally, a new CSX railroad bridge crossing the interstate near mile maker 81 was constructed under this Contract. The BZJV began construction in June of 2017.

The work being performed on these roads and bridges will help alleviate traffic congestion throughout this entire corridor. This project will improve safety for the traveling public, provide a financial boost to the local economy and increase the capacity of this section of the interstate system so it may function more efficiently for many years to come. The contract awarded to BZJV was the second largest infrastructure improvement contract ever awarded in South Carolina, trailing only the contract awarded to replace the Cooper River Bridges.

This project will make a positive difference to all who travel the Upstate.

3. Chronology of Events: Analysis based on November 21 Schedule update

Chronology of Events:

This analysis is based on the November 1, 2021 schedule update. It explores actions that could have been taken by BZJV and how those actions would have resulted in recovering the negative float on project completion, leading to a +7 total float on substantial completion.

Step 1: In this analysis the settlement of the CSX and Wet Utilities claim allows for a new target date of substantial completion of November 29, 2023. This revised timeline includes the closures of





ramps 80, 83, 87, and 90, as well as major phases of the Y Lines being opened to its final alignment on the Intermediate Course. The result is a +7 days total float on substantial completion.

In the steps of this analysis, several changes are made to the activity relationships, both in terms of additions and deletions. These alterations reflect the reorganization of tasks and dependencies within the project, based upon additional requirements and concessions of the SCDOT.

• Added Predecessor Activity Relationships:

<u>S2C1440 - Mill Asphalt / Undercutting Shoulder to Grade - CSX S2 ST3A PH1</u>: This activity is now linked as a predecessor to "Install Permanent Signs - Dewberry Rd 890+00 to 902+74," indicating that the road milling and undercutting must be completed before installing signs on Dewberry Road.

<u>M1361 - Section 2 Complete</u>: This activity now depends on the successful completion of "Pave Dewberry Road - CSX S2 ST2 PH1," ensuring that Section 2 will only be marked as complete once the road paving is finished.

<u>M1370 - Section 4 Complete</u>: Three predecessor relationships have been added for Section 4 completion, requiring the installation of permanent signs on different segments of the project before marking Section 4 as complete. This reflects the interdependence of sign installation and roadwork.

<u>S4M1010 - Set Detours. Close Exit 92 Ramp D - S4 ST3A PH2:</u> This activity is now linked to "Install Erosion Control - S4 ST3A PH1 Area 1" as its predecessor, suggesting that detour setup should precede erosion control installation in Area 1.

<u>S4M2400 - Set Portable Barrier - S4 ST3A PH2:</u> It now relies on "Stripe and Shift Traffic - S4 ST3A PH2" and "Set Portable Barriers - S4 ST3A PH1 Area 1" as predecessors, implying a sequential order of tasks to ensure safety and traffic management.

<u>S4M2380 - Stripe and Shift Traffic - S4 ST3A PH2:</u> This activity has multiple predecessor relationships, indicating its involvement in various stages and areas of the project, all linked to other crucial tasks.

<u>S4M1155 - Mill Asphalt / Undercutting Shoulders to Grade - S4 ST3A PH4:</u> It now depends on "Excavation/Embankment - S4 ST3A PH4 (Remaining from Stage 1B Installation)," signifying that the milling and undercutting work in Phase 4 must follow the excavation and embankment activities.

• Deleted Predecessor Activity Relationships:

<u>S4B2772 - Open New Bridge - SC18:</u> This relationship, linking the opening of a new bridge to sign installation on Shelby Hwy, has been removed, possibly due to a change in the project timeline or priorities.

<u>S4M1210 - Excavation/Embankment - S4 ST3A PH4 (Remaining from Stage 1B Installation):</u> The Start-to-Start relationship between excavation/embankment and milling/asphalt activities has been deleted, suggesting a reevaluation of the timing or workflow of these tasks. <u>M1361 - Section 2 Complete:</u> The Finish-to-Finish relationship between Section 2 completion and Dewberry Road paving has been removed, indicating that Section 2 completion is no longer





dependent on the paving of Dewberry Road.

<u>S4M1005 - Install Erosion Control - S4 ST3A PH1 Area 1:</u> The Start-to-Start relationship between erosion control installation and detour setup has been deleted, potentially reflecting changes in the coordination of these activities.

• Added Successor Activity Relationships:

Several successor relationships have been added, reinforcing the logic of task sequencing:

Install Permanent Signs - Dewberry Rd 890+00 to 902+74 (S2Y1770) is now followed by Mill Asphalt / Undercutting Shoulder to Grade - CSX S2 ST3A PH1 (S2C1440).

Pave Dewberry Road - CSX S2 ST2 PH1 (S2C1400) is succeeded by Section 2 Complete (M1361). Install Permanent Signs - Wilcox Ave 1583+13 to 1643+50 (S4Y1465) is followed by Section 4 Complete (M1370).

Install Permanent Signs - Shelby Hwy 203+60 to 209+38 (S4Y2440) is succeeded by Section 4 Complete (M1370).

Install Permanent Signs - Shelby Hwy 209+45 to 218+25 (S4Y3610) is followed by Section 4 Complete (M1370).

Install Erosion Control - S4 ST3A PH1 Area 1 (S4M1005) is succeeded by Set Detours. Close Exit 92 Ramp D - S4 ST3A PH2 (S4M1010).

Stripe and Shift Traffic (Exit 92) - S4 ST3A PH2 (S4M2380) is succeeded by Set Portable Barrier (Exit 92) - S4 ST3A PH2 (S4M2400), Set Portable Barriers - S4 ST3A PH1 Area 1 (S4M2460), Set Portable Barriers - S4 ST3A PH1 Area 2 (S4M2350), and Stripe and Shift Traffic - S4 ST3A PH1 Area 3 (S4M2445).

Excavation/Embankment - S4 ST3A PH4 (Installed in Stage 1B) (S4M1210) is followed by Mill Asphalt / Undercutting Shoulders to Grade - S4 ST3A PH4 (S4M1155).

• Deleted Successor Activity Relationships:

Several successor relationships have been removed, altering the project flow:

Install Permanent Signs - Shelby Hwy 203+60 to 209+38 (S4Y2440) is no longer followed by Open New Bridge - SC18 (S4B2772).

Excavation/Embankment - S4 ST3A PH4 (Remaining from Stage 1B Installation (S4M1210) is no longer followed by Mill Asphalt / Undercutting Shoulders to Grade - S4 ST3A PH4 (S4M1155).

Pave Dewberry Road - CSX S2 ST2 PH1 (S2C1400) is no longer followed by Section 2 Complete (M1361).

Install Erosion Control - S4 ST3A PH1 Area 1 (S4M1005) is no longer followed by Set Detours. Close Exit 92 Ramp D - S4 ST3A PH2 (S4M1010).

Install Permanent Signs - Wilcox Ave 1583+13 to 1643+50 (S4Y1465) is no longer followed by Section 4 Complete (M1370).

Install Permanent Signs - Wilcox Ave 1643+50 to 1658+30 (S4Y1905) is no longer followed by Section 4 Complete (M1370).

Asphalt Pave Intermediate Course (Open on Intermediate Course) - Shelby Hwy 203+60 to 209+38 (S4Y2400) is no longer followed by Survey - Signs, EP, Demo Limits, Drainage - Shelby Hwy Round-About (S4Y2765).





Step 2: This step of the analysis focuses on the changes that needed to be made to the schedule to reflect the changes required to comply with SCDOT's request to not allow any further "Split Conditions" in the construction of the Mainline traffic in Segment 4. These changes include the following items:

- Variable Wedging for Height Difference: The process of adjusting the height difference between sections. This adjustment required careful planning and execution to ensure smooth transitions and contributed to an overall delay to the project.
- Getting out of the Split Condition: Overcoming initial challenges and obstacles took longer than expected, causing a setback in the project timeline. Addressing these bottlenecks and finding effective solutions required additional time and resources, resulting in an overall delay to the project.
- Full Depth Reconstructions: The comprehensive reconstruction process, involving the complete reconstruction of the road surface to its full depth, proved to be a complex and time-intensive task. The adding of this work to the Phase 3B MOT phase resulted in an overall delay to the project.
- Stage 3b Shoulder + 2 Lanes: The construction of the widened shoulders presented complications and complexities to adjust grades and sequence of construction. This expansion of the roadway width led to an overall delay to the project.

These factors collectively resulted in a delay of 303 days in the project schedule.

4. Conclusion

In this analysis of a Time Impact Analysis Report for the November 1, 2021 update, we have shown that the actions that would have been taken by BZJV to recover from negative float and achieve a total float of +7 on substantial completion. The analysis outlines the changes that would have been made to the project schedule, including additions and deletions of activity relationships, and identifies the I factors that contributed to a delay of 303 days.

In this analysis, BZJV would have implemented various strategies to address the negative float. After settling the CSX and Wet Utilities claim and revising the target date of substantial completion to November 29, 2023, the BZJV would have been able to address any remaining negative float with the steps outlined in this analysis. This revised timeline would have included the closure of specific ramps and the opening of major phases of the Y Lines in their final position by opening on the Intermediate Course. By making adjustments to activity relationships, BZJV would have been able to streamline processes, optimize resource allocation, and address the additional requirements request by the SCDOT that were included as part of the MoU.

This Time Impact Analysis Report could has provided insights into the added and deleted predecessor and successor activity relationships. These I changes would have reflected the dynamic reorganization of tasks within the project. This shows the interdependencies between road milling, undercutting, and sign installations that are crucial for the project's success in this analysis and the BZJV would have had the opportunity to address were it not for the requests made by the SCDOT.





The analysis reveals a delay of 303 days, attributed to factors such as variable wedging for height difference, initial challenges for removal of previously constructed work, full-depth reconstructions, and the construction of widened shoulders. In this analysis, efforts would have been made to address these challenges, recover lost time, and bring the project back on track within the revised timeframe had it not been for the additional requests of the SCDOT that were outlined in the MoU.

5. Disclaimer

This what-if analysis was carried out using contemporaneous events and conversation with the Project Teams. Due to the nature of CPM scheduling isolating events result in a different result than those that may have been represented in the contemporaneous updates submitted to SCDOT. The intent of this analysis is to show whether BZJV could have recovered the time beyond the completion date of 11/29/2024 if it were not for the additional work to not construct the remainder of the project using a Split Condition in Segment 4.





6. Appendices

Step 1 Schedule (+7) vs. Step 2 Schedule (-303)