LESSONS LEARNED

SUMMARY REPORT

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C. LESSONS LEARNED SUMMARY

1) Plan Scale and Legends – Indicating Pavement Construction
2) Drop-off Mitigation – Driver expectation
3) Base Failures
4) Mitigating Base Failures
5) Identification of cross-slope changes in the shoulder

LESSON LEARNED

1) Plan Scale and Legends – Indicating Pavement Construction:

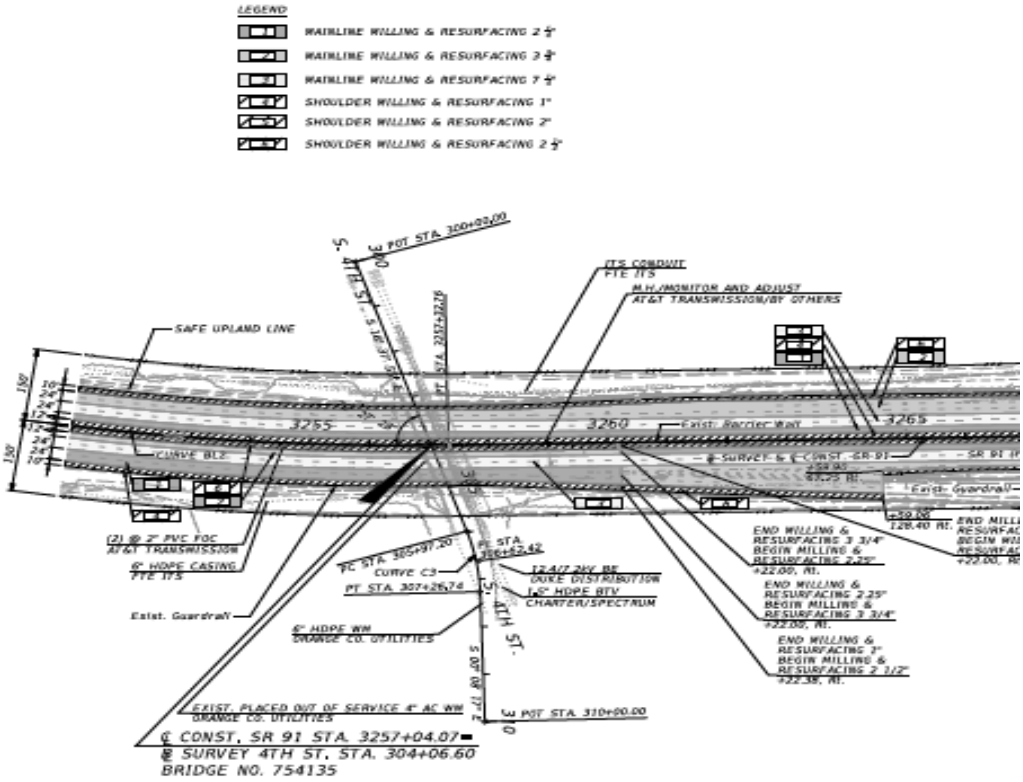
ISSUE SUMMARY: There is substantial information on each page, so when the scale is small, the Plan Views are more difficult to read. The legends are very helpful, but with just the variance of shading it is difficult to determine the limit of each area. The Contractor made various errors in milling and placement which had to be corrected at their cost.

RESOLUTION: The CEI reviewed areas to determine if placement was incorrect due to the Plans or the Contractor's misreading of the Plans and requested the Contractor to make corrections.

COST IMPACT:
Total Cost Impact: $0.00 Not tracked.

TIME IMPACT: 0 DAYS

RECOMMENDATION: Recommend providing a more definitive set of Plans for resurfacing/ reconstruction of the roadway by providing more distinctive legends and delineation of milling and resurfacing areas, especially with the number of varying depths of resurfacing. The Contractor will be more likely to mill and resurface without having to go back and make corrections.



LESSON LEARNED

2) Drop-off Mitigation – Driver Expectation:

ISSUE SUMMARY: The roadway on this project consisted of four lanes in each direction. Without shifting traffic, resurfacing the second lane would have placed workers directly next to the third lane, requiring three lanes to be closed. Due to heavy traffic, a triple-lane closure would have significantly shortened the available time to work. Therefore, at certain points in the project, the original TCP required the lanes to be shifted onto the shoulder to allow the contractor to resurface the second lane, maintain two open lanes, and provide workers with a safe distance between the work and the open lanes of traffic. Unfortunately, the resurfacing of this project required a drop-off between resurfaced lanes and the lanes that had not yet been resurfaced. Prior to shifting traffic, the drop-off was at the lane line; however, once the traffic shift was installed, the drop-off was between the vehicles tires, requiring the drivers to drive with one side of the vehicle at a different elevation than the other side of the vehicle. Although no accidents were attributed to this condition, complaints came in from various travelers on the roadway that the ride was uncomfortable and the condition was perceived to be unsafe.

RESOLUTION: Midway through the project, the traffic shift was changed so the drop-off remained at the lane lines. In some areas, this required a triple-lane closure to perform the resurfacing. In other areas, a triple-lane closure was impractical. In those areas, to allow two lanes to remain open while the middle lane was being resurfaced (as was the goal of the original TCP), additional striping was placed so the lanes on either side of the drop-off were at least 4' apart, creating a buffer between the lanes. When the lane on one side of the drop-off was closed for resurfacing, the lane on the other side of the drop-off could be left open, affording workers at least a 4' buffer from the active traffic. During the day when all the lanes were open, the buffer formed a "no drive" area, which could be crossed for lane changes but better assured drivers that they would not have to straddle the drop-off. *Note: This was implemented as a field change.*

COST IMPACT:
Striping/RPM: Overrun: $16,353.72
Work Order: Hydro-blasting: $23,935.56
Total Cost Impact: $40,289.28

TIME IMPACT: 0 DAYS

RECOMMENDATION: During design, provide traffic shifts, including the use of buffer zones if needed, to assure the drop-offs are contained at the lane lines and provide for smooth transitions when having to travel across the areas with the drop-offs to the next area where work has not been performed.


East Elevation
271°W (T) 28°32'42"N, 81°34'34"W ±16ft 108ft

JBS

LESSON LEARNED

3) Base Failures

ISSUE SUMMARY: Within 24 to 48 hours after completing areas of deep milling into the base, base failures were discovered at three (3) locations.

RESOLUTION: Repaired each location by removing material between 24” and 36” deep, depending on the depth to firm and unyielding material, for the lane width. Type D2 geotextile fabric was then placed followed by 12” to 24” of #57 stone. Finally, 12” of asphalt was placed over the stone.

COST IMPACT:
Work Orders and SA’s: $291,708.90

TIME IMPACT: None. This was due to the contractor mobilizing quickly and the day the failure occurred which did not impact the regular paving schedule; i.e. failure found on a Friday.

RECOMMENDATION: Add into contracts, where deep milling occurs, a means to pay for base repairs; excavation, geotextile fabric, #57 stone (24”), etc. Having items in the contract to account for these events would greatly reduce the cost of a repair based on time and materials.

4) Mitigating Base Failures

ISSUE SUMMARY: Due to having three (3) base failures within six (6) weeks of starting the deep milling, it was determined that the Plans would be revised to help mitigated the base failures for the remainder of the project.

RESOLUTION: Due to heavy daytime traffic, significantly extending the lane closure time to allow for additional cooling was not feasible. Therefore, a mitigation strategy was employed at the areas that were determined to be the greatest areas of concern. That strategy included an additional 4" of material to be removed in the deep mill areas, followed by the placement of geotextile fabric and 4" of # 57 stone. Finally, asphalt was placed in accordance with the Plans. Deep mill areas which were not determined to be the greatest area of concern were not deep milled; therefore, did not get the structural value intended for this reconstruction of the roadway. Also, with the placement of the #57 stone, drainage was provided to assure the stone areas did not hold water. These trench drains were composed of #57 stone placed on top of geotextile fabric from the outside edge of the excavated area to the outside of the shoulder and at specified locations, this included a perforated pipe so flow would be directed into a drainage structure. *Note: There were no additional base failures on the project once this Plan change was implemented utilizing the #57 stone. There were also no other contract changes as to implementing cooling time requirements or restrictions as to when to perform paving operations.*

COST IMPACT:
Revision No. 3 Total: (-$936,460.74)
Reduction of Deep Mill: $2,034,660.17 Savings
Mitigation Implementation: $1,098,199.43 Cost
Trench Drains: $304,471.60
The total contract cost was reduced, since the deep milling was not performed in many locations, but the actual cost to perform the work was significant.

TIME IMPACT: None

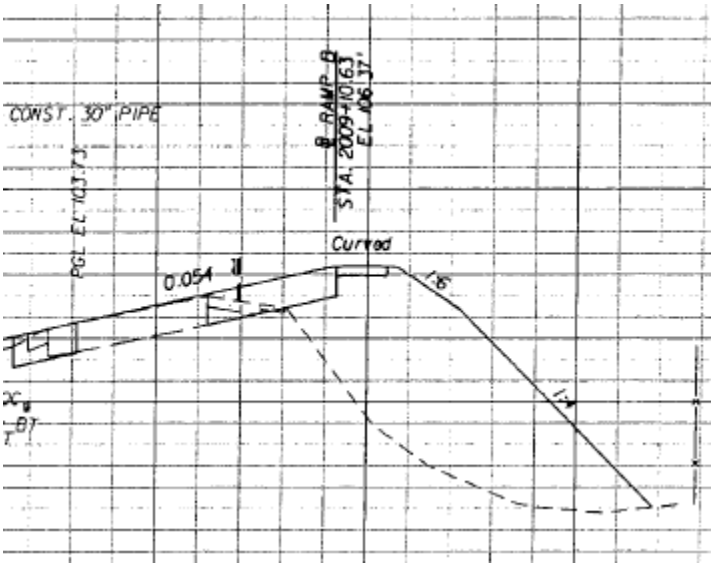
RECOMMENDATION: During design have a discussion regarding mitigation of potential base failures. Some areas within the Turnpike system, mitigation may be achievable by performing 24 hr. lane closures providing necessary cooling times; other areas with high volume traffic, utilizing 4"of #57 stone method may be best. Consideration could be made to avoid paving directly on the base by treating the cracking (ARMI) and placing more asphalt than is removed. It is recommended to include a mitigation plan to implement whether it is to handle base failures that may occur or the prevention thereof.

LESSON LEARNED

5) Identification of cross-slope changes in the shoulder

ISSUE SUMMARY: After resurfacing of the shoulder, water was being retained within the shoulder area, which was not an existing condition. When temporary pavement is being placed to shift traffic on to the shoulder, the existing shoulder slope can get lost especially for when the shoulder needs to break. The contractor continued paving through this section at the same slope as the shoulder coming into where the break needed to occur.

RESOLUTION: The CEI had procured the Final As-built Plans of the previous construction project and found there was break in the existing shoulder. The as-built plans show this as "Curved". (See below). The contractor was directed to mill and resurface the shoulder to match the existing condition.



COST IMPACT: $5,173.09 (Portion of Shared Cost)

TIME IMPACT: None

RECOMMENDATION: Provide Station and grades for existing shoulder breaks in the Plans.