Ohio Corridor Ranking Assessment Tool Development

By Ohio Department of Transportation

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Benefits Statement

The Ohio Department of Transportation (ODOT) is optimizing traffic signal timing using the Ohio Corridor Ranking Application (OCRA) tool to enhance safety, efficiency, and cost-effectiveness. ODOT plans to improve safety by retiming dangerous corridors with the use of Travel Time Reliability, Delay Data, ADT, and the date of the corridor last being re-timed. With a benefit-to-cost ratio of 40:1, this data-driven approach ensures resources are allocated effectively, maximizing the impact of investments. Overall, this initiative promotes safer travel and efficient use of funds, ultimately benefiting all Ohioans.

In this case study you will learn:

1. How ODOT effectively allocated resources by developing the Ohio Corridor Ranking Application (OCRA) to non-subjectively prioritize corridors for retiming based on a variety of performance metrics and crash data.
2. How ODOT improved traffic safety and reduced crashes and delays by focusing on high-need corridors.
3. How ODOT plans to apply the OCRA tool to all traffic signals in Ohio, indicating a significant potential for statewide impact.

Case Study #200

Version Number: 1

NOCoE

BACKGROUND

The Ohio Department of Transportation owns and operates over 1600 traffic signals statewide, with nearly half of them along coordinated signalized corridors. Having well-timed traffic signals is a proven strategy for safer and efficient roadways that lead to benefits to the users in terms of crash reductions, delay savings, fuel savings, and emissions savings.

For ten years, ODOT has been a beneficiary of federal safety funding to study and retime signalized corridors. These corridors are chosen based on annual review of crash data, ODOT District and Local feedback, ADT trends, time elapsed since last retiming, and public feedback. All these approaches have served a positive approach, but they are all segmented and siloed. ODOT has tracked Benefit: Cost ratios of signal timing studies, and it has been a successful program leading to a 10-year average of 40:1 Benefit: Cost ratio, so continuing the success by choosing the right corridors is valuable to the organization.

Like many Agencies, ODOT was looking to gain efficiencies in the use of available resources and leverage data sources that we already have to ensure and prioritize the corridors we select to retime/study signal corridors are those with the greatest need.

The existing manual process of prioritization of corridors for signal retiming is not sustainable at the state level, and a tool was developed using data to non-subjectively prioritize corridor optimization.

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

One of ODOT's TSMO Planning and Strategy initiatives is to integrate our robust Data and Applications functions into consistent and actionable uses across the Agency. With Signal Operations, we wanted to better use the data that we have available to create a tool that directly shows information about what signal corridors need the most attention. After brainstorming with key stakeholders who participate in the Signal Timing and Phasing Program (Statewide Signal Timing & Phasing Program (SSTPP) | Ohio Department of Transportation) ODOT Central Office + 12 ODOT Districts, a scope was developed to blend ODOT data sources, current practices, and desired outcome for a research project to aid in bringing our needs together.

A stepped approach to conquer our needs follows below.

First, ODOT has access to probe data that gives us the ability to historically evaluate performance across our corridors. Specifically, we identified all 130 corridors within the ODOT system and selected those segments across the platform. This first important step allowed these segments to be shared across the Agency, which would allow anyone to keyword search *Signal Corridor* and any corridor could be selected. For the first completed iterations, we pulled all AM (6a-9a), Midday (11a-1p), and PM (3p-7p) peak Corridor Delay and Travel Time Index (TTI) data for Tuesday-Thursday for all of 2022 across 130 corridors.

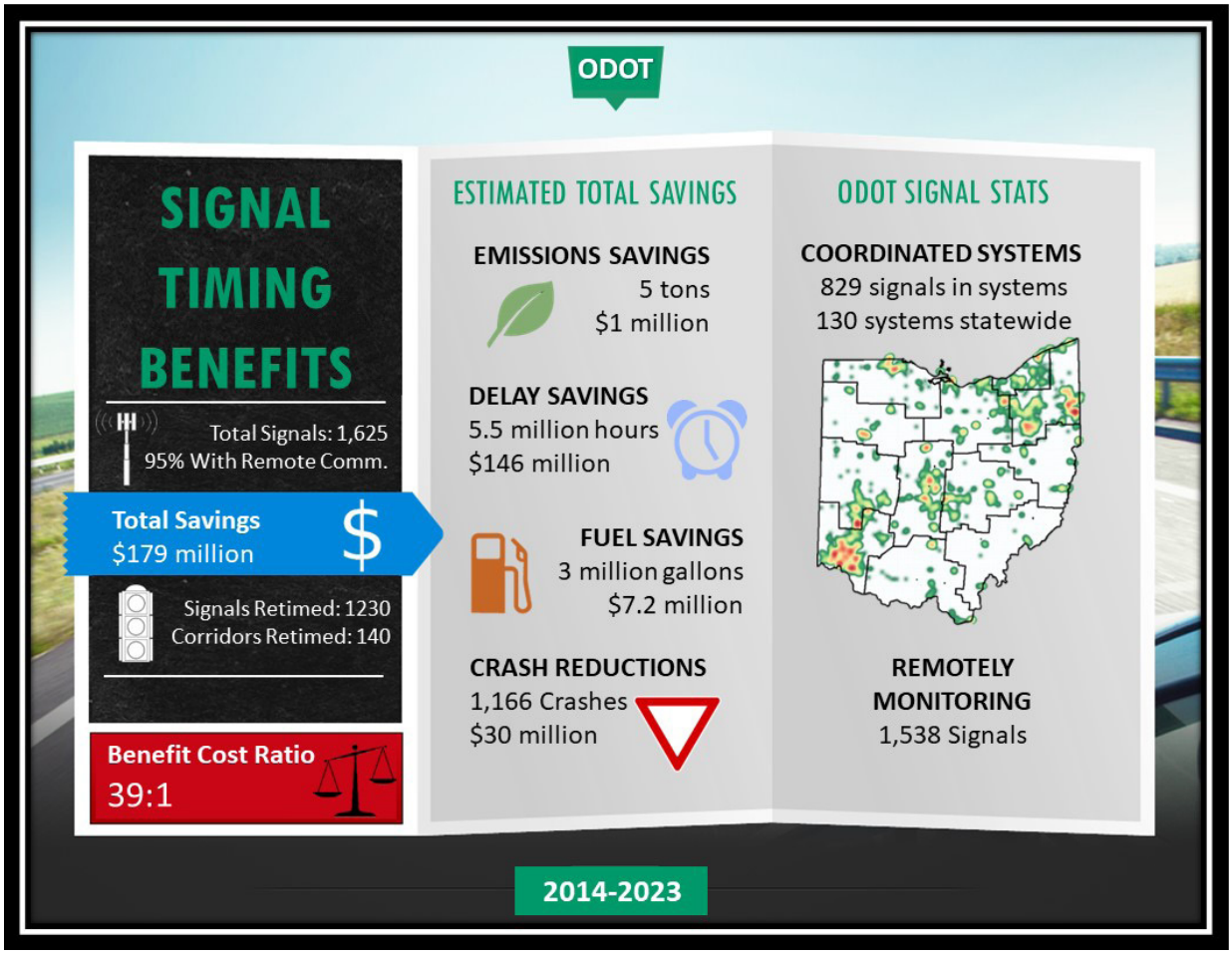
Second, once we had this probe-based data, we wanted to ensure that other data that is not as dynamic but still important was accounted for in our process, which was housed in Agency databases. Those factors were: AADT, Number of Signals on the corridor, length of corridor, and Last Re-timed/evaluated.

Third, ODOT called on its research team to produce a ranking or scoring system based on the metrics noted above, along with the importance of producing it to not be biased or favored to high-volume corridors, as one of ODOT's goals is to ensure that all Ohioans are equally served across the roadway network. The equation to normalize the data and requirements to stand the corridors side by side with each other is displayed below:

[Score] _corridor=D_(max-direction,corridor,AP)*√((Corridor AADT)/1,000)*[MaxNormalizedIQR]_(corridor,AP)*√(T_lr) .

In the end, the corridor score produced for every corridor displayed how it is performing + has it been getting the attention required on an iterative basis per standard national best practices. The greater the score, the more it needs attention to be studied or retimed.

The development of this tool, OCRA (Ohio Corridor Ranking Application), led to direct action taken by ODOT to address top priority corridors for this year's signal timing program, and we are poised to use it moving forward in the years to come.



COMMUNICATIONS PLANNING AND EXECUTION

As ODOT has become more integrated with this tool over the last 6 months, we have shared it across our Agency partners—District Traffic Operations Engineers, Office of Safety, Office of Roadway Engineering, and internally with our TSMO Funding Program to share hotspots for quick remediation or to provide better evidence for a larger capital-based project.

Additionally, ODOT shared the results of the study and tool production with TRB in January 2024 at the Signal Timing Subcommittee, where it was well-received by peers. A proud moment for ODOT was sharing these methods and tools with another State Agency, who has used and crafted their own scorecard for their corridors to enhance their TSMO program.

As the uses of the tool mature, ODOT envisions being able to apply it to all traffic signals in Ohio, not just ODOT's. As a state, Ohio ranks near the top 10% in the nation with over 11,000 traffic signals, so there is a generous opportunity to expand this tool's reach.

OUTCOME, BENEFITS AND LEARNINGS

After the first iteration of the ODOT scorecard, 24 of the 30 top ranked corridors needing attention already had or have begun direct action in the first year in terms of: capital project already under construction or currently under study for retiming or minor tweaking. Additionally, a huge validation point was made when capital improvement projects were already underway to address high scoring/low ranking corridors. The #1 worst corridor in ODOT's arterial system—by far score-wise—was so unreliable that it was under construction to build a grade separated interchange. This case example, along with many others, validated the OCRA tool and what was envisioned.

Moving forward, we believe the OCRA tool can be run confidently throughout the year to identify trouble locations to address quickly, to identify long-term strategies for technology enhancements, and to expand beyond ODOT arterials and boundaries to identify additional Local corridors that would benefit signal timing improvements.

The TSMO solution developed allows ODOT to focus resources where most needed to ensure safer and more efficient travel for all modes across our corridors using data and technology that is available to us. With this strategy, the roadway footprint is not expanded, and optimization happens along our arterials creating signal timing benefits desired, which equals a huge win for ODOT.