AP4 Case Studies

AP4.1 Communication, Coordination & Alternate Construction Method

The Mill Creek Bridge Project, on US 26 in Wasco County, addressed a bridge deck failure on a historic steel truss structure. The project, located on the Warm Springs Indian Reservation, was surrounded by sensitive archaeological sites, cultural sites, and endangered species. The only detour route available to trucks would take them a great distance off their route causing extensive delays. The project was on a primary freight route carrying 5,000 vehicles per day, including a significant truck percentage (15%).

The project team engaged the Mobility Services Team early and identified impacts on freight mobility and the need to involve industry. The Mobility Services Team communicated with stakeholders and invited key industry representatives to meet with the project team.

The result was an alternate construction method that had been successfully used in other states to accelerate the work. By analyzing the shipping schedules for freight along this route, along with the traffic patterns for regular vehicles, a closure schedule was agreed upon which minimized impacts to the freight industry and the traveling public. The roadway closed for four days each week starting on Sunday night. Sections of the deck were replaced with new pre-cast sections, and the route was reopened to traffic each Friday morning without restrictions. The Mobility Services Team and the industry representatives communicated the restrictions to industry stakeholders so they could schedule their trips to coincide with the route's open times.

AP4.2 Maintaining Vertical Clearance

The Lancaster Drive Bridge portion of the OR22: North Santiam Highway Bridge Repairs Project addressed a failing concrete structure that crossed over a high-volume roadway. This route already had a vertical height restriction in place.

To strengthen and repair the structure, steel plates on the top of the deck would be bolted to other plates on the bottom of the deck to provide additional support. Unfortunately, the existing vertical clearance of the structure was already only 15' 3". By bolting steel plating to the bottom, the vertical clearance would be reduced by an additional 2" – 2½".

To determine the impacts of further reducing the vertical clearance on this structure, the Mobility Services Team and freight industry stakeholders were contacted. Due to the severity of the impacts to freight mobility along this freight route, additional options to reinforce the bridge without reducing the vertical clearance were researched. The bridge designer found a way to provide the needed structural reinforcement without reducing the portal height. The needed repairs were made without restricting freight mobility.

AP4.3 Minimizing Weight Restriction Impacts

The Cordon Road Bridge on the North Santiam Highway in Marion County had a failing concrete structure that crossed over a high-volume roadway. This route is the primary freight detour route when closures on I-5 in the Salem area are needed. The route is also the only available detour for mobile home traffic that exceeds 16’ 2”.

To strengthen and repair the structure, it was determined that crack sealing and epoxy dowelling were needed to provide structural reinforcement. Considering the weakness of the bridge, drilling holes into the existing supports to install the dowels weakened the bridge enough that it needed to be weight restricted during construction.

As soon as it was determined the weight restrictions would be necessary, ODOT Policy PMT 06-01 went into effect. The Mobility Services Team, key ODOT staff, and freight industry stakeholders were contacted to establish a plan and a suitable detour route. The duration of the weight limitations was limited to times with the least impacts to traffic. Weight restrictions and closures were planned to provide windows for the over-height vehicles to cross at times that the bridge was not restricted. Using input from all parties involved, the project team set up a detour and staging plan that reduced delays and minimized impacts to mobility.

AP4.4 Minimizing Horizontal Clearance Impacts

The Siuslaw River Bridge Project along the Oregon Coast Highway addressed a failing metal grid deck on an old double bascule draw span. Built in 1936, the bridge only provided 27 feet of usable roadway width. This structure is the only crossing of the river for many miles and carries around 12,200 vehicles per day, including many trucks and recreational vehicles.

Due to the high traffic volumes and the importance of keeping the route open, the project team decided that staged construction would work better than a full closure with detour. The length and nature of the structure made it impractical to build a detour structure or widen the existing structure during construction. To stage the deck replacement, this project would need to further restrict a bridge that was already very narrow.

To determine impacts of reducing the horizontal clearance, the Mobility Services Team and freight industry stakeholders were contacted, and research was done to develop options.

Since impacts could not be avoided, efforts were made to accelerate construction and minimize the duration of the impacts. Specific construction timeframes were identified, and aggressive construction windows were set. A few days were also provided between stages for full, unrestricted traffic and freight flow. Communication protocols were established, so that industry stakeholders could prepare for these openings and maximize each day the bridge was unrestricted. Through effective communication and planning, the impacts to freight mobility were minimized.

AP4.5 Minimizing Detour Impacts

The Chehalem Creek Bridge Project, along OR 240 in Yamhill County, addressed a failing timber structure surrounded by wetlands, endangered fish habitat, and a FEMA flood plain. The route carried 7,000 vehicles per day, including a significant truck percentage (8.2%). Due to the excessive environmental impacts and costs associated with a temporary bridge or staging scenario, the option for an off-site detour was selected.

Initially, a 1/2-mile detour was identified using county roads. This route worked well for passenger cars but would not accommodate freight. One of the bridges along the route was weight restricted and the turning radii at the intersections were too sharp for trucks.

By working with the Mobility Services Team and the freight industry, the project team identified a longer detour route that had previously been utilized as an emergency truck detour. Although this route was four times longer, the actual out-of-distance travel was the same.

Since the delay time was considered a significant impact to the trucking industry, modifications to the detour were implemented to reduce the delay time. The modifications included radii improvements to three intersections, eliminating a four way stop along the route, changing through and stop movements at several intersections, and improving the sight distance along the route. The project team was able to provide free-flow conditions along the route, avoiding back-ups and minimizing delay.

Construction was completed in about a quarter of the time that would have been needed to stage the construction. Overall cost was also reduced without impacting the sensitive environmental concerns. The infrastructure of the local road system was enhanced, freight and other traffic experienced minimal delays and the work zone was much safer by removing active traffic from the construction site.

AP4.6 Minimizing Staging/Detour Impacts

The Lake Creek Bridge Project, along US 20 in Jefferson County addressed a failing concrete structure on a freight route surrounded by sensitive wetlands, endangered fish habitat, and archaeological sites. This route carried 5,500 vehicles per day with severe weekend fluctuations and had a very high truck percentage (23%). To further complicate the situation, the project was located at the bottom of a steep grade.

To minimize impacts, the team considered a single lane detour controlled by a temporary traffic signal or flaggers. It was noted, however, that significant queuing and delays would result from stopping trucks at the bottom of the grade. With a high percentage of truck traffic along this route, queues would backup for miles into sharp corners. Attempting to stop heavily loaded trucks going down the grade created another dangerous concern.

Considering the needs of the freight industry, the project team selected a second option that utilized a two-lane detour, allowing for safe passage of all traffic without excessive queuing. The reversing curves in the detour alignment were modified to permit truck traffic to travel through the construction zone at only a slightly reduced speed. This option did not force freight traffic to stop at the bottom of the steep grade before going up, or stop traffic while going down the grade, significantly reducing delay time. With the two-lane detour, over-dimensional loads did not need to be restricted from the route during construction, and traffic was able to travel this route with minimal delays.

AP4.7 Alternative Construction Methods/Materials

The Mill Creek Bridge Project, along US 26 in Wasco County, addressed a bridge deck failure on an historic steel truss structure which is one of the highest bridges in Oregon. The bridge is located on the Warm Springs Indian Reservation and is surrounded by sensitive archaeological and cultural sites and endangered species. It is a primary freight route that carries 5,000 vehicles per day, with a significant truck percentage (15%). Initially, three options were considered:

1. Close the road and detour all traffic until the bridge is completed.
2. Build a single-lane detour bridge and alternate traffic along it.
3. Re-align the highway and build a parallel structure.

ODOT could not re-align the highway due to the excessive cost and environmental impacts. A single lane detour bridge could not be used due to adverse roadway geometry and safety concerns with traffic backing up into sharp curves. The roadway also could not be closed during construction as there were no suitable detour routes, and the impacts to freight and the public would be extreme ($265K to $316K per day).

By meeting with the Mobility Services Team and representatives from the freight industry, the project team identified alternative materials and methods successfully used in other states. The team decided to use a new process (exodermic deck replacement) used in New York and Illinois that required only short-term closures. The process enabled them to replace small sections of the bridge with precast modular joint panels which fit together like a large jigsaw puzzle. The roadway was closed four days each week starting on Sunday night, as sections of the deck were cut out and replaced with new precast ones. The route was reopened to traffic each Friday morning without restrictions. The contractor worked 24 hours a day during the closures and the deck was replaced in four weeks.

By working closely with the Mobility Services Team and freight stakeholders, it was determined when the route should be opened and closed, so truckers could plan their trips. Since the closures occurred on a set schedule, fewer vehicles were required to use the extensive detours. With the exodermic deck replacement process, the project did not have any impacts on the sensitive cultural, archaeological, or environmental sites adjacent to the bridge. By coordinating the closures with the traffic flows, the deck was successfully replaced with minimal impacts to traffic and freight mobility and greater safety to the contractor and the traveling public.